First Shot Fundamentals

Revised March 2013

1. **M.A.T** - Three Fundamental Rules of Gun Safety
    a. **Muzzle Always Pointed in Safe Direction**
    b. **Action Always Open, Empty and Exposed to View Until Ready to Shoot**
    c. **Always Keep you Finger off the Trigger Until Ready to Shoot**

2. Shotgun Nomenclature and Safe Gun Handling Rules
    a. Barrel
        i. Muzzle – Front of the barrel

ALWAYS KEEP THE MUZZLE POINTED IN A SAFE DIRECTION

(Discuss safe direction)

    b. Action - The parts that load, fire and unload the gun

ALWAYS KEEP THE ACTION OPEN AND UNLOADED

UNTIL YOU ARE READY TO SHOOT

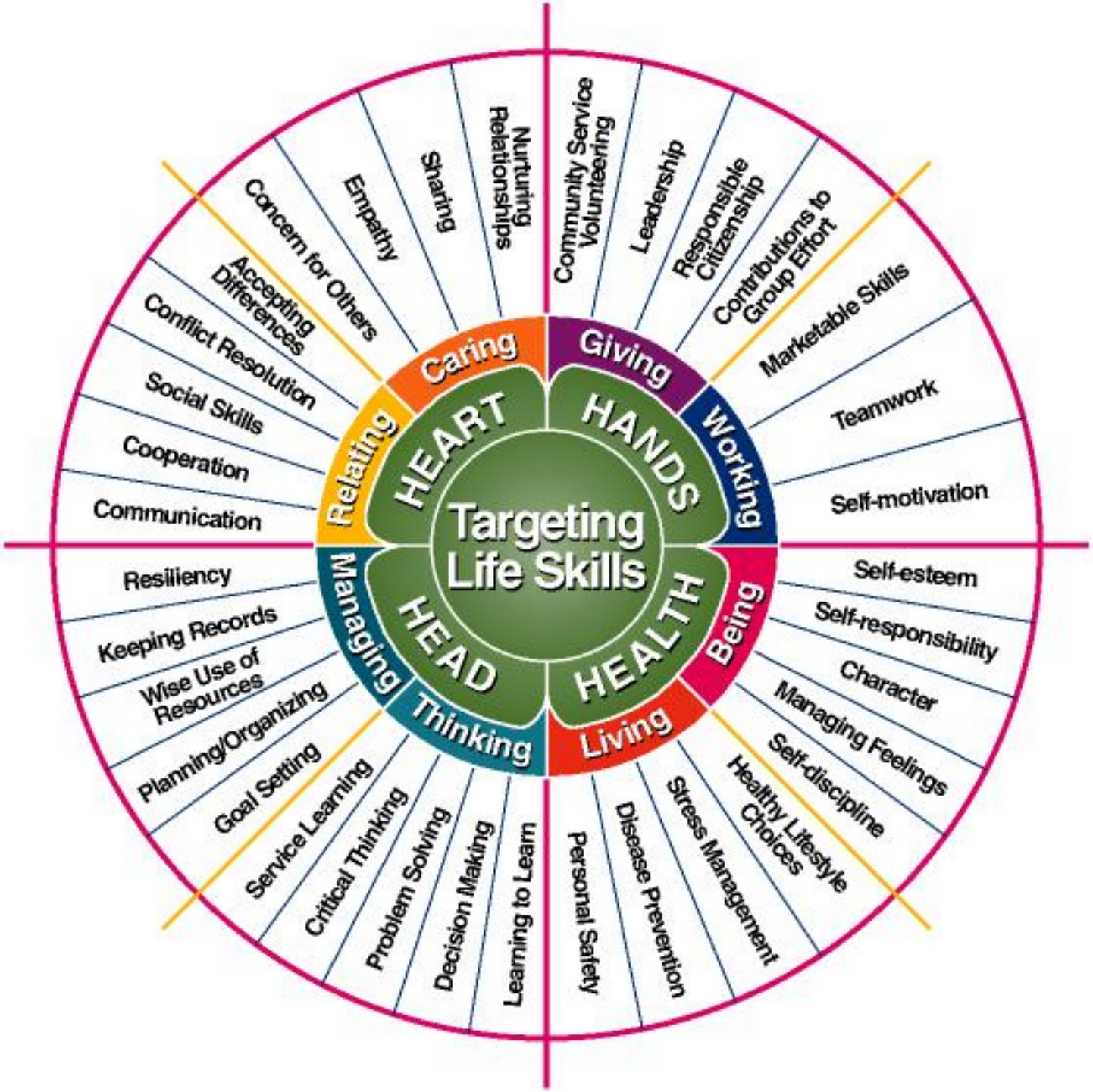
    c. Trigger – Part of the action that releases the firing mechanism

ALWAYS KEEP YOUR FINGER OFF THE TRIGGER

UNTIL YOU ARE READY TO SHOOT

    d. Stock and forearm – the parts of the gun that you grip.
        i. Explain how you grip the gun to shoot and to carry in a safe manner (muzzle up with two hand grip)
3. EYES AND EARS – Safety glasses and ear protection **always required** in front of the safety line.
4. Eye Dominance
    a. Check eye dominance
    b. Explain why it is important
5. Six Shotgun Shooting Fundamentals
    a. Stance – explain boxer stance and foot placement
    b. Gun-Ready Position
    c. Mount the Gun
    d. Swing to the Target
    e. Trigger Pull
    f. Follow Through
6. Orientation to range, traps and targets

7. Range Commands
    a. Range is Hot/Live and Ready to Fire – No guns should be handled until the range has been declared Hot or Live Fire.
    b. Cease Fire - <u>Immediately stop firing and make the line and guns safe!</u>
        i. <u>Anyone can call a cease fire</u>
        ii. All shotguns should be made safe (pointed in safe direction, actions opened, all ammunition removed and pointed straight up with action open and exposed to view).
        iii. All trap operators should make sure no target is thrown
        iv. Once the problem is fixed, the range officer will declare the range open and shooting may resume.
    c. Squib Loads and Misfires
        i. Misfires and Malfunctions – Instructor should take the gun and keep the gun pointed downrange for at least two minutes before opening the action.
        ii. Squib Loads – Check barrel for obstructions before firing another round
8. Firing the First Shots
    a. Passing of the Gun
        i. Explain and show process of passing the gun from instructor to student and back.
        ii. Two hand grip
        iii. “Thank you” and “Your Welcome”
9. Shotgun Shooting Step by Step
    a. Watching Targets
    b. Finger Point
    c. Finger Point and Bang
    d. Dry Point with the Shotgun
    e. Dry Fire
    f. Ball and Dummy
10. Debrief and Review



Iowa State 4-H Youth Development – Targeting Life Skills Model
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Using the Shotgun Lesson Plans

James V. Peter, Jr.*

Shotgun shooting is exciting to many young people. Proper preparation, organization and orientation are the keys to successful shotgun instruction. Since youth development is the foundation of the program, the instructor must keep the young people in mind at all times. Safety is always a primary consideration. The instructor must maintain the highest standards of safety at all times for participants, other instructors and all assistants. The methods used here introduce the fundamentals of firing a shotgun, some of the informal games that can be used to increase shotgun shooting skill and the fundamentals of the formal target games with shotguns.

Shotgun instructors should consider carefully the following points when planning or delivering their courses.

1. Consider the age and size of the participants carefully. One of the most important features of shotgun instruction is the ability of the shooter to handle the physical mass and size of the shotgun. Recoil is seldom a consideration if the shotgun is properly sized to fit the shooter. Oversized shotguns predispose the shooter to being hurt by recoil by requiring that the body be bent backward to compensate for the difficulty in holding the gun at the ready position. See Fact Sheet 9 for more information on gun selection.
2. In a basic course, many instructors prefer using a matched set of shotguns. This reduces the level of expense for the shooters while minimizing the number of elements instructors must introduce and watch. Instruction is easier, more consistent and safer when the only variable is shotgun size, function type, safety location, action release, and similar features should be uniform if possible. As students progress, they should obtain and use their own shotguns. All shotguns used should be checked by a qualified person to ensure their safe condition.
3. Maintain control over all live ammunition during the basic instruction phase of the program. As the shooters gain skill, the ammunition may be handled by the "coach" of the coach-pupil pair. Finally, each shooter may take the responsibility for their

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own ammunition. In the beginning, the ammunition should be provided by the sponsoring group, either at cost or through donation. This assures proper loadings and gauges. As the students become more proficient, they can purchase the needed ammunition for each shooting session.

4. Enforce using effective eye and ear protection for all shooters and others on or near the firing line. Inexpensive shooting or safety glasses can be purchased at many gun shops, sporting goods departments, mail-order houses or industrial supply stores. Shooting glasses intended specifically for young people and small women are available. Ear plugs or ear muffs are readily available from the same sources. Instructors may feel more comfortable using electronic ear muffs so they can hear what is happening on the line more clearly without risking hearing damage.

5. Purchase clay targets from local sporting goods outlets or a gun club. You will need approximately 25 targets per shooter plus approximately 75 more for demonstrations and non-shooting use. If the ground is soft, some of these targets may be recovered and used again. Note that the terms "clay birds" or "clay pigeons" are objectionable to some people because they suggest the young people are learning to hunt. This is a shotgun marksmanship course. To hunt or not to hunt is a personal choice.

6. Any safe shooting area with a minimum shot fall zone of 300 to 400 yards is adequate for teaching basic shotgun marksmanship. Use shot sizes no larger than #7½. Spring powered manual traps are excellent for throwing a fairly slow, consistent target. Many instructors prefer the seat-mounted type because it elevates the trap operator to the shooter's level and enhances safety. The sun should be behind the shooters. Existing trap or skeet shooting facilities meet all necessary conditions and are an excellent instructional facilities. They are not necessary. If a trap field is used, the trap should be adjusted to throw only straightaway targets at a reduced speed. Shooters should stand immediately behind the trap house. If a skeet field is used, instruction should take place from station 7.

This program is designed to teach the fundamentals of safe and successful shotgun shooting. Shotgun knowledge, the basics of shotgun safety and proper shotgun shooting form are taught before introducing formal shotgun games. Avoid the temptation to jump directly into the shotgun games. Trap, skeet and sporting clays are best taught after the fundamentals are established. The shotgun program outlined below includes two major sections, fundamentals and shotgun games. An introduction and several activity or fact sheets are also included. Review these materials carefully before starting an instructional program.

Using the Basic Shotgun Lessons

Basic Shotgun Lesson 1: Safe Shotgun Handling
Basic Shotgun Lesson 2: Shotgun Shooting Fundamentals
Basic Shotgun Lesson 3: Firing the First Shots
Basic Shotgun Lesson 4: Basic Shotgun Knowledge
Basic Shotgun Lesson5: The Next Steps
Basic Shotgun Lesson 6: Caring for Your Shotgun

Fact Sheets

Fact Sheet 3: Determining Eye Dominance
Fact Sheet 4: Non-threatening Hands-on Instruction
Fact Sheet 9: Shotgun and Ammunition Selection
Fact Sheet 11: Practicing Your Shotgun Skills
Fact Sheet 12: Clover Clays
Gun Fit Fact Sheet
Fact Sheet 13: Detecting and Correcting Shotgun Shooting Errors
Fact Sheet 14: Range Setup and Operation from Shotgun Instruction
Fact Sheet 15: Shotgun Shooting from the Gun-Ready and High-Gun Positions

Methods of Learning

Known to Unknown

Simple to Complex

Break Complex into Component Parts

People Learn at Different Rates

Safe Shotgun Handling

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Objectives

Participating youth and adults will:

1. Understand and practice safe shotgun handling practices.
2. Practice checking various types of shotguns to see if they are loaded.
3. Demonstrate safe shotgun handling practices and procedures.
4. Have fun while learning.

Roles for Teen and Junior Leaders

- Demonstrate proper shotgun handling procedures.
- Review main points of the lesson in small groups.
- Tutor or quiz participants on the lesson content.
- Teach portions of the lesson.
- Assist shooters in practice sessions.

Parental Involvement

- See Roles for Teen and Junior Leaders above.
- Supply materials or equipment needed to teach the lesson.
- Arrange for or provide transportation.
- Arrange for or provide refreshments.
- Act as an assistant instructor, backing up teen leaders and instructing part of the lesson.

Best Time to Teach
Any time of year, but before any shotgun handling on the range

Best Location
Indoor or outdoor classroom

Time Required
1 hour

Materials/Equipment
- chalkboard or newsprint with markers
- shotguns of various action types
- dummy action testing ammunition
- NRA shotgun instructional charts (optional)

References
The Basics of Shotgun Shooting. H.W. Sheets, National Rifle Association, Washington, DC. 1985

National Rifle Association Basic Shotgun Shooting Course, National Rifle Association, Washington, DC.

State, NRA or Outdoor Empire Hunter Education Manuals. Contact your state hunter education coordinator

Basic Shotgun Shooting: A Better Way. Video. Contact your state 4-H Shooting Sports Coordinator or Federal Cartridge, Anoka, MN.

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Teaching Outline

Presentation	Application
I. Responsibilities for shooting safety	POINT OUT that shooting is a safe sport because those who participate keep it that way. NOTE responsibility touches everyone on range.
A. Safety is no accident	EMPHASIZE teaching environment and support for teaching.
1. Personal responsibility of all people on the range	DISCUSS range behavior.
▪ range officer	
▪ coach or instructor	
▪ shooter	
▪ spectators	
2. Shooter the key	
B. Instilling basics of safe firearms handling and shooting	REVIEW main objective of this session.
1. Shotgun as a tool	DEMONSTRATE the power of a shotgun if adequate range is available.
▪ recreation	
▪ potentially deadly	
2. Need for constant attention	
▪ on firing line	DISCUSS attentiveness as key to safety
▪ off firing line	
▪ respect and responsibility	
II. Shooter responsibilities for safe shotgun handling	DISCUSS fact that shooting safety is a full-time requirement for every shooter.
A. Full-time responsibility	
B. Knowledge necessary	
1. How shotgun operates	Using action-proving dummy rounds, DEMONSTRATE how to open shotguns being used to determine their status. LOAD and UNLOAD to show how that is done.
▪ checking status of gun	
▪ making a shotgun safe	
▪ loading and unloading	
▪ operating the action	
▪ firing	
2. Need for muzzle control	
C. Mental and physical skills	
1. Self-control	ASK – what is the most important element in shooting safety? Work for an answer involving shooter attitudes. BUILD on the ATTITUDES to SKILLS.
2. Muzzle control	
▪ conscious responsibility	
▪ physical skills	
▪ vital importance	
3. Other shotgun handling skills	
D. Developing safety conscious habits	
1. Attitude	ASK – who is responsible for shooting safety? Extract an answer that emphasized taking safety as a PERSONAL COMMITMENT.
▪ Primary importance of safety	

- taking safety personally
- not permitting "accidents"

2. Rules not enough
   - applying and practicing the rules
   - nothing taken for granted

III. Basic rules of safe gun handling

DISCUSS foundations of firearms safety and sources of rules of safe firearms handling and use.

A. Rules come from responsibilities
   1. Self-control
   2. Muzzle control
   3. Personal responsibility
   4. Trigger control

DISCUSS and demonstrate importance of these three basic rules.

B. Three fundamental rules of safety with firearms
   1. Pointed in a safe direction
      - Muzzle always under control
      - Never pointed at anything you do not intend to shoot
      - Common sense and "safe" directions

ROLE PLAY several scenes to stimulate discussion of what a "safe direction" is. Use a BARREL ONLY to demonstrate size of hole in muzzle.

   2. Open, empty and exposed to view
      - Closed action equals "ready to fire"
      - Loaded unless personally verified as empty
        - chamber
        - magazine
      - action open except when firing
        - safety courtesy
      - exposed to view fore easy checking by instructors

STRESS that a closed action means ready to fire to any shooter. USE a shotshell loaded with a PRIMER ONLY to reinforce this point. POINT OUT that assuming a gun is empty can be fatal.

ROLE PLAY a group of shooters who do not open their guns and another group of shooters who do. ASK – how did you feel about these scenes? Which group would you shoot with?

   3. Finger off the trigger
      - Outside the trigger guard
        - protects trigger
        - keeps finger off trigger
      - on only when firing

DEMONSTRATE proper trigger finger location on trigger guard. DISCUSS why that location is important.

C. Golden rule of shooting safety
   1. Treat every firearm with the respect as if loaded
   2. Practice proper and safe handling

ASK shooters why this rule might be called the golden rule of shooting safety.
POINT OUT that following it and other simple rules could eliminate almost all shooting accidents.

3. Refuse to associate with those who will not do so

IV. Shotgun handling protocols

A. Picking up a shotgun

1. Pointed in a safe direction
2. Firm, secure grip
   - one hand on forearm
   - one hand on grip
3. Never by the muzzle or barrel

DEMONSTRATE proper way to pick up a shotgun. Have shooters break into small groups and PRACTICE picking up a shotgun with aid of an assistant or teen leader.

B. Passing a shotgun between people

1. Practice open and empty rule
2. During instruction
   - always in a safe direction
   - closed action part of teaching method
   - extra caution required
   - instructor
     - one hand on forearm
     - other hand on receiver
     - fingers cupped over the tripper guard
   - shooter
     - one hand grasps forearm
     - other grasps grip
     - “thank you” to signal control over the shogun
     - “you’re welcome” signals instructor’s release of control
   - security and courtesy

DEMONSTRATE and have each shooter PRACTICE passing shotguns between persons using the protocols described here. BE ABSOLUTELY SURE NO LIVE AMMUNITION IS PRESENT! Use same small groups with assistants or teen leaders.

DISCUSS each element and how it relates to shooting safety.

V. Elements of safe shooting

A. Knowing how gun operates

1. What the gun can do
2. Limitations of the gun
3. Operations
   - Opening and closing action
   - Safety operation
   - Coping with minor malfunctions
4. Safe shooting technique

DEMONSTRATE various action types once more, showing how all these operations are carried out. CAUTION shooters to keep shotgun pointed down range any time a malfunction occurs.

B. Compatible arm and ammunition

DEMONSTRATE effect of chamber length by dropping a dummy 3-inch shell in a 2¾- inch chamber. Now PLACE a fired 3-inch round in the chamber. NOTE that the length that must be forced into the chamber constricts the barrel and creates a dangerous situation.

1. Arm and ammo of same gauge
2. Length of case equal to or less than chamber length

STRESS using proper length shell (or SHORTER ones) in any shotgun chamber.

C. Carry only one gauge of ammunition

1. Mixing gauges is dangerous
2. *Potentially lethal mixes*
   - 16 gauge in 10 gauge
   - 20 gauge in 12 gauge
   - 28 gauge in 20 gauge

DEMONSTRATE the potential for disaster using any of gauge combinations listed. If available SHOW the results on a blown barrel. STRESS that this is important on range and in field.

D. Be sure of the target and what lies beyond it

1. Identify target and safe shot fall zone *before* firing
2. Range proportional to shot size
   - target loads
     - shot #7½ or smaller
     - range up to about 275 meters or 300 yards
   - buckshot up to nearly 600 meters or over 600 yards
   - hunting shot sizes between these extremes

SHOW selected shot sizes and discuss how their size and weight affect their range.
Have several assistants DEMONSTRATE range of various shot sizes if a large open area is available.

E. Eye and ear protection is vital

1. Protecting vision
   - potential eye injury
     - pellets
     - target chips
     - gases and powder residue
     - other foreign bodies
   - shooting glasses for protection
     - corrective lenses
     - tinted lenses
   - needed in all types of shooting

SHOW several types and colors of shooting glasses. If time and glasses are available, allow shooters to try different styles and colors.

NOTE that prescription lenses can be ground from materials used in most shooting glasses.

2. Hearing protection
   - cumulative and gradual loss
   - all powder firearms produce harmful sound levels
   - target shooting worse than hunting

- protection shows wisdom
  - -plugs
  - -muffs
  - -combination of both
  - -electronic muffs
- use them-ears will repay with better hearing

DEMONSTRATE the use of ear plugs and muffs. PASS OUT foam ear plugs and HELP each shooter insert them properly.

STRESS gradual but permanent nature of hearing loss.

F. No alcohol or other drugs

STRESS importance of complete attention and impact of these drugs on concentration.

1. Impact of alcohol or other Depressants
   - poor concentration
   - reduced judgment
   - feeling of heightened skill
   - or awareness
2. Not just illegal drugs
3. Prescription or over-the Counter drugs
   - cold tablets
   - cough suppressants
   - anti-histamines
   - some pain relievers
   - if drowsiness occurs, do not shoot

POINT OUT that many prescriptions or over-the-counter drugs may affect judgment and attention. STRESS importance of knowing whether a drug causes drowsiness or other problems before taking it.
ASK shooters who may be taking medication to inform instructor so arrangements can be made for them to shoot under controlled conditions.

G. Any special precautions
   1. Local conditions may require More restriction
   2. Range officer in charge

ANNOUNCE any local restrictions and point out the need to be flexible.

VI. Personal responsibility and safety

A. Safety lapses can occur with any shooter
   1. Inexperienced beginners
   2. Experienced shooters

ASK shooters what they would do if a person shooting with them did not follow safe shooting procedures. STRESS that they should call the fault to the attention of the other person AND refuse to shoot with them if they are unwilling to shoot safely.

B. Keep a safety focus and point out safety violations
   1. Avoid habitually unsafe shooters
   2. Take personal responsibility for yourself and others

NOTE personal responsibility to keep shooting safe.

C. Shooting safer than tennis-keep it that way!

VII. SUMMARY

A. Fundamentals of firearm safety
B. Personal knowledge, skills and attitudes the key

USE quiz game or other means to review content of this lesson and previous one.

C. Shotgun handling and procedure for passing guns between people on the range.
D. Rules and considerations for safe shooting.
E. Next session starts range work.

REMIND the shooters that eye and ear protection will be needed for the next session.

Lesson 1 Narrative- Safe Shotgun Handling

Shooting safety does not just happen. It is the responsibility of every person on the range - the range officer, coaches and instructors, shooters and spectators. Ultimately the shooter is responsible for his or her actions, own personal safety and the safety of every other person around. That is serious. The objective of this session is to instill the fundamentals of safe firearms handling and range behavior. We will use a combination of methods, including hands-on practice, to accomplish this.

A shotgun is a tool, like a power saw or a lawnmower. When used properly, a shotgun can hit moving targets the way it was designed to do. But when improperly used, it can kill or injure the shooter or anyone nearby. A shotgun poses no danger if the shooter exercises responsibility and common sense. Shooting safety demands constant attention, understanding and personal responsibility.

Even behavior off the firing line influences those who are on the line at the time. This time also gives the shooter a chance to observe and learn from watching other shooters, as well as listen to advice of coaches and rehearse the behaviors needed for solid shotgun shooting. Participants not on the firing line are expected to act in a responsible manner. Disruptive behavior cannot and will not be tolerated. Not only does it make learning difficult for those on the line, but it also creates a potential hazard for all persons on the range. The instructor or range officer is the ultimate authority on the range, and that includes the spectator or observation area. Show respect for the other shooters and obey all instructions or commands from range officials.

Shotgun Handling Safety

To handle a shotgun, or any firearm safely, the shooter must be completely-100 percent sure of their gun's status at all times. Firearms do not think. The shooter has mental control over it.

To handle a shotgun safely, shooters must know how the parts of the gun operate. They must understand the necessity for muzzle control. They must be able to determine a shotgun's status and know how to make it safe. They must know how to load or unload it safely, and how to fire it and operate the action. These simple things must be learned and practiced.

Both mental and physical skills must be developed by safe and responsible shooters. Self-control is one of the most important elements of safety. It may seem to be an attitude, but it is a learned skill. Muzzle control is similar. It involves both a conscious awareness and an attitude of responsibility, as well as the physical skills to handle the shotgun with control and muzzle awareness. Muzzle control makes the difference when a handling mistake or a malfunction causes a shotgun to discharge unexpectedly. The result is determined entirely by the muzzle control of the shooter. The other mechanics of shotgun handling must become instilled to the shooter can perform them while consciously focusing on safety.

Developing safety conscious habits of shotgun handling takes effort and reinforcement. It is a matter of attitude. You must consider safe gun handling so important that no one ever needs to worry about your shotgun. Safety is your job so never permit a potential accident to occur. Exercise complete control over your shotgun at all times. Knowing the rules is not enough. They must be practiced constantly without lapses. Even when safety becomes second nature, the shooters must make a conscious effort to keep their shooting safe.

Basic Rules for Safe Gun Handling

Shooting organizations promote a set of rules for safe firearms handling, often called, 'The 10 Commandments of Shooting Safety'. In their most basic form, they include self-control, muzzle control, personal assurance of a "safe" firearm and trigger control. All the others are based on these basic rules.

Always keep the muzzle pointed in a safe direction. Whether shooting, hunting or just handling a firearm, the muzzle must always be kept under control. It should *never* be pointed at another human being, nor at anything you are not willing to shoot, destroy or kill. Your location and common sense will tell you which direction is safest under various conditions. It is usually safest to point the muzzle of a shotgun down range (into a safe shot-fa1l zone) or straight up.

Keep the shotgun empty with the action open and exposed to view except when preparing to shoot. Any firearm with its action closed should be considered loaded and ready to fire. The first act after picking up a firearm is to point the firearm in a safe direction then open the action and verify personally that the gun is unloaded in both the chamber(s) and the magazine. Be sure beyond all shadow of doubt. In order to keep the shooting range safe, all shotguns are to have their actions open and exposed to view at all times except while actually firing. Except in the ball and dummy instruction activities, guns with closed actions should never be passed between people. Practice opening the action before passing any firearm to another person and insist that others do the same. Your life and that of other people is at stake

Keep your finger off the trigger until you are in the act of shooting. It is very tempting to place your finger on the trigger when handling a gun. This bad habit can be prevented by consciously avoiding it when you start handling firearms. The trigger guard is there to protect the trigger and to help prevent accidental discharges. The finger should be placed along the side of the trigger guard to reinforce this function. Placing your finger on the trigger of a firearm means the firing sequence has started. A sudden bump or startling noise could cause you to move discharging that shotgun without intending to do so. Be safe stay clear of the trigger until you are ready to fire.

Treat every firearm as if it were loaded. This applies even to those you have personally checked to be sure they are unloaded.

The golden rule of firearms safety is to **treat every firearm as if it were loaded. This applies even to those you have personally checked to be sure they are unloaded.** Shooting safety means that you must pay attention to detail and show the responsibility needed with loaded firearms at all times. By handling unloaded guns with the same respect as a loaded one, you will establish good gun handling habits and will never have to say, "I thought the gun was unloaded." If other shooters refuse to follow these guidelines, refuse to associate with them in any firearms handling situation. They are unsafe and pose a danger to both themselves and to you.

Shotgun Handling Procedures

Many circumstances require a firearm to be passed between two individuals. The teaching method we will use requires passing loaded shotguns from a coach or instructor to a shooter. We will use a standard process to pick up a shotgun or pass it between people on the range.

You may have noticed that all the shotguns used here have had their actions open with the muzzles pointing away from people. We will keep all shotguns stored in this condition on a rack, bench, table or other surface until they are ready to be used. Before picking up a shotgun check to see that it is empty. Grasp it firmly by the forearm with one hand and by the grip with the other. This requires the use of both hands. With a firm and secure grip, lift the shotgun. Never grab a gun by the barrel to drag it toward you or swing it into your grasp. That provides poor muzzle control and exposes you and others to potential danger. It also risks dropping and damaging the shotgun. Sliding the gun across a surface also should be avoided. Such actions can scratch or mar both wood and metal surfaces, as well as risk exposure to danger (and the wrath of the shotgun's owner.)

Passing a shotgun between people always requires caution. Since the teaching method involves handing a shotgun with a closed action to another person, an extra measure of caution is necessary. The instructor or coach must maintain control of the shotgun and the muzzle direction until the shooter signals that they have the gun and its direction under control. Here is how to do this effectively. The instructor loads the firearm and closes the action with the shotgun pointed in a safe direction. Before handing it to the shooter, the instructor grasps it with one hand on the forearm and the other on the action. The hand grasping the action should have its fingers extended over the trigger guard to prevent the shooter from touching the trigger. The shooter should grasp the shotgun firmly with one hand on the forearm and the other on the grip. Once their grasp is secure, the shooter should say "thank you" to indicate that the gun is under control The instructor should say "you're welcome" to indicate that he or she is releasing the shotgun. Safe handling is introduced while reinforcing courtesy and sportsmanship.

Elements of Safe Shooting

On the range or in the field, safe shooting demands certain things of the shooter. Some are skills. Others are matters of knowledge and preparation. The skills will develop with practice, but they must be practiced to become fixed. Some of the knowledge must be memorized. Some of it is a matter of common sense.

Know how your gun operates. This may seem elementary, but the shooter must learn how the gun works, what it can do and what its limitations are. Opening and closing the action, operating the safety and coping with minor malfunctions are also essential knowledge. Safe and proper shooting technique comes with practice.

Be sure your gun and ammunition are compatible. Shotgun shells are not interchangeable between gauges nor even between lengths in some cases. Only shotshells that are manufactured for your shotgun should be carried. Using the wrong shells or mixing gauges can have disastrous results. Note that a 3-inch shell fits easily in a 2¾-inch chamber. A fired 3-inch case dropped into the same chamber tends to project slightly. It can be forced into the barrel, but it does not fit easily. Why does that happen? When the shell is fired, the crimp begins to unfold. Since the chamber is too short, it unfolds into the barrel, causing it to be partially obstructed. This results in increased pressure levels and stresses on the barrel. In an extreme case, the barrel could rupture, causing injury. Be sure the shells are appropriate for the gun being used.

Carry only one gauge of ammunition when hunting or shooting. Watch what happens when a 20 gauge shell is dropped into a 12-gauge barrel. Note that a 12-gauge shell can now be chambered behind it. What could happen if this shell were fired? Not only is the barrel obstructed, it also contains an additional round that will fire when struck. The barrel is likely to burst, destroying the barrel or the shotgun and risking injury to the shooter and others. This is not the only potentially dangerous combination. The same thing can happen with 16 gauge shells in a 10 gauge or with 28 gauge shells in a 20 gauge. *Do NOT mix gauges!* Let your buddies carry their own shells.

Do NOT mix gauges!

Be sure of your target and what is beyond. Every shooter must be absolutely sure they correctly and completely identify their target *before* firing a shot. They also must make sure that the area beyond the target provides a safe shot-fall zone for their load. A shooter must never fire in a direction where any potential for a mishap is present. Remember, the range of a shot charge is proportional to the size of the shot. Although target loads normally have a range of less than 275 meters (300 yards), buckshot may have a range of more than twice that distance. The shooter relinquishes all control over the shot as soon as it is fired, so the determination of a safe zone of fire must be made before the trigger is pulled.

Wear eye and ear protection when it is appropriate. Eye and ear protection should be considered mandatory for all shooters, coaches and others on the range. Vision is priceless, so it would be

wise for everyone to protect their eyes. The likelihood of an injury is relatively small, but the impact of such an injury could be serious. Stray or deflected pellets, target chips, gases and powder residue from shotgun and other foreign objects have the potential to damage the eyes. The simple precaution of wearing shooting glasses protects them. Many shooters combine their eye protection with corrective lenses or tinted lenses that increase contrast, reduce light intensity, or enhance vision in other ways. Eye protection should be used whenever shooting is taking place.

Like sight, hearing is a precious gift. The sound levels produced by any powder burning firearm are sufficient to cause hearing damage. Hearing damage is usually gradual. The shooter seldom notices the loss until it is serious. The damage is cumulative and permanent. The infrequent firing during hunting may have little effect, but some shooters wear ear protection even while hunting. All authorities agree, however, that the damage from the prolonged exposure during target shooting is a real and present threat. Shooting without hearing protection does not show toughness. It shows foolishness. Inexpensive and comfortable hearing protection in the form of either plugs or muffs is readily available. Some shooters use both plugs and muffs for added protection. Instructors often use electronic muffs to allow them to hear better for firing line control. The sounds of firing are muffled electronically. Choose the type of protection that fits your shooting style and budget. Always wear them on the range. Your inner ears will repay you with better hearing.

Avoid mixing alcohol or other drugs with shooting. Anything that reduces your concentration or judgment while shooting poses a threat to you and others on the range. Alcohol and other depressant drugs cloud judgment and reduce concentration even though the user experiences a heightened sense of security or ability. Illegal drugs are not the only culprits. Some prescription or over-the-counter medicines may have the same effect. Cold tablets, cough suppressants, antihistamines and some pain relievers can have a similar effect on some people. Read the label and observe the impact the drug has on you before entering the shooting range. Products that cause drowsiness or similar effects should not be used if you are shooting. If you are using them, you should not be shooting. If you are ill or on medication, tell the instructor, who can arrange for you to shoot under more controlled conditions.

Be aware of special precautions related to the specific situation. Special circumstances or unique features of a particular site may require additional safety rules. If you are not sure a situation is safe, *ask your range officer!* The range officer is responsible for controlling the range, assuring that all safety rules are followed and ensuring that all shooters are treated with respect.

Personal Responsibility and Safety,

Occasionally you may encounter unsafe shooters, and even experienced shooters who become lax at times. Do not allow people who are acting foolish and practicing risky behavior to influence you. Point out the unsafe behavior. If the shooters refuse to modify their behavior to meet the standards of safe shooting, don't shoot with them. As you grow older, you will become increasingly concerned with shooting safety. Shooting is a very safe sport, safer than such non-contact sports as tennis; but the results of a shooting accident can be disastrous. Keep shooting safe by insisting on the highest standards of safety from yourself and everyone who shoots with you.

Summary

Are there any questions? Be sure to review this material before our next meeting. If you don't understand something in your review, write yourself a note and bring it to the next session. Today we learned about safe gun handling practices. We learned that we must check all guns to see if they are loaded before handling them. You have demonstrated your ability to safely handle shotguns. In our next session we will move to the range and begin learning to hit moving targets with a shotgun.

Summary Activities

1. With a teen leader or assistant instructor in charge of each small group, have every shooter go through the mechanics of using the shotguns that will be used in the shooting sessions. Have them check and clear the shotgun. Then let them load, unload and operate the safety. Use a mousetrap pistol to demonstrate trigger operation. *Instructor note:* No live ammunition should be present. Use only dummy rounds or snap caps.
2. Have teen leaders or assistant instructors work with small groups practicing the procedures for picking up a shotgun, checking it for safety and passing it to another person.
3. Have teen leaders or assistant instructors conduct an informal quiz over the content of this lesson and the previous one.
4. Role play several range or field situations and have the participants discuss safe muzzle directions and other safety considerations.

No live ammunition should be present. Use only dummy rounds or snap caps.

Exhibit and Sharing Ideas

1. List some of the things you learned in your shooting journal.
2. Make a poster or a set of signs reinforcing the cardinal rules of safe firearms handling. Post them in the classroom, the shooting range or at the county fair.

3. Make a poster or display that illustrates one of the safety considerations in shotgun shooting (for example, show the range of various shot sizes). Integrate the posters into a display for 4-H Week, your club, National Hunting and Fishing Day or some other timely event.

4. Prepare a group exhibit or demonstration on shotgun safety.

5. Prepare a demonstration or illustrated talk on shotgun safety and share it with your club, other interested shooters or a small group of adults.

6. Demonstrate and practice the protocols for passing a shotgun between two people with a parent or other interested adult.

7. Explain the basics of shotgun safety to a parent or other interested adult

Shotgun Shooting Fundamentals

James V. Peter, Jr.*

Objectives

Participating youth and adults will:

1. Determine eye dominance and assist others in doing so.
2. Understand and practice six fundamental steps in shotgun shooting.
3. Practice the fundamentals on the range.
4. Understand and practice using spring-powered traps.
5. Observe and understand the basics of clay target flight.
6. Introduction to the range.
7. Have fun while learning.

Roles for Teen and Junior Leaders

- Demonstrate elements of shooting form without shotguns.
- Demonstrate trap operation.
- Demonstrate the elements of proper shooting form with live ammunition.
- Supervise a small group learning to use the traps.
- Assist any young person having difficulty with the lesson.
- Teach portions of the lesson.

Parental Involvement

- See Roles for Teen and Junior Leaders above.
- Assist in securing supplies needed to teach the lesson.
- Assist with range set up.
- Assist with range operation.
- Arrange for or provide transportation.
- Arrange for or provide refreshments.
- Act as an assistant instructor, coach or range officer.

Best Time to Teach

Any time weather is suitable, but after Introduction to shotguns and shotgun safety and before firing the first shots

Best Location

Classroom and range

Time Required

Approximately 1 hour

Materials /Equipment

- traps
- clay targets
- eye and ear protection
- shotguns
- appropriate ammunition (on range only)
- materials to set up range if needed
- 8½ x 11-inch paper
- ½-inch or larger diameter dowels (if used)
- string or cord
- tacks or nails

References

Shotgunning: The Art and Science. R. Brister, 1977. Winchester Press, New York

The Basics of Shotgun Shooting. H.W. Sheets. 1985. The National Rifle Association of America, Washington, DC.

NRA Basic Shotgun Shooting Course, National Rifle Association, Washington, DC.

Basic Shotgun Shooting – A Better Way. Video. Contact your state coordinator or Federal Cartridge Corporation, Anoka, MN.

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Teaching Outline

Presentation	Application
I. Shotgun shooting skills learned A. Complex set of activities 1. Moving target 2. Moving shot 3. Coordination 4. Timing B. Learned, not genetic	POINT OUT that shotgun shooting is a learned skill involving moving objects and fundamental skills.
II. Determining eye dominance A. Handedness and eyedness 1. Same side 2. Cross-dominance B. Influence on learning to shoot 1. Pointing natural for dominant eye 2. Hands easier to retrain 3. Shoot from the dominant-eye side	DISCUSS eye dominance and importance of shooting with dominant eye.
C. Determining dominant eye 1. Partners stand about 3 meters (10 feet) apart • face squarely toward each other • both eyes open 2. Make sighting triangle • thumb on top of thumb • fingers crossed over fingers 3. Extend arms fully 4. Focus attention on partner's nose	Have shooters DETERMINE their dominant eye. USE crossed-hands method here or one of other techniques from the *Fact Sheet 3: Determining Eye Dominance.* STRESS importance of keeping both eyes open and facing other person squarely.
5. Raise hands and center nose in triangle • partner note visible eye • watch for switching 6. Bring hands back to face • focus on nose, not hands • comes to dominant eye 7. Switch roles and repeat	CAUTION partners to watch for "cheating" or forcing hands to non-dominant eye.
D. Demonstrating dominance 1. Point at an object • both eyes open • focus on object, not finger	Use this exercise to DEMONSTRATE influence of dominant eye in pointing. STRESS that shotguns are POINTED not aimed.

2. Cover or close non-dominant eye
3. Cover or close dominant eye
4. Note difference
   - Finger stable with dominant eye open
   - Moves off object with dominant eye covered

E. Importance of using both eyes
1. Better depth perception
2. Better peripheral vision
3. Less fatigue
4. Getting on target faster

ASK shooters how using both eyes might help their shooting. STRESS depth perception, peripheral vision and reduced fatigue.

III. Shotgun shooting fundamentals

Use adult or teen leaders to DEMONSTRATE shooting fundamental.

A. Ambidextrous directions
1. Dominant or shooting refers to the dominant-eye side
2. Non-dominant or off refers to the opposite side

ILLUSTRATE ambidextrous directions with right- and left-handed examples. *See Fact Sheet 15: Shotgun Shooting from the Gun-ready and High-gun Positions.*

B. Stance
1. Body position and posture
2. Foundation of shooting form
3. Orients shooter to target
4. Foot position
   - body square to target area
   - feet shoulder-width apart
   - off foot slightly forward
   - weight distributed evenly
   - line through heel of dominant foot and toes of forward foot points to target breaking area
5. Knees bent slightly
   - hips free to move
   - boxer's stance
6. Upper body boxer's stance
   - off hand forward
     - grips shotgun forearm
     - elbow raised
   - dominant hand closer to face
     - grips shotgun grip
     - elbow raised
   - head erect
7. Gun-ready position

DEMONSTRATE proper stance while DESCRIBING it. Have shooters adopt stance with help of teen leaders or assistant instructors.

STRESS importance of freedom of movement for shotgun shooter.

DEMONSTRATE boxer's stance. NOTE lead with off hand.

EXPLAIN how raising elbow increases upper body freedom of movement.

DEMONSTRATE and DESCRIBE a proper gun-ready position. POINT OUT that it is flexible, but this one is basic position for developing one that is comfortable and effective.

- practiced here to prepare for later use
- shotgun held slightly across chest
  - muzzle on or just below flight line of target
  - heel of stock under dominant elbow
  - toe of stock near point of hip
  - stock close to body but clear of clothing
- off elbow flexed, not extended fully
  - grasp forearm near middle
  - gun balanced between hands
  - index finger pointed along forearm
- grip firm but not tense
- both eyes open, looking where target will appear

EXPLAIN importance of free movement of stock to shoulder.

STRESS that position is alert and poised for action, but not tense. Demonstrate and explain how to reach high-gun position.

DISCUSS looking toward area where target will appear.

8. Gun mount
   - shotgun in shooting position
   - muzzle as pivot point
   - bringing shotgun to face and shoulder
     - butt in pocket formed when dominant elbow is lifted
     - stock firmly against cheek
   - slight lean into shot by upper body
     - weight 70 to 80 percent on forward foot
     - head nearly over front foot
     - forward knee slightly bent

DEMONSTRATE a proper gun mount at normal speed, and then at slow speed while DESCRIBING process.
STRESS mount as being part of swing. Also STRESS the importance of staying on flight path of target with muzzle.

EMPHASIZE bringing stock to face and proper location on shoulder. Have each shooter LOCATE hollow in their shoulder.
STRESS importance of firm, consistent contact between the stock and cheek.

DEMONSTRATE shift of weight forward, flex of forward knee and forward lean of body. DEMONSTRATE and DISCUSS value of this position in absorbing recoil. PUSH on shooter and have them rock back onto rear leg.

9. Swing to target
   - smooth movement of shotgun to point at target
     - straight-away targets
     - forward lead for angled targets
       - swing through leads
       - sustained leads

DISCUSS and DEMONSTRATE a proper swing. Use dowels as guns and have shooters TRACK a string either along a wall or strung between two posts.

DISCUSS different leading methods.

- continuation of mount to follow through sequence

10. Trigger pull
    - timing of shot critical
    - precise location not important
    - quick, crisp pull
    - avoid snatching or jerking

ILLUSTRATE importance of a proper trigger pull.

CAUTION shooters about jerking or snatching trigger.

11. Follow through
    - vital to successful shooting
    - continues through recoil
    - more important as target speed increases
    - following a piece to the ground
    - swing from the hips
    - upper body and gun a unit

ILLUSTRATE a proper follow through.
DISCUSS why it is important for consistently good shooting.

DEMONSTRATE how swing comes from hips and knees rather than from arms.

IV. Orientation to clay targets

PASS AROUND some clay targets. ASK shooters what they can tell you about them. If available, show several types and colors.

A. Target types
   1. Standard target
   2. Other shapes and sizes

B. Target colors
   1. Single color
      - black
      - painted
   2. Colored dome
      - orange
      - white
      - yellow

C. Target flight
   1. Smooth arc
      - rising to peak
      - falling to earth
   2. Distance of flight
   3. Consistency of flight
   4. Influence of wind
   5. Spinning for stability

THROW one target with trap. ASK shooters to tell you what they observed. STRESS flight path of target.

THROW several more to show consistency of trap or influence of wind.

V. Orientation to trap

REVIEW basic parts of trap. CAUTION shooters about dangers around throwing arm. Have each shooter THROW several targets under direction of an assistant or teen leader.

A. Spring-driven traps
   1. Spring
   2. Thrower arm
   3. Latch
   4. Lanyard

B. Safe operation of trap
   1. Cocking the arm with the finger tips

- pull back to the latch
- be sure its latched

2. Loading the trap
   - hold target dome with finger tips
   - place target against rail
   - purpose of mark on arm
     - consistent flight
     - direction control
3. Firing the trap
   - pull lanyard
   - never with anything in the way of the thrower arm
   - risk of injury from arm or target pieces

IV. Orientation to the range

DISCUSS range layout and DEMONSTRATE proper range procedures.
Have groups of shooters ROLE PLAY the responsibilities of all people on range.

A. Firing line
1. Traps set along it
2. Beyond line is danger zone
3. Danger zone includes shot-fall area
4. Carpet square or shooting box for shooter
5. Coach between shooter and trap operator
6. Down range only on command
   - range safe
   - traps uncocked
   - guns on rack

DISCUSS importance of protecting trap operator.

B. Range control
1. Ammunition under instructor control
2. No shooters with guns until range declared open for shooting
3. Firing points independent, but under range officer control
   - disturbance in safety area
   - potential impact on line

STRESS strict control of all ammunition on range while primary teaching is in progress.

REINFORCE absolute authority of range officer.

C. Safety area
1. Clearly marked
2. Physical barrier
3. Part of range and under control of range officer
   - disturbance in safety area
   - potential impact on line

DEMONSTRATE potential hazard of distractions in safety area using teen leaders and dowel “guns”.
ASK shooters to discuss possible impacts of a mistake.

D. Cease fire
1. Any time unsafe condition exists

ASK shooters to describe actions to be taken on a CEASE FIRE.

3. Everyone's responsibility
4. Stop, unload and make safe
5. Resume only on command

E. Misfires and malfunctions

STRESS importance of treating malfunctions or misfires as shots waiting to happen.

1. Muzzle down range
   - two-minute wait
   - range assistance
   - raise hand for help
2. Problem shells
   - bloopers or squib loads
   - check barrel before shooting

EMPHASIZE potential hazard of an obstructed barrel.

VII. Summary

ASK questions or use game format to REVIEW main content of lesson.

A. Eye dominance

B. Elements of shooting form
   1. Stance
   2. Gun-ready position
   3. Mount
   4. Swing to target
   5. Trigger pull
   6. Follow through

STIMULATE thought and prepare shooters for live firing by having teen leaders DEMONSTRATE live firing.

C. Introduction to clay target

D. Introduction to trap operation

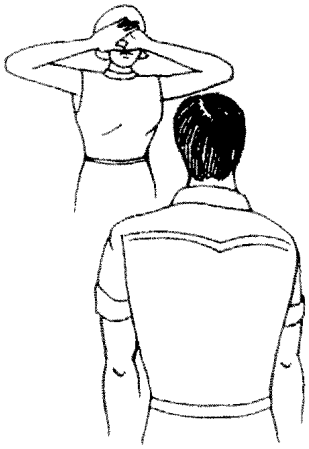
E. Introduction to the range

F. Live firing next time

Lesson 2 Narrative

Shotgun shooting involves hitting moving targets with a cloud of moving shot. To accomplish this, the shooter must see the target, point the shotgun and fire when all the moving parts are in a proper relationship to each other. Learned skills and coordination are needed for effective shooting. One element must be determined before learning can begin. The shooter must know which eye is dominant when the shotgun is pointed.

Eye Dominance



Most people are right handed. The vast majority of them are also right eyed. Others have a dominant left side. Some people are cross-dominant, with their handedness and eyedness on opposite sides. Shooting is more easily learned if the shooter allows the dominant eye to serve its natural function. Right-eyed people should shoot from the right shoulder and left-eyed people should shoot from the left shoulder regardless of their hand dominance.

Finding out which eye is dominant is fairly easy. Stand about 3 meters (10 feet) from your partner, facing each other squarely. One of you should place one thumb on top of the other and cross the fingers of the top hand over the fingers of the bottom one, leaving a small triangular hole. With both eyes open, face the other person squarely and raise your hands until you can see your partner's nose through the hole. Hold your position for a few seconds, while your partner notes which eye they can see. Then bring your hands back to your face slowly while keeping your partner's nose in focus and in the middle of the hole. Partners, watch for any switching of the hands from eye to eye, and be sure the hands return to the eye you saw through the opening earlier. The eye your hands come to is your dominant eye. Try it again. Now change roles and do the whole thing again.

How many of you are left eyed? Even if you are right handed, you should learn to shoot left handed. It is easier to teach your non-dominant hand what to do than to switch your eye dominance. Since pointing is one of the key elements in hitting a target with a shotgun, the dominant eye needs to be involved or a lot of unexplained missing will take place. Demonstrate that for yourself. With both eyes open, point at a distant object with your finger. Cover your non-dominant eye with your other hand. Did your finger stay on the object? It should have. Now, cover your dominant eye. Did your finger seem to jump to the side, pointing to the wrong spot? That is exactly what happens when you try to shoot with your non-dominant eye. The dominant eye takes over and you wind up pointing at the wrong spot.

Some shooters compensate for being cross-dominant by shooting with the dominant eye closed. Although that works, it is a much poorer shooting strategy. You lose depth perception and peripheral

vision. Both of them are helpful to a shotgun shooter. Be patient and try to use the dominant eye. You will shoot better if you do.

(Refer to fact sheet #3)

Shotgun Shooting Fundamentals

Shotgun shooting is learned, not an inborn gift. Six fundamental form concepts must be learned and practiced before they can be put together effectively: stance, gun-ready position, mounting the gun, swing to the target, trigger pull and follow through. Each of them involves a number of skills important to good shotgun shooting. We will develop them one at a time before trying to put all of them together. *Please note that all the instructions are given in relation* to *the dominant eye. Thus, "dominant"* or *shooting" side is on the dominant-eye side. Similarly, "non-dominant" or "off" side refers to the opposite side.* These instructions are the same for both right- and left-handed shooters.

Please note that all the instructions are given in relation to the dominant eye. Thus, "dominant" or "shooting" side is on the dominant-eye side. Similarly, "non-dominant" or "off" side refers tot he opposite side.

Stance

The stance is the position and posture of the body during the course of shooting. It is the foundation of good shooting. Although some variation in stance is seen among good shot shooters, most of them share certain elements. Freedom of movement is vital. The stance provides support and recoil absorption; the shooter is oriented to the area where the target will be broken.

(Refer to fact sheet #4)

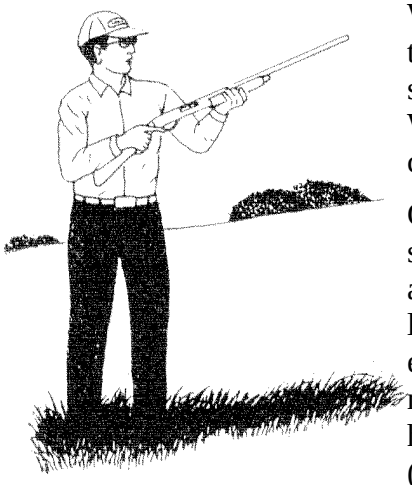
Stem (Know them bones)

A proper shotgun shooting stance starts with the feet. One experienced shotgun instructor says, "you may hit the target with the shot, but you miss with your feet." The body should face the area where the target is likely to be broken. The feet should be comfortably set about shoulder width apart. The off foot should be slightly forward of the dominant foot, perhaps 10 to 20 centimeters (about 4 to 8 inches). The weight should be evenly distributed, favoring the forward foot slightly. When the feet are properly set, a line drawn through the heel of the rear foot and toes of the front one should point to the area where the target will be broken.

The knees should be bent slightly, giving the hips freedom to rotate freely. This movement is critical when shooting crossing targets, since a smooth swing starts from the hips rather than the upper body. Most instructors refer to this as a boxer's stance. It shows the same readiness to act and freedom of movement a boxer must have.

The upper body also requires a boxer's stance. The off hand, the one that will hold the forearm or forend on the shotgun, is extended halfway or slightly more. The arm is held nearly parallel with the ground, giving the upper body freedom to move. The dominant hand, the one on the grip and trigger, is held closer to the chest. Most good shooters also raise that elbow to aid in movement.

This stance is the one that will be assumed as the shooter prepares to call for a target with the gun either in the ready position or raised and ready to fire.



Gun-ready Position

We will be shooting from a high-gun position during the early part of the instruction. A proper **gun-ready position** is essential for hunting, sporting clays, international skeet and other shotgun shooting activities. We will teach the position as part of the fundamentals and practice it in controlled way each time the shotgun is fired.

Gun-ready position is the upper body posture and the position of the shotgun prior to mounting the gun. The shotgun is angled slightly across the chest. The muzzle should be on or slightly below the flight line of the target. The heel of the stock should be under the dominant elbow and slightly above the belt or waist. The toe of the butt plate or recoil pad should be on or near the point of the hip. The stock should be held close to the body, barely touching it or within a few centimeters (about 1½ inches). The elbow of the shooting hand should be lifted about 5 to 10 centimeters (2 to 4 inches) away from the stock. This position makes raising the gun to the shoulder easy by keeping the butt of the gun forward of the arm pit and free from any restrictive contact with the clothes.

The off elbow should be flexed, placing the hand on the forearm without extending the arm fully. The shotgun should be balanced between the hands. If the stock is the proper length, the forward hand should be near the middle of the forearm. Some shooters prefer to move their hands back toward the receiver for better support and control and many good shooters point the index finger toward the muzzle, and at the target with it. Both hands should grip the shotgun firmly, but without excess tension.

Both your eyes should be open and looking at the area where the target is expected to appear. If the muzzle obstructs your vision, lower it slightly. Good shooting demands that you be able to see the target quickly and clearly. Once the target appears, every bit of concentration should be focused on it. Both the background and the barrel will be somewhat out of focus, but the target will be in sharp focus.

Mounting the Shotgun

(Refer to Gun fit fact sheet)

Bringing the shotgun into shooting position on the shoulder is called mounting the gun. The shotgun is raised to the face and shoulder in a smooth motion. The muzzle acts as a pivot point for the mount, with little vertical movement. It should track the target (begin moving along the flight path of the target) as the stock comes to the cheek. The head remains comfortably erect as the stock is brought up to the dominant cheek. This mounting method prevents many of the problems associated with head position that bother shotgun shooters. Avoid bringing the gun to the shoulder and lowering the head to the stock. With practice, the stock will reach a consistent position on both the shoulder and the cheek. This will lead to quicker and better shooting. The cheek and the comb should remain firmly against each other throughout the firing process. The butt of the stock should be held firmly against the shoulder in the pocket formed when the dominant elbow is raised to shoulder height. The heel of the stock should not

project much above the top of the shoulder. That keeps most of the butt against the shoulder and helps to distribute recoil.

During the mount, the upper body should move forward slightly, leaning 70 to 80 percent of the weight on the front foot. The forward knee should flex slightly as well. This brings your head into a position almost directly over the forward foot. We will take our time with this process, mounting the gun before calling for the target. With practice the mount will become a swift and fluid motion that blends with the swing to the target and follow through.

Swing to the Target

As you gain experience and begin shooting from the gun-ready position, the mount and swing to the target wil1 blend into a smooth motion. Since we are starting with the gun mounted, the swing will be taught as a separate unit first. With the gun at the shoulder and your gaze shifted to the area where the target will appear, call for the target by saying "pull." As soon as you see the target, focus all your attention on it and point the shotgun at it by swinging the entire upper body and shotgun as a unit. When shooting at rising, straight-away targets, simply point the gun at the clay target and shoot. When other angles are encountered, you must swing the shotgun to and through the target smoothly. The legs and hips power the swing, and the upper body and shotgun move as a unit. Some lead will be needed to hit a crossing target. Every shooter perceives an appropriate lead differently. A swing-through method of leading will usually succeed for most shooters. Starting with the shotgun behind the target, accelerate the muzzle through the target along its flight path. As the muzzle clears the target, fire and continue to swing. Target shooters, often prefer a sustained lead, where the muzzle is perceived as towing the target with a gap of appropriate length. Both methods require some practice, and both depend upon the shooter to perceive the relationship between the muzzle and the target, pointing rather than aiming.

Trigger Pull

Successful shotgun shooting requires proper timing of a shot charge and a target. You must fire the shotgun when the muzzle is pointing at the location where the target will be when the shot charge arrives. Since the shot charge is spread over a fairly large area, there is no need for the careful aiming needed with rifle shooting. In fact, that approach is likely to cause all kinds of difficulties for the shooter. The trigger needs to be pressed with a quick, crisp pull, but not snatched or jerked. Violent movements can disrupt the smooth swing essential to good shotgun shooting. The shotgun should flow smoothly from the mount to the follow through without interruption by the trigger pull. Eventually, a conditioned reflex of hand-eye coordination will fire the shot when the target and muzzle are in the proper positions.

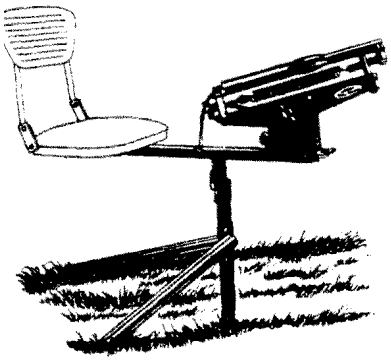
Follow Through

Follow through refers to the continued smooth swing of the shotgun after it is fired. Many instructors consider it the most important part of consistent shotgun shooting. Follow through the recoil of the fired shot until after the target is broken. To practice a follow through, many shooters follow a broken piece of the target to the ground. Follow through becomes more important as the speed of the target increases. As with other elements of the swing, good follow through is governed by movement of the hips and legs.

Putting all these elements together into a swift and smooth action may seem like a challenge. It is, but it is a challenge you can meet. We will put each of these skills together to help you hit targets effectively, and add new challenges when you are ready. Let's move over to the firing line and get started on your skills.

Orientation to Clay Targets

A standard clay target looks somewhat like a frisbee or a saucer. Other shooting games, like sporting clays can use other types and sizes of targets, but we will used the standard trap and skeet target for instructions. These targets may be painted, unpainted or painted only on the dome. Usually they are painted white, yellow or orange for better visibility.



Watch while this target is thrown. I will call for the target as you will during instruction. “Pull." What did you notice about the target's flight? The target flew in a curved course, rising to a peak height, then falling to the ground about 50 meters (55 yards) away. The target had a fairly straight line of flight. The target was spinning as it flew. Let's watch a few more. Did you notice anything else about these targets? They landed fairly close together, so they had a consistent line of flight. Wind gusts can cause them to rise, fall or curve to one side. They also slow down as they move down range.

Orientation to the Trap

These traps are powered by a strong coil spring that can be adjusted to throw faster or slower targets. Tightening the spring increases target speed. The throwing arm is cocked by grasping its upper edge with the fingers of both hands and pulling it back until it latches in place. Be careful when cocking the thrower arm or placing a target on it. It can deliver a very powerful blow if released.

Be careful when cocking the thrower arm or placing a target on it. It can deliver a very powerful blow if released.

To place a target on the thrower arm, grasp the target by its dome with the fingertips of your left hand, and set the target on the thrower arm against the back rail. Note that the thrower arm has a line marked on it. Place the target on the arm touching that line. That is what controls the direction of the target.

To launch a target, pull the **lanyard**. That releases the latch, allowing the spring to pull the thrower arm around powerfully.

Never release the thrower arm when anything is in its path. It could cause severe injury. Always leave the thrower arm uncocked when the trap is not being used or is unattended. Let's spread out along the firing line and try throwing a target or two.

Orientation to Range Operation

(Refer to fact sheet #14 & Range set up diagram)

Instructor note: This discussion is based upon a range set up in a safe, open area. If you are using a regulation field, you will need to modify your orientation to meet the local conditions.

Before we go any further we need to understand how the firing line operates. The traps are lined up on the firing line. The danger area includes not only the area covered by the targets, but the shot fall zone as well. That zone extends 300 meters (330 yards) down range from the firing line. Firing should never take place with anyone in that area.

We will be retrieving some of the targets we use, but no one should be forward of the firing line until or unless specifically authorized by the range officer or instructor. Only after all the traps are sprung and the shotguns are safely in the racks will we move down range.

Notice that there is a carpet square on the ground to the left of each trap. The shooter will stand on that carpet square. The coach stands between the shooter and the trap operator, keeping clear of the throwing arm and making sure the shotgun never endangers the trap operator. The coach or instructor will keep all ammunition under control, either loading the shotgun for the shooter or handing the shooter a round to load personally. Although each firing point will operate independently during the ball and dummy exercise, the range officer or chief instructor is in ultimate, control of the entire range. No shooter may touch a shotgun until the range officer declares the range open to shooting by stating, "Live ammunition on the range" or "The range is hot!"

The safety area behind the tape barrier is for spectators and shooters who are not on the line at the moment. Those in the safety zone must be careful not to disturb the shooters on the line or interfere with the instruction in any way. Disturbance behind the line is extremely dangerous to those on the firing line. Inexperienced shooters may have a lapse in muzzle control if they come distracted or embarrassed by actions behind them. Show respect and restraint when off the firing line.

Anyone on the range may declare a cease fire by shouting "cease fire!" or "freeze!" when an unsafe condition exists. That command stops everything on the range immediately. All shotguns should be made safe (pointed in a safe direction, opened, all ammunition removed and pointed straight up with the action open and exposed to view), and all trap operators should make sure no target is thrown. Once the problem is fixed, the range officer will declare the range open and shooting may resume.

Do not fire another round without checking the barrel for obstructions.

Should a miss fire or other malfunction occur, keep the shotgun pointed down range for at least 30 seconds. Do not move the shotgun until the range officer takes control of it using the protocols we practiced last time. If any shell fails to perform properly (bloopers or squib loads), *do not fire another round without checking the barrel for obstructions.* If in doubt, raise a hand to get help from the range officer or assistants.

Summary

We have learned a great deal about shotgun shooting and ourselves today. You determined your eye dominance. You learned the fundamentals of shotgun shooting without equipment and with unloaded guns, practicing the six fundamentals of shotgun shooting: stance, gun-ready position, mount, swing to the target, trigger pull and follow through. Then we moved to the range and you got a chance to throw a few clay targets on the trap, to watch some targets in flight and to become familiar with range operation. Next time we will start on the range and begin live firing. If you have any questions between now and the next session, please write them on a piece of paper and bring them to the next session.

Summary Activities

1. Have a teen leader demonstrate proper shooting form without equipment, then with an empty shotgun and then with several live rounds. Review the elements of shooting form with the shooters after each sequence, and any that are necessary later.
2. Discuss the content of the lesson with the shooters, asking them questions or responding to questions they may have.
3. Have shooters practice the elements of shotgun shooting form without equipment in the classroom and with dowels or empty shotguns on the firing line.
4. Demonstrate the potential for problems caused by disturbance in the safety zone using instructors and teens as models. Use only dowels or mimics for the demonstration.

Exhibit or Sharing Ideas

1. List the things you have learned about shotgun shooting and range operation in your shooting journal.
2. Share things you learned with a parent or other interested adult.
3. Construct a teaching poster listing the six fundamentals of shotgun shooting, how to determine eye dominance or range layout. Post it where it will remind your group of the right way to hit moving targets with a shotgun.

Firing the First Shots

James V. Peter, Jr. *

Objectives

Participating youth and adults will:

1. Successfully shoot a moving target using the fundamentals of shotgun shooting.
2. Practice fundamental shotgun shooting skills in a ball and dummy exercise.
3. Demonstrate the necessary knowledge, skill and mental attitudes for safety firing shotguns at moving targets.
4. Operate a spring-powered trap.
5. Have fun while learning.

Roles for Teen and Junior Leaders

- Set up range and traps for instruction.
- Stock each trap with targets and supply shells to instructors
- Operate traps
- Work with shooters having difficulties with the fundamentals.
- Supervise one firing point after proper training and supervision.
- Demonstrate shooting fundamentals.
- Serve as an assistant range officer.
- Supervise shooters and spectators in the safety area.

Parental Involvement

- See Roles for Teen and Junior Leaders above
- Serve as assistant instructors for one firing point.
- Support teen leaders in their roles
- Control off range activity.
- Arrange for or provide transportation.
- Arrange for or provide refreshments.

Stem (A catapult fling) teach before starting chapter

* County Extension director and agricultural agent for the Dubois County Office of Purdue Cooperative Extension, Jasper, Indiana

Best Time to Teach

Soon after shotgun shooting fundamentals, any time of year when shooters can be outside comfortably.

Best Location

Any safe shooting range

Time Required

1 hour or more depending on class size repeat as needed

Materials/Equipment

- one shotgun per shooting station (suitable types and sizes for the shooters)
-ammunition (five rounds minimum per shooter)
-ammunition (five rounds minimum per shooter)
-clay targets (75 to 100 for demonstration plus 15 per shooter)
-one trap per shooting station spring-powered traps with seats recommended)
-eye and ear protection
-range set-up materials *(Fact Sheet* 14: *Range Setup and Operation for Shotgun Instruction)*
-range safety posters
-gun rack

References

The Basics *of Shotgun Shooting.* H.W. Sheets. National Rifle Association, Washington, .DC. 1985.

Basic Shotgun Shooting: A *Better Way.* Video. Consult your state 4-H shooting sports coordinator or Federal Cartridge Corporation, Anoka, MN.

- At this stage, every firing point should be controlled by a qualified adult volunteer or an advanced teen leader with considerable shooting and teaching experience.

Teaching Outline

Presentation	Application
I. Fundamentals of shotgun shooting	ASK – what are the rules for safe shotgun shooting? REVIEW the fundamentals carefully with the shooters.
A. Safety 1. Muzzle in a safe direction 2. Action open, empty and exposed to view 3. Finger off the trigger until shooting 4. Self-control	
B. Elements of shotgun shooting 1. Stance 2. Gun-ready position 3. Mounting the shotgun 4. Swing to the target 5. Trigger pull 6. Follow through	ASK – what are the elements of shotgun shooting form? Have a teen leader DEMONSTRATE if needed to reinforce these elements.
C. Hitting moving targets complex 1. Step-by-step process 2. Emphasis on developing basics 3. Shooting only when you are ready	EMPHASIZE that a step-wise process will be used to teach the basics of shotgun shooting and that each shooter will progress at their own pace.
II. Range safety and orientation review	If a range officer will be used, let that person COVER all range operations. POINT OUT the danger and safety zones and safety area.
A. Danger zones 1. Down range 2. Shot-fall zone 3. Area around trap	
B. Safety zone behind line	EMPHASIZE shooter control and instructor actions.
C. Shooter control 1. Shooting Box 2. On line when called by the instructor to be there 3. Inactive shooters behind safety line	
D. All ammunition under instructor control 1. No other live ammo on line 2. “Live ammunition on the line” means range is hot and ready for live firing	STRESS that NO LIVE AMMUNITION is permitted on the line EXCEPT by the instructors.
E. Only instructor may bring shotguns to the firing line	STRESS shotguns being under instructor control exclusively.
F. “Cease fire!” or “Freeze!”	EMPHASIZE that meaning and actions of either command. ENSURE

1. Immediately stop
2. Make your shotgun safe
3. Resume only when range officer or instructor gives command

that every shooter knows what to do. DEMONSTRATE if necessary.

G. Shooter/spectator behavior

1. Importance
   - learning
   - safety
     - yours
     - mine

ASK shooters why these rules are important. STRESS the importance of SAFETY for EVERYONE.

2. Consequences of violations
   - removal from line
   - removal from session
   - removal from program

PRESENT the consequences in a straight-forward manner, not as a threat.

III. Targets and traps

A. Targets

1. Composed of pitch and clay
   - hard
   - aerodynamic
   - easily broken
   - toxic to swine
2. Visible chip: broken target

PASS AROUND a target for each shooter. Have them Handle it, then STRIKE it sharply on a hard object. DISCUSS the results.

B. Traps

1. Powerful operating spring
   - caution cocking and loading trap
   - stay away from thrower arm
   - shooting glasses
2. Consistent operation needed
   - location of throwing assembly
     - elevation
     - direction
   - target location on thrower arm – consistent flight

DISCUSS how hits and misses are determined. EMPHASIZE safety with the traps. DEMONSTRATE trap operation one more time.

IV. Shotgun shooting step-by-step

A. Watching targets

1. All shooters on firing line
2. Face target impact area squarely
3. Watch target flight

BRING shooters to the line as a group. Line them up on either side of the active trap and watch several targets. ASK them what they observed.

- “pull” for release
- straight line
- rising and falling trajectory
- consistent impact area

B. Finger point

1. Boxer’s stance on the line
   - square to the target area
   - off foot slightly forward
   - off arm straight
     - held about 45 degrees to the ground
     - index finger pointed
2. Both eyes open
3. Concentration on target
4. Point finger at target and follow to the ground
5. Realign body if needed

Have the shooters TAKE a BOXER’s STANCE facing the target flight area and follow several targets with the index finger of the off hand.

CHECK eye dominance again if necessary. Be sure to FOLLOW the target to the ground WITHOUT aiming.
WATCH for poorly aligned stances and CORRECT as needed.

C. Finger point and BANG

1. Repeat sequence
2. Say “bang” when finger touches target
3. Late or unison “bangers”
   - late – aiming
   - unison – waiting for group
   - when YOU are on target

REPEAT the finger point sequence, but add the shouted “bang?” when the finger first touches the target.
BEWARE of the problems that can be caused by unison or late “banger”. CORRECT this problem before going on.

D. Safety review

1. Muzzle in safe direction
2. Shotgun empty, action open and exposed to view
3. Finger off trigger

REVIEW basic shooting safety with all shooters. REPEAT the process once more with each individual on the line.
DEMONSTRATE the process of checking a shotgun for safety.

E. Dry point with shotgun

1. Shooters to the line
2. Follow sequence used in finger point and bang
3. Open hands for shotgun
   - will place shotgun in the proper mount
   - firm grip with both hands
   - “thank you when under control

Bring one shooter per instructor or trap to the line. WALK them through several DRY POINTS at targets.
STRESS a uniform ways of doing business with all elements. KEEP the ACTION OPEN for this series of targets.
WATCH for fatigue, particularly with smaller shooters.

- "you're welcome" before instructor releases

4. Action remains open
5. Mounting shotgun
   - hold muzzle just below flight path
   - firm, relaxed grip
   - poised for action
   - watch where target will be
6. Point shotgun and follow to ground
   - no aiming
   - follow to ground

F. Dry fire

1. Closed action
   - shotgun loaded and ready to fire
   - empty chamber or dummy round
   - respect as loaded gun
2. Passing the shotgun
   - shotgun is loaded and ready to fire
   - safety is off
   - thank you/you're welcome
3. Mounting the gun
4. Swing to the target
5. Pull trigger when on target

REPEAT the process above, closing the action on a dummy round. Do not allow the shooter to SEE what is being loaded. STATE each time that the shotgun is loaded and ready to fire.

G. Ball and dummy

1. After surprise live round
   - how was that
   - good job!
2. Limit to 5 shots total

After several dry fired shots and when the shooter is ready (see if the location appears to be right), slip a LIVE ROUND into the shotgun.
Experience shows about 85 percent of shooters break their first target.

V. Summary

A. Shotgun shooting demanding

1. Skill
2. Coordination
3. Practice

B. Concentration and programming mental computer

C. Give yourself a break

1. Everyone misses
2. Fatigue
3. Form and practice

CONTINUE this process with dummy rounds and live ones.
Do NOT EXCEED 5 rounds of live ammo in this session. AVOID excessive time on the line and be prepared to let the shooter REST

PRAISE all shooters honestly. NOTE that shotgunning demands skill, coordination and practice for success.

STRESS that everyone misses targets and fatigue hurts performance.

Lesson 3Narrative - Firing the First Shot

Shotgun Shooting Fundamentals

We covered six fundamentals for shotgun shooting when we met last time. You had a chance to practice a stance, go to a gun-ready position, mount the gun, swing to a "target" and follow through without having a trigger to pull. You have learned how shotguns operate and the importance of safety rules when using shotguns. You are ready to begin developing shooting skills needed for becoming a successful shotgun shooter. We will take this process step-by-step, moving slowly and carefully toward becoming an accomplished shot.

Learning to hit a moving target involves a number of steps. The best way to learn is to be patient and take each step as it comes, even if it seems silly. We will not let you shoot your first shot before you are ready. Each of the steps we take is designed to prepare you for breaking your first target.

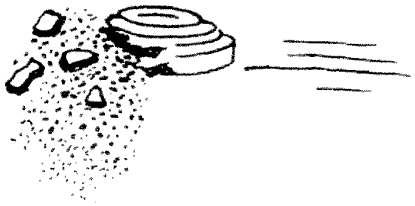
Range Safety and Orientation

We discussed the shooting range last time. Anything down range of the firing line to the boundary of the shot-fall zone is a danger area. Shooters will be restricted to each of the shooting boxes marked by the carpet squares. No one is to approach the firing line until told to do so by the range officer (or chief instructor). All shooters who are not immediately involved in the shooting session must stay behind the safety line. The shotguns are in the rack between the firing line and the safety line. They have all been made safe before being put in the rack. Only the instructor for each firing point may pick up a shotgun. No one may have any live ammunition in their possession under any circumstance except for the instructors. When live ammunition is on the line and the line is ready for instruction, I will announce it by saying, 'There is live ammo on the line." Anyone who sees an unsafe condition should shout "CEASE FIRE!" Any cease fire command must be obeyed immediately. If you are in the act of firing, stop if you possibly can. Stop where you are, open the action and remove the ammunition from the shotgun. Do not do anything else until the instructor corrects the problem and tells you to resume. These rules, and those we shared last time, are for your safety and mine. Anyone who does not follow them will be removed from the firing line.

Targets and Traps

We have already observed several targets and practiced using the traps. (If this has not been done, see Lesson 2.) Please pick up a clay target. Notice that it is very hard, made of clay and pitch and molded into a flying saucer shape. The targets are brittle, so they break easily when struck by shotgun pellets, Hit the target sharply in

the center with you knuckles. Notice that it shatters easily from the blow. The ease with which the targets break makes them as excellent indicator of hits by shotgun pellets. A visible chip from the target scores it as a hit. Millions of these targets are shot every year in practice and competition by shotgunners. Clay targets break down easily, but the pitch used in making them is toxic to swine. Do not use them where hogs could eat the chips. Remember that the traps are powerful and demand respect. When you operate the trap, take care in placing the target on the thrower arm so the targets will fly consistently.



Shotgun shooting step-by-step

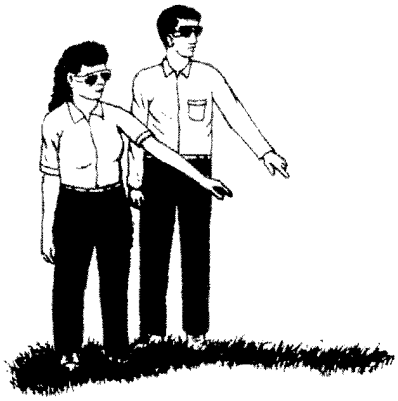
(Refer to debrief on firing the first shot)

Watching Targets

Let's all move to the firing line and review the flight of the target. Line up with about half the group on either side of this trap. Face squarely down range, and watch as we throw several targets. As we learned last time, the shooters call for the release of the target by saying "pull."

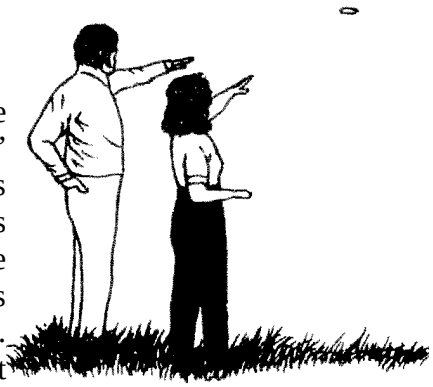
"Pull." Note the speed of the target as it is thrown. "Pull." Notice that the target travels in a fairly straight line. "Pull." Look at how the target rises to a peak and then travels downward. "Pull." Remember that the location on the thrower arm is important for getting the target to fly straight down range from the trap.

Finger Point



Assume a boxer's stance with the off foot slightly forward and facing the flight path of the targets. Extend the off arm and point the index finger while holding the arm at about a 45-degree angle to the ground. When the target appears, raise your hand quickly and smoothly to point at the target and follow it to the ground. Keep both eyes open and concentrate on the target. Do not try to aim with your finger, point! Ready? "Pull." Did anyone have a problem getting their finger on the target? Realign your stance to the area where you got on the target. This concentration on the target and pointing technique will make you successful with the shotgun. Try bringing your finger up and pointing at several more targets.

Finger Point and Bang!



Now let's repeat the same exercise with a new twist. This time the instant your finger touches the target, I want you to "break the target" by shouting "BANG!" Remember to follow through. [In most groups a few shooters will be significantly slower than the majority. Stress the importance of saying "Bang" the instant the finger touches the target. Some groups will have a tendency to "bang" in unison. It is very unlikely that all shooters will get on the target simultaneously. Emphasize that they should say bang when they get on the target, not when others do so.] This process is programming your mental computer to perform instinctively when live firing starts later.

[Repeat this activity as many times as necessary.]
Before we go on to the next step, let's review the basics of shotgun handling. We keep the muzzle of the shotgun pointed in a safe direction at all times. The shotgun is kept empty in both magazine and chamber with the action open and exposed to view except when we are ready to shoot. Note that the action is open and the gun is unloaded. I am visually and physically checking the chamber and magazine to assure that the shotgun is unloaded. Finally, the trigger finger is kept off the trigger until you are ready to fire. [This should be repeated with each shooter on the line as well.]

Dry Point with the Shotgun

Your first shotgun handling experience will be a repetition of the first three fundamenta1s. Get into your boxer's stance. Be sure you are balanced and facing the target breaking zone. Swing yourself to the right and the left. Can you move freely through either side of the area where you expect to break the target? If not, change your position until you are able to move freely

Assume the gun ready position. I will put the gun in the proper position on your shoulder. Bring your face to the stock and look down the barrel. What do you see? Now I will put the muzzle in the proper place and all you have to do is concentrate on the target. Relax, but be ready for action. Watch in the area where the target will appear and call for the target. When the target appears, point the gun at it and follow it all the way to the ground. [Repeat this exercise several times. Be sure to take the shotgun from the shooter and return it each time. Follow the thank-you-you're-welcome procedure each time. During pauses for advice, take the shotgun so the shooter does not tire too quickly.]

Dry Fire
This time, we are going to close the action on an empty chamber and pull the trigger when the shotgun touches the target on the swing. This is known as dry firing the shotgun. It is an excellent way to practice your swing and timing. Any time the action is closed for the rest of the session, I will tell you that the shotgun is loaded and ready to fire. As before, you should treat the shotgun with the respect due a loaded one at all times.
The safety is off, the shotgun is loaded and ready to fire. Assume the gun-ready position. Again I will put the gun in the proper place on your shoulder and have the muzzle where it needs to be. Look to the area where the target will appear. Remember to fire as quickly as the muzzle touches the target and to follow through until the target touches the ground. [Repeat this process four or five times.]

Ball and Dummy

When the instructor sees that the shooter is getting on the target and firing, a live round is slipped into the chamber during the loading

process. The shooter will hit the target most of the time. If the shooter is hitting the targets well and handling the shotgun properly, the instructor may elect to permit him or her to load and fire the final round on their own. The shooter should not fire more than about five rounds in this session.

Summary

Shotgun shooting, like any other sport, requires skill, coordination and a lot of practice. Concentration and programming your mental computer with lots of perfect practice will develop your skill and reflexes. Do not be too hard on yourself if you missed a few targets today. Everyone misses some. You probably feel a little tired. Even though we only fired five shots, you "fired" quite a few more. As we continue to practice, your stamina will increase. Continue working on shooting form and you will get better. At our next session, we will review these steps and practice shotgun shooting.

Summary Activities

1. Have a brief discussion session about things the shooters learned or questions they have about shooting straight-away targets.

2. Teen or junior leaders or assistant instructors can tutor shooters who have had difficulty during the live firing stage.

3. Shooters should prepare to coach each other using the coach pupil method in later stages. In this session, the technique can be used up to the live firing stage.

Exhibit or Sharing Ideas

1. List things you learned in this session in your shooting journal.

2. Make a poster showing the steps to safe and effective shotgun shooting. Display it in a location where it can be reviewed by other shooters in the program.

3. Share things you have learned in the lesson with an adult or parent who is interested in shooting.

4. Demonstrate the fundamentals of shotgun shooting without a shotgun for your club or another small group.

5. Demonstrate how to pass a shotgun between two persons for your club or another group.

Basic Shotgun Knowledge

James V. Peters, Jr.*

Objectives

Participating youth and adults will:
1. Understand the parts of a shotgun and their functions
2. Understand and be able to identify shotgun action types.
3. Understand the differences between rifles and shotguns.
4. Understand the function of basic shotgun ammunition components.
5. Have fun while learning.

Roles for Teen and Junior Leaders

·Set up and arrange room for instruction
·Demonstrate various shotgun action types
·Supervise circulation of "pass a rounds."
· Tutor or quiz participants.

Parental Involvement

·See Roles for Teen and Junior Leaders above.
·Arrange for or provide transportation.
·Arrange for or provide refreshments.
·Present portions of the lesson.

* County Extension Director and Agricultural Agent for the Dubois County Office of Perdue Cooperative Extension, Jasper, Indiana

Best Time to Teach
Anytime of year

Best Location
Indoor or outdoor classroom setting

Time Required
Approximately 1 hour

Materials/Equipment
-chalkboard or newsprint pad
-appropriate writing materials
-shotguns of various action types: hinge (single. over/under, side-by-side) bolt, pump or slide, semi-automatic
-pattern sheets
-sections, illustrations or models of rifles and shotgun barrels
-dummy ammunition in appropriate gauges
-shot shell components
-dissected rifled slug
-small quantity of smokeless shotgun powder
-matches
-fire-proof container (like a small plate)
-tools to assemble and disassemble a shotgun
-twelve ¾ inch lead balls
-caliber .69 musket balls
-NRA Shotgun Instructional Charts
-action type illustrations from manufacturers
-shot size chart or models
Absolutely no live ammunitions

References
Shotgunning, The Art And Science R. Brister. Winchester Press, New York, N.Y. 1987.
The Basics of Shotgun Shooting. H. Sheets, National Rifle Association, Washington, D. C. 1985
NRA Basic Shotgun Shooting Course

TEACHING OUTLINE

Presentation	Application
I. History of the shotgun	REVIEW learning objectives of lesson to set stage for learning.
A. Past	EXPLAIN evolution of shotgun from a tool for food gathering, personal protection and war to uses of recreation and competition.
1. All guns smoothbores 2. Shot or ball 3. Hunting and protection from Predators 4. Self-defense 5. Use in warfare	
B. Present	
1. Some military and police use	
2. Hunting	DISCUSS popularity of shotguns as hunting arms and types of hunting uses.
•small game •upland birds and waterfowl •big game	
3. Shotgun sports •international -clay pigeon	
	Briefly OUTLINE various clay target games using, illustrations videos, or other means.
-skeet ·American trap ·American skeet ·sporting clays ·informal shotgun sports -hand trap -clover clays	
C. Shotgun versus rifle	
1. Purpose	DISCUSS uses of shotguns versus rifles and RELATE that to design of barrels.
·single projectile ·multiple projectiles	
2. Design ·rifles have rifling -spiral ridges and groove -lend stability to projectiles	POINT OUT that "rifling" in shotguns is designed for either rifle-like purposes or for pattern control.
·shotguns have smoothbores -straight or slowly spiraling rifling -specialized uses	
II. Shotgun parts	
A. Basic parts of shotguns	POINT OUT and DISCUSS each shotgun part as it is mentioned. If possible, USE small groups of youth with adult or teen leader to get closer contact.

1. Stock

2. Action
3. Barrel

B. Stock

1. Function of stock
   - ·handle
   - ·control
   - ·recoil control
   - ·aid in operating action
2. Butt
   - •functions
     - -supports shotgun on shoulder
     - -spreads recoil
     - -supports cheek
   - ·heel
   - ·toe
   - ·butt pad or plate
   - ·drop at heel
3. Comb
   - ·styles
   - ·drop at comb
4. Grip
   - ·function - shooting hand support
   - ·styles
     - - pistol grip
     - - straight grip
   - ·checkering
5. Forearm
   - ·functions
     - -non-shooting hand support
     - -operating handle for slide or pump action
   - ·styles
     - -splinter
     - -beaver tail
     - -semi-beaver tail

Use disassembled shotgun to ILLUSTRATE and EXPLAIN parts of a shotgun, where they are, how they fit together and work and how they relate to shooter.

ASSEMBLE shotgun as each part is identified.

MENTION drop and stock fit in process of discussing stock, but DO NOT dwell on technical aspects of it.

C. Action

1. Parts that operate the firearm
2. Receiver
3. Loading or ejection port
   - • sometimes called the breech
   - ·opening in receiver for access to the chamber
4. Firing mechanism

DEMONSTRATE each part as it is discussed. Note that receiver is center piece of firearm.

DEMONSTRATE and POINT OUT parts of firing mechanism on fire control module.

- trigger
- sear
- hammer
- hammer spring
- firing pin
- ejectors/extractors

5. Safety

DEMONSTRATE operation of safety and action release on shotgun being used in shooting sessions.

6. Trigger guard
7. Action release
- only on semi-auto and slide-action guns
- usually around trigger guard, on receiver or on loading gate

8. Magazine

D. Barrel

1. Functions
- launching tube for projectiles
- seals gases behind projectiles

MAKE SURE every shooter understands what muzzle is early in class to avoid any chance of confusion on safety rules.

2. Muzzle
- points in direction projectiles will go
- muzzle control critical

3. Bore size
- gauges
  - English gauges – number of bore-sized balls that can be cast from one pound of lead
  - modern standard borings
    - o 10 gauge
    - o 12 gauge
    - o 16 gauge
    - o 20 gauge
    - o 28 gauge
    - o.410 bore actually a caliber

ILLUSTRATE various bore sizes with a picture or actual barrels.
DEMONSTRATE how gauge was determined using lead balls.

USE barrel sections or piece of tubing and a paper towel tube to ILLUSTRATE difference between a rifle barrel and a shotgun barrel.

4. Bead(s)
- single bead
- target guns

5. Chokes
- construction
  - forcing cone
  - choke
- types
  - built in
  - choke tubes

ILLUSTRATE various shotgun chokes and choke types using actual barrel, photographs or diagrams.
USE pattern sheets to illustrate differences between various chokes at close range (about 25 yards) and long range (about 45 yards).

- collet chokes
- function
  - controlling shot dispersion
  - adjusting shot pattern to use

POINT OUT each part on shotgun being used as it is discussed.

III. Action types

A. Hinge action
   1. Single barrel
   2. Over/under
   3. Side-by-side (double)
B. Bolt
C. Pump/slide action
D. Self-loading/semi-automatic
E. Others (such as lever action)

DISPLAY and DISCUSS each type of shotgun you have available. NOTE similarities and differences among them.

IV. Shotgun ammunition components and function

A. Basic components
   1. Case or shell
   2. Battery cup or primer
   3. Powder charge
   4. Wad
   5. Shot charge
B. Base or shell
   1. Construction
      - paper
      - plastic
   2. Head
      - head stamp
      - rim for extraction
      - composition
        - metal
        - all plastic
   3. Base wad
      - assembled wad
        - composition wad
        - plastic base wad
      - compression formed plastic
   4. Case or body
      - holds other components in place
      - seals gases in place at the beginning of the shot
   5. Crimp
      - seals case temporarily
      - types
        - folded
        - rolled
C. Battery cup or primer

DEMONSTRATE and DESCRIBE function of each action types. REVIEW parts and operation of a shotgun.

1. Pressure sensitive
2. Ignites powder charge

D. Powder charge
1. Propellant for shot
2. Smokeless powder
   ·progressive burning
   ·high pressure
3. Dram equivalents
   ·equal to the listed volume of black powder
   ·velocity measure

E. Wad
1. Seals gas behind shot
2. Cushions and protects shot
3. Composition wads
   ·over-powder wad
   · shot sleeve or cup
4. Plastic unit wads
   ·gas seal
   ·cushion
   ·shot cup

F. Shot charge
1. Carry energy to the target
2. Materials
   ·lead and lead alloys
   ·soft iron (steel)
3. Sizes
   ·fine shot
   - Diameter about 0.17 inch minus the shot size
     - #2 shot = 0.15 inch
     - #9 shot = 0.08 inch
   - buckshot
     - cast pellets
     - #4 buck (0.24 inch) to 000 buck (0.35 inch)
4. Pattern density and shot size inversely related
5. Energy and shot size directly related
6. Balance of shot size, pellet energy and pattern density
7. Rifled slugs

G. Shotshell sizes and shot charges
1. 10 gauge
   - length 2 7/8 and 3 ½ inches

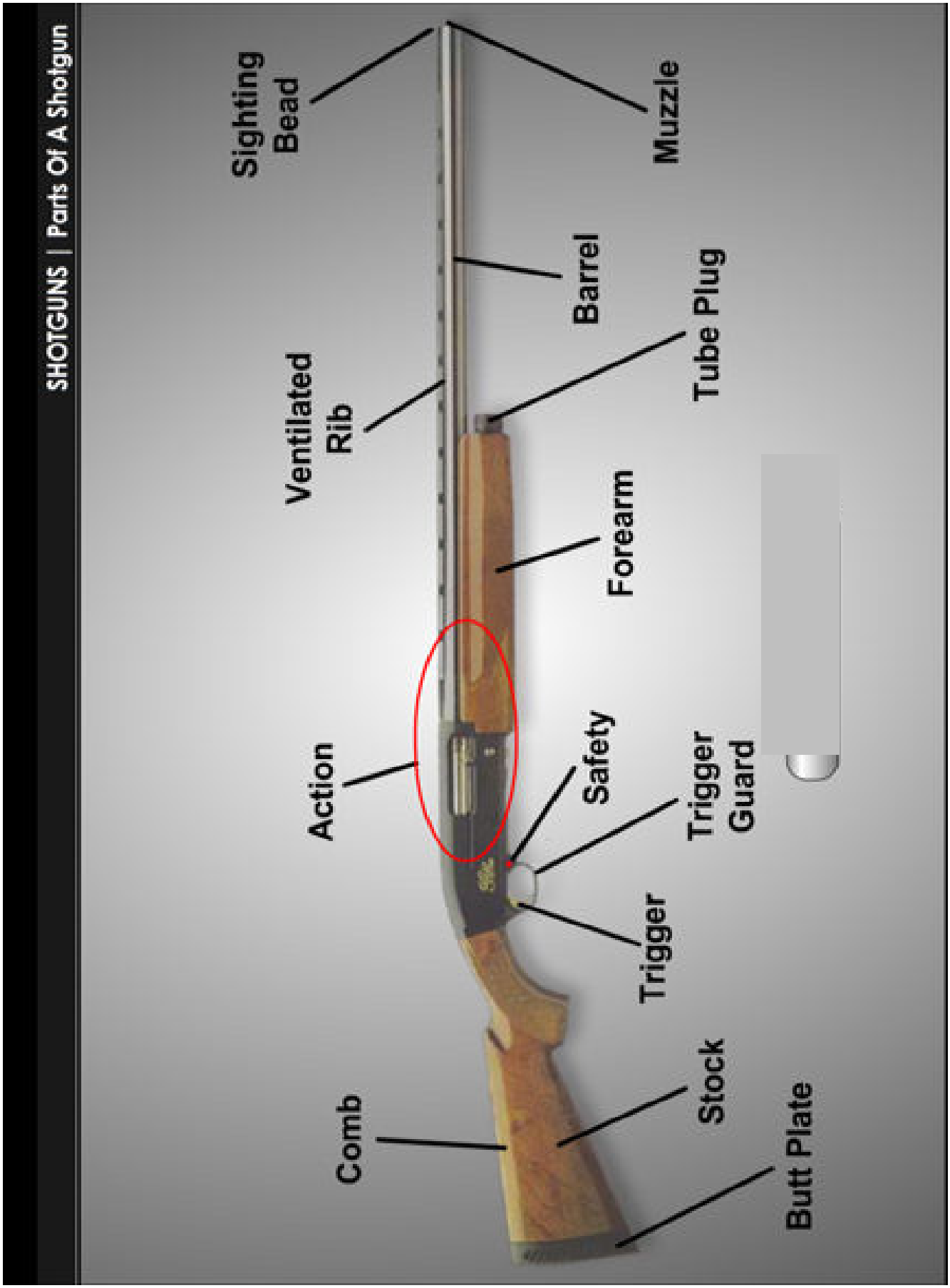
STRESS importance of using proper ammunition with each boring and
ILLUSTRATE how a smaller gauge could lodge in a larger one.

- shot charges to 2 ½, ounces

2. 12 gauge
   - length 2 ¾, 3 or 3 1/2 inches
   - shot charges 1 to 2 ½, ounces
3. 16 gauge
   - length 2 ¾, inches
   - shot charges 1 to 1 ¼, ounces
4. 20 gauge
   - lengths 2 3/4 and 3 inches
   - shot charges 7/8 to 1 ¼, ounces
5. 28 gauge
   - length 2 ¾, inches
   - shot charges 3/4 to 1 ounce
6. .410 bore
   - length 2 ½, and 3 inches
   - shot charges 1/2 and 11/16 ounces
7. Dangerous combinations
   - longer shells in short chambers
   - lodging of smaller gauge in larger bore
     - 16 gauge in 10 gauge
     - - 20 gauge in 12 gauge
     - - 28 gauge in 20 gauge
   - never mix gauges

V. Summary

A. History and significance of shotguns
B. Parts and functions of shotguns
C. Parts and functions of shotgun ammunition
D. Fundamentals of shotgun safety


SHOTGUNS | Parts Of A Shotgun
Sighting Bead
Muzzle
Barrel
Tube Plug
Ventilated Rib
Forearm
Action
Safety
Trigger Guard
Trigger
Stock
Comb
Butt Plate

History of the Shotgun

Shotguns have been in existence for centuries. Before development of the rifling process, firearms could be used with either a single projectile or multiple projectiles. Shotguns developed as specialized firearms to shoot multiple projectiles over relatively short ranges. In their earliest form, they were used for military purposes. As ignition systems increased in speed and reliability, shotguns became practical for self-defense, controlling wildlife or killing game for food. The shotgun, or **scattergun** as it was often known, served prominently in the early development of North America, both as a good gathering arm and a weapon.

The bell-mouthed **blunderbuss** commonly pictured as the Pilgrim's hunting tool was a **matchlock** arm that was cumbersome and slow to fire. They were used to hunt game that was at rest or moving slowly. Fowling pieces with **wheel lock** designs were faster, but they were complicated and very expensive. When the **flintlock** design became available, shotguns became accessible and effective hunting arms and the arm of choice for hunting moving game. Caplock muzzleloading shotguns increased their speed and reliability, and soon they were replaced by single- or double-barrel breach-loading shotguns. Other action types developed rather rapidly, giving us the wide variety of shotgun designs available today.

Shotguns are the arm of choice for swiftly moving targets or situations where a pattern of smaller pellets (shot) is preferred to a single projectile. They still have some law enforcement and military applications, but the vast majority of all shotgun use is for recreational purposes. Millions of shooters participate in a variety of shotgun-shooting games using clay targets. The shotgun is also preferred by many hunters for small game, waterfowl, or upland birds. In some areas, the versatile shotgun is even used with specially designed loads of buckshot or a single projectile for hunting big game.

The shotgun usually fires a large number of pellets, called **shot**, instead of a single bullet. Once the shot leaves the barrel it spreads out forming a pattern. The pattern is the area covered by the spreading shot, increasing the likelihood of hitting the target.

Parts of the Shotgun

The phrase "lock, stock and barrel" refers to the major parts of a muzzleloading firearm. Modern shotguns are made up of three basic groups of parts: **action** similar to the lock), **stock** and **barrel.** They work together to make a functional shotgun.

Stock

The **stock** is the shotgun's handle. It helps you hold and shoot the shotgun comfortably and accurately. Fiberglass (or other reinforced plastics) and metal stocks are available, but most shotgun stocks are made of hardwood. Each part of the stock performs a function for the shooter. Stock designs affect shot placement, accuracy and shooter comfort. Most shotgun stocks have two sections, divided by the **receiver.** The rear part that fits the shoulder and supports the shooting hand and the cheek is called the **butt stock.** The part that supports the forward hand is called for **forend, forearm** or **fore stock.** On some shotguns movement of the forearm operates the action. Understanding the parts of the stock and how each part influences the behavior of the shotgun aids in shooting more comfortably and accurately.

The butt of the stock is the part that rests against the shoulder when the shotgun is mounted for firing. The blunt, top part of the butt is known as the **heel**. The more pointed, bottom part of the butt is the **toe.** Many shotguns have a **butt plate** made of plastic, metal or rubber attached to the butt. Others have a **recoil pad** made of honey combed rubber in that area. The butt on a few shotguns is simply checkered wood, with or without a metal skeleton around it. The shape and size of the butt is important in proper gun fit and recoil distribution. The vertical distance from the top of the heel to a line extended from the upper surface of the barrel measures **drop at the heel.** The amount of drop at the heel affects both the apparent recoil and the shooter's stance.

The top edge of the butt stock, running from the heel to the grip or wrist is the **comb.** A shotgun is properly mounted when the comb is brought firmly to the cheek. Like the drop at the heel, the **drop at the comb** is important in determining how "straight" or "crooked" a stock will be. Stock straightness is a major factor in regulating the relationship between the point of impact and the shooter's impression of where the muzzle is pointing. Straight stocks tend to pattern higher. Crooked stocks tend to pattern lower. Straight stocks also tend to recoil back rather than upward, reducing the apparent or felt recoil. When the gun is used to shoot rising targets, as in trap shooting, the comb may be built up to raise the **point of impact.**

The **grip** or **wrist** is the part of the stock you hold in your trigger hand. The grip is usually one of two basic shapes. The pistol grip is the most common. The straight or English grip is found on many light-hunting guns. Like building up the comb, the straight grip tends to raise the point of impact. The grip is often checkered to give the hand a more secure hold.

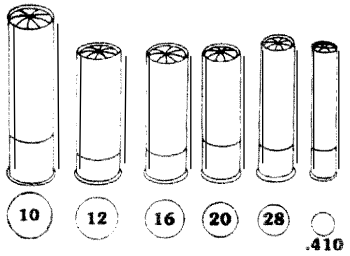
The part of the stock located under the barrel is called the fore stock, forend or forearm. Like the grip of the butt stock, the forend is often checkered, carved or otherwise sculpted to increase the security of the grip by the forward hand.

Barrel

The **barrel** is simply a tube through which the shot passes on its way to the target. The end of the barrel that holds the unfired cartridge is the **breech end.** The end from which the fired shot emerges is the **muzzle**. Since the muzzle points toward the impact area, muzzle direction must be controlled at all times to ensure safety.

The inside of the barrel is called the **bore.** Most shotguns have smooth bores, although a few specialty barrels may have straight or spiral rifling. In contrast, rifle barrels almost always have a spiraling set of lands and grooves that cause the bullet to spin, thus increasing its stability in flight.

Today most shotguns are manufactured in one of six standard bore diameters. Bore diameters are measured in **gauges.** Gauge is a measure that originated in England long age. Gauge was determined by the number of bore-diameter lead balls that could be cast from one pound of lead. Thus, the smaller the gauge number, the larger the diameter of the lead balls and the shotgun bore. A 20 gauge shotgun (20 lead balls to the pound) is substantially smaller in bore diameter than a 10 gauge (10 lead balls to the pound). Most shotguns are manufactured in six standard sizes. The modern gauges, starting with the largest bore, include 10, 12, 16, 20 and 28 gauge guns. The sixth standard boring is the .410 bore. This exception to the rule for shotgun sizes, this one is actually a .410 caliber, that is, its bore is 410/1000 inch in diameter. If expressed as a gauge, the .410 would be a 67½ gauge gun. Standardized ammunition sizes and barrel dimensions for each of these shotgun borings have been established by the arms and ammunition manufacturers. For safety reasons, cartridges designed for different borings should *never* be mixed. Ammunition for some boring will lodge in the barrel of others with potentially fatal results. Most shooters know that a 20 gauge shell will lodge in a 12 gauge barrel, but other potentially deadly combinations exist. Sixteen gauge shells will lodge in 10 gauge barrels, and 28 gauge shells will lodge in 20 gauge barrels.



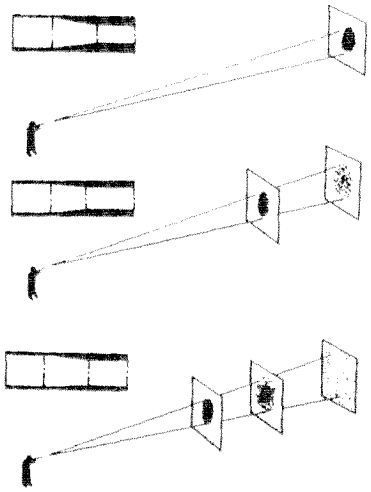
Externally the shotgun barrel appears to be a simple tube, usually with a small bead near the muzzle. It may also be fitted with a solid or ventilated rib. In some over/under doubles the side ribs are also ventilated to help disperse heat. Almost all shotgun barrels have one or more beads on them. Field guns usually have an additional smaller bead midway along the rib. These reference points may be made of metal, plastic or a combination of materials. Shooters may refer to them as sights, but they are merely reference points. Proper shotgun shooting calls for the gun to be pointed rather than aimed.

(Refer to supplement sheet 6)

Internally shotgun barrels are more than just a tube. At the breech end, they have a chamber designed to fit snugly around the appropriate shotgun shell. Beyond the chamber, the tube may have a uniform diameter; but most shotguns have some construction at the muzzle end of the barrel. That construction is called a **choke**. The

choke controls how fast the shot will spread out after it leaves the muzzle. Within a rather narrow range of tolerance, increasing choke constriction decreases shot dispersal. By keeping the shot in a more restricted area (a tighter pattern), the density of the pattern is increased. That increases the effective range of the shotgun, allowing the shooter to fire at longer distance. Selecting the appropriate choke for the type of shooting being done is part of learning to use a shotgun effectively.

A series of "standard" chokes are defined by the arms and ammunition manufacturers. These definitions include a range of tolerance, and they may differ among manufacturers or between guns. A shotgun with no choke constriction has a cylinder bore. Listed in order of increasing amounts of constriction the standard chokes include: cylinder, skeet, **improved cylinder, modified,** improved modified, **full** and extra full. (The ones in bold print are most commonly seen in field guns. The others are found mainly in target guns or those designed for special purposes, like long-range waterfowling, turkey hunting or shooting slugs.) A full or extra full choke shotgun has the tightest constriction and the greatest range. At close range a full choke pattern can be too small to consistently hit a moving target. When a close target is hit, the pattern is so dense that a clay target is "smoked" (reduced to a cloud of dust) or a game animal is ruined. The modified choke has less constriction than a full choke. The modified choke will have a shorter effective range than a full one, but a wider pattern at close ranges. Improved cylinder choke is less constricted than the previous two and gives a wide pattern at close range.



Three basic types of chokes are available in modern shotguns. First, in many shotgun barrels the choke is an integral part of the barrel, built into it during the manufacturing process. In other barrels, a threaded portion of the barrel may accept short tubes with different choke constrictions built into them. Having a variety of choke tubes that may be used greatly increases the versatility of a shotgun. The tubes are small enough to be easily carried in the field or to the range. The third choke design is a collet-type that is adjusted by rotating a collar. As the collar is tightened, the collet moves a set of thin steel blades closer together. That increases the choke constriction and degree of choke. These devices are attached to the barrel after it is made. Different chokes are obtained by adjusting the collar to the proper setting.

Action

The moving parts that allow you to load, fire and unload the shotgun are called the **action.** Most of these parts are housed in a metal frame called the **receiver**. There are many different types of actions, among the most common are **hinge, bolt, pump** or **slide** and **self-loading** or **semi-automatic**.

In nearly all cases, the action cocks a shotgun by compressing a main spring that drives the **firing pin** or **hammer**. The spring-loaded

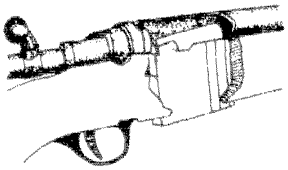
hammer locks in place until released. Loading is done by opening the action and placing a shot shell into the chamber (or a loading port) at the breech end of the barrel. Then the shell is locked in place with a bolt or breech block as the action is closed. Operating the action on many shotguns requires you to activate a button or lever called the **action release.** The cocked and loaded firearm can be fired immediately and should always be treated with care and respect. On a target range, the shotgun should be loaded only in immediate anticipation of a shot and according to the rules of the game being shot. When in the field (hunting), the **safety** should be placed in the ON position. A safety is a mechanical device. Like other mechanical devices it may fail to operate properly. Ultimately safety depends on the person holding the shotgun. Never point a gun at something you are not willing to shoot.

In order to fire the shotgun, move the safety to the OFF position (if it was ON). Then simply press the **trigger.** That releases the spring energy stored by the opening of the action, causing the firing pin to strike the battery cup and fire the round. The trigger is the lever pressed to fire the shotgun. It is surrounded by a **trigger guard** to help prevent accidental firing. The trigger finger should stay outside the trigger guard until you are ready to shoot – under all circumstances. Under hunting conditions, the finger acts as an additional trigger guard to prevent brush or other obstructions from reaching the trigger. Remember – ALWAYS keep your finger outside the trigger guard until you are ready to fire.

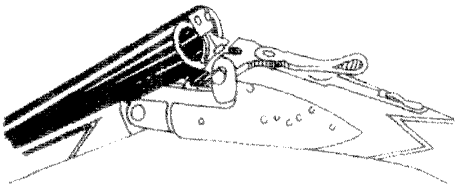
ALWAYS keep your finger outside the trigger guard until you are ready to fire.

Some types of shotguns have a **magazine**, a part of the action that stores additional shot shells until they are ready to be used. Operating the action ejects the fired shell and loads a fresh one into the chamber. Some bolt-action shotguns have clip-fed magazines, but most shotgun magazines are tubular and located immediately below the barrel. A careful shooter always checks both the chamber and magazine of a shotgun to be sure they are empty before handling it.

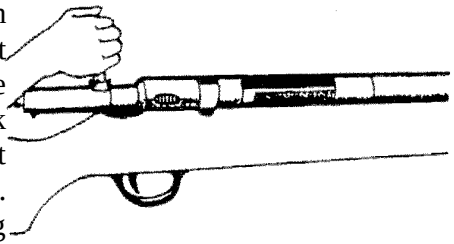
Action Types



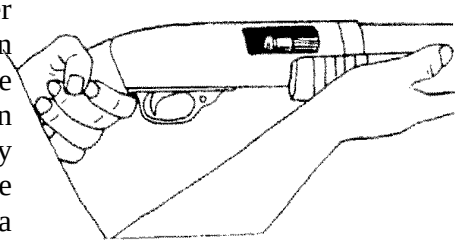
There are four basic action types commonly used in shotguns. One of the oldest designs is the hinge or break action. This action operates much like a hinge on a door. The action is opened by pressing the action release lever (usually to the right). The barrel(s) are then pivoted down, exposing the chamber(s) of the shotgun. This cocks the action and lifts spent cartridges to ease removal or ejects them by spring action. To load, place live round(s) in the chamber(s) and close the action. Hinge-action firearms are easily checked to see if they are loaded or if the barrels are obstructed because the shooter can physically see down the barrel(s). Shotguns of this type come in three basic forms. Many single-shot break action models are available. Some of them are inexpensive, and other are among the most expensive shotguns made. Double-barreled shotguns (doubles) come in two basic styles. The barrels may be fixed **side-by-side** or stacked vertically. Those with the side-by-side arrangement are



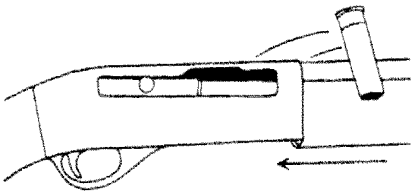
known as doubles or side-by-sides. Those using the vertical arrangement are called **over/unders.**



Bolt-action shotguns operate on the same principle as a door bolt. Much more common in rifles than in shotguns, the bolt action is strong but relatively slow. Bolt-action shotguns are usually relatively inexpensive guns. Lifting the bolt handle cocks the shotgun, and drawing the bolt back ejects the spent cartridge. A new one loads when you push the bolt forward and rotate the bolt handle downward, locking the action closed. These shotguns are suitable for many types of hunting, but slow cycling and awkward action for a second shot makes bolt actions a poor choice for most clay target games. Bolt action shotguns are readily available, but probably the least common action in use today.



Pump or slide action shotguns resemble a trombone or an insect sprayer in action. Pulling the forearm back toward the receiver cocks the action and ejects the spent shell. Pushing it back toward the muzzle loads the next round and locks the action closed. If the shotgun is not fired, the gun remains in a closed and locked condition until an action release (usually located near the trigger guard) is pressed. Experienced shooters can fire several rounds in rapid succession, often as quickly as a shooter using a semi-automatic shotgun. Many hunters use pump action shotguns because they are reliable, positive and durable under all sorts of weather conditions.



Semi-automatic actions could be more properly called “self-loaders.” The action uses some of the recoil energy or gases from a fired shot to cock the hammer, eject a spent round and load a new one. Most semi-automatics lock open when the magazine is empty. A fresh round can be loaded by inserting a shell into the loading port when the bolt is locked back. Pressing the action release allows the action to close by spring tension. In normal operation, the shooter merely pulls the trigger to shoot a second round. The trigger is equipped with an interrupter, so it must be released between shots. Self-loading shotguns are extremely popular with both target shooters and hunters. Most models are heavy compared with other action types in the same gauge. The weight can help smooth a shooter’s swing, and the quick follow-up shot requires little effort. By using part of the recoil energy to operate the action, semi-automatics spread the recoil energy over a longer time and reduces its impact. Most semi-autos require more care to keep clean and function smoothly than other types of shotguns.

Shotgun Ammunition

(Refer to fact sheet #9)

Modern shotgun ammunition is composed of five basic parts. The **case** or shell is a container for the rest of the components. The initial spark is provided by the **battery cup** or shotshell primer. Like other ammunition, shotshells contain a powder charge. The powder is separated from the shot or other projectile by a **wad column** of some type. Most shotshells carry a charge of **shot**; but some are designed to use a single projectile usually a **rifled slug.**

The most common types of shotshell cases or shells are made of paper or plastic, but brass cases are available from some sources. The **head** of the shell is the part that is located in the rear of the chamber when the shell is loaded in the shotgun. The flat, back portion of the head is marked with information on the manufacturer and gauge of the shotshell. This material is known as the **headstamp**. The **rim** of the shotshell's head serves two primary functions. It provides the proper **headspace** for the cartridge in the firearm's chamber and allows the shotshell to be extracted from the chamber. Most shotshells have metal rim, but some have a case composed entirely of plastic including the rim. In shells with a metal head, the length of that head varies considerably. In most modern shotshells, the height of the metal head on the body tube has very little to do with the strength of the tube itself.

The shotshell case contains a base wad at the head end of the tube. In compression-formed plastic cases the base wad is an integral part of the case. In composite cases, those made up of several parts, the base wad may be a separate plastic unit, rolled paper similar to the case body in design or another material. The base wad strengthens the head of the case.

The case or body tube holds the other components in place prior to firing, keeps them in proper relation to one another and provides an initial seal for the gases produced by the powder. The **case mouth** is crimped to maintain the integrity of the shell.

Crimps come in two basic designs. Rolled crimps are used in conjunction with rifled slugs, sabots or overshot wads. They are formed by simply tucking the end of the body tube back inside itself forming a smooth rim. Folded crimps lock the end of the body tube into a series of six or eight pie-shaped wedges with adequate pressure to lock them in place. Most modern shells containing shot use a folded crimp.

The battery cup is the shotshell primer. It contains a pressure sensitive chemical that detonates when compressed between the base material of the battery cup and the internal anvil. The flash from the process is directed through the opening in the top of the battery cup into the powder charge, igniting the powder.

Stem (Reactions Hot times)

Nearly all modern shotshells use a progressive, smokeless powder as a propellant for the shot. This powder generates much higher chamber pressures than did the black powder it replaced. The powder charge is listed on the cartridge box in **dram equivalents**. That is an approximate measure of the velocity of the shot charge, based on the velocity that would have been generated by the listed number of drams of black powder.

The wad column serves two primary functions. It seals the powder gases behind the shot charge, and it cushions and protects the shot from being deformed during firing. The wad column may be composed of a single plastic unit or a series of components. The plastic unity combines a gas-sealing skirt with a cushioning section and a shot cup that protects the shot from abrasion on its way down the barrel. Other types of wad columns may use a plastic or card wad to seal in the gases

and a cork or fiber wad to cushion the shot with or without a separate shot cup or plastic liver strip. Plastic units are used by the vast majority of handloaders as well as many manufacturers.

Stem (I need energy)

The shot charge carries the energy produced by the shotshell to the target. Shot is made from lead or lead alloys, steel and a few other materials. **Fine shot** is commonly formed by pouring molten material through a screen and allowing it to drop into a water bath at the bottom of a tower. It is commonly available in sizes from BB to #9. The diameter of the shot is approximately 0.17 inch minus the shot size. Thus, #2 shot is about 0.15 inch in diameter and #9 shot is about 0.08 inch in diameter. **Buckshot** is cast in molds rather than in a shot tower. The smallest buckshot is #4 buck, approximately 0.24 inch in diameter. The largest is #000 buck, approximately 0.35 inch in diameter. Rifle slugs are bore diameter projectiles intended for large game. Most American slugs are shaped like an inverted cup. Some European slugs are longer with an attached wad column. Some manufacturers make bullet-like projectiles contained in a set of plastic sleeves or sabots for the same types of uses.

Pattern density, the number of pellets per unit or area in the shot pattern, is inversely related to the shot size. Larger shot are more dispersed because there are fewer of them in the shot charge. **Pellet energy**, the striking energy of each pellet, is directly related to the size and mass (weight) of the pellet. Larger pellets retain their energy longer and hit harder than smaller ones. Shotgunners must strike a balance between pattern diversity and pellet energy when selecting shotshells. Usually target shooters use light charges of #9, #8 or #7½ shot. Shotgun hunters match the shot type, size and charge to the hunting conditions and quarry.

Common Shotshell Loadings

Stem (Gravity-It's a drag)

Commercial shotgun shells are available to fit a variety of chambering's. The largest shotgun shells readily available in this country are loaded for the 10 gauge. Shells are loaded in two lengths, $2^7/_8$ and 3½ inches, with shot charges as heavy as 2½ ounces of lead shot or slightly lighter charges of steel shot. Shotguns in this gauge are used primarily in hunting waterfowl, turkeys and big game. They may not be used in any target games.

The 12 gauge shotgun is the most versatile boring available. It has standard chambering's for 2¾, 3, or 3½ inch shotshells. Shorter shells may be used in longer chambers, but using longer shells in short chambers results in dangerous pressures. Shot charges of an ounce or less up to 2½ ounces of lead shot in the 3½ inch case are available. Steel shot is readily available for 12 gauge guns in all case lengths.

Standard loadings for the 16 gauge are 2¾ inch cases loaded with shot charges of 1 to 1¼ ounces of lead shot. Though less common than 12 gauge ammunition, steel shot for 16 gauge guns is readily available. Users of older 16 gauge guns should be certain that the chamber is actually 2¾ inches, since earlier guns may have been made with chambers slightly shorter.

Second only to the 12 gauge in versatility, the 20 gauge is manufactured with either 2¾ or 3 inch chambers. Shot charges from the standard target load of $^{7}/_{8}$ ounce to 1¼ ounces of lead shot are available, as are charges of up to 1 ounce of steel shot. As with other gauges having several chamber lengths available, shorter shells may be used in long chambers, but the reverse condition is very dangerous.

The 28 gauge is available in the 2¾ inch chamber length only. This smallest shotgun gauge is commonly loaded with either ¾ ounce or 1 ounce of lead shot. Steel shot is not available.

The .410 bore is loaded in 2½ or 3 inch cases. The shorter case is normally loaded with ½ ounce of lead shot. The longer case carries an $^{11}/_{16}$ ounce shot charge. As with the 28 gauge, steel shot is not available.

Two potential hazards bear repeating. Use of longer shells in any chamber that is not designed for them is very dangerous. Be sure to check the chambering of the shotgun before selecting ammunition. The second potential hazard lies in the potential of one gauge of ammunition lodging in the bore of a larger gauge. Three deadly combinations exist: 16 gauge in 10 gauge, 20 gauge in 12 gauge and 28 gauge in 20 gauge. This hazard can be avoided by making sure you carry only shotshells for the gun you are shooting at the time and **never** mixing gauges of shotshells.

Summary

Shotguns come in several different borings and action types, but all of them share some common parts. Every one has a stock, action and at least one barrel. From the tiny .410 bore to the 10 gauge magnum, shotguns are relatively short range firearms designed to shoot a cluster or pattern of shot. Gauges are now standardized, but they were based on the number of bore-sized lead balls that could be cast from a pound of lead, The spread or dispersion of shot is controlled by the amount of constriction or choke in the barrel. We discussed factors to consider when looking for a shotgun, and how to tell a rifle from a shotgun (at least most of the time).

Be sure to review this material before the next meeting. If you do not understand something, write it down and bring your questions to our next meeting. Next time we will learn about safe gun handling.

Summary Activities

1. Use an informal quiz to review the material covered.
2. Relate shotgun action types to common household items and review the action types.
3. Have older members or junior leaders prepare and present demonstrations illustrating certain points.
4. Break the group into small clusters. With an adult or junior leader in charge of each group, have them handle each type of shotgun available, loading and unloading them using inert ammunition (such as action providing dummy rounds). ABSOLUTELY NO LIVE AMMO SHOULD BE PERMITTED IN THE AREA!

Absolutely no live ammo should be permitted in the area!

Sharing or Exhibit Ideas

1. Discuss the parts of a shotgun, action types or ammunition parts with an adult or another shooter using diagrams or illustrations.
2. Construct a quiz board covering shotgun parts or action types.
3. Make and display posters of shotgun action types or parts to be used in teaching the shotgun program.
4. Study the history of shotguns and their role in the settlement of North America. Prepare and share a report on your discoveries.
5. Demonstrate principles of shotgun safety and proper shotgun handling.
6. Demonstrate how various shotgun actions operate using dummy or inert ammunition.
7. Study the importance of stock fit and present a report on it to your group or another group of interested people.

The Next Steps

I. What do you do after the student has broken the first target

A. Show them how to work different action types

B. Explain chokes and their function and how to properly choose the correct one

C. Explain ammunition (gauges and different loads, how to choose the correct one)

D. Take them to the next level (Letting them load, mount and fire on their own)

II. Action Types

A. Semi-Automatic

1. Action releases and where they are located
2. Keep fingers out of action
3. Location of safeties
4. Magazines and how it stores the ammunition waiting to be used.

B. Pump Action

1. Action releases and where they are located
2. Keep fingers out of action
3. Location of safeties
4. Magazines and how it stores the ammunition waiting to be used

C. Break action

1. Different types (side by sides, over under, single barrel)
2. Location of safeties and their different functions on this type (Barrel selectors)
3. Field guns reset safety every time gun is opened, most target guns do not

III. Chokes

A. Screw in

1. Most new guns are fitted with this type
2. Never fire a gun fitted with these without one in place

B. Fixed choke barrels

1. Markings on barrel show you what choke it has
2. Have to change barrels to change choke selection

IV. Choke Types

A. Full

1. Long range choke (up to 50 yards)
2. Typically the tightest choke that comes with field guns

B. Modified

1. Medium range choke (25 to 40 yards)

C. Improved Cylinder

1. Short range choke (20 to 35 yards)
2. Most open choke that comes with typical field guns

V. Ammunition

A. Gauges and how to determine the proper size

B. Shell length (look on the barrel to know what length shell it will take)

C. Target loads vs. game loads

VI. The Next Step

A. Pick up where you left off (finger point, finger point bang, firing a shot)

B. Assume gun ready position

C. Let the student mount gun (practice this several times with unloaded gun)

D. Hand student ammunition and let them load and mount gun

E. Put the gun in the proper hold point and let them fire the shot

F. Use your judgment as to when you can let them handle the ammunition on their own

Chapter 5 The Next Steps

After you have fired the first shots with the instructor handling all the ammo, loading the gun, and placing the gun in the correct place on the shoulder. The next step is to start letting the student learn the proper way to load the gun, mount the gun, and know what to do in the case of a malfunction.

By the time you return to the range you should have covered, parts of the shotgun, action types and how they operate. Let each student operate all of the different types of actions, and cover the safety issues associated with each one.

Semi-Automatic-The action release closes the action. Keep fingers out of the action, the gun is designed to take a shell out of the magazine and put it into the chamber. All you have to do is drop the shell into the action with the crimp end toward the chamber. The gun will do the rest. Different makes of Semi-Automatics operate differently. Some actions will not stay open if it has not been fired unless you trip a lever (Beretta). The magazines that hold the shells waiting to be fired are located below the barrel. Show how to take the different makes apart and check the gun to make sure it does not have an obstruction in the case of a squib load or the barrel makes contact with the ground.

Pump-Action-The action release allows you to open the action if it has not been fired. You also should not put fingers into the action. This action is designed to take a shell out of the magazine and put it into the chamber. Action releases are in different places on different makes of guns. Have different models available to demonstrate. The magazines that hold the ammunition waiting to be fired are located below the barrel. Show how to take the different makes apart to check the gun to make sure it is safe in case of a squib load or the barrel makes contact with the ground.

Break Actions- There are basically three types of break actions. Side by sides or double barrels, over under, and single barrels. The action release allows you to open the action on all of these. This action type is the easiest to make sure you don’t have an obstruction in the barrel. All you have to do is open the action and look through the barrels or barrel. Most of the safeties on this type of firearm are on the tang behind the action release lever. Some of these safeties also serve as a barrel selector to choose which barrel will fire first on the side by side and over under guns. Some of the barrel selectors are located behind or in front or the trigger. Most field guns reset the safety every time the action is opened, so you need to make sure you take it off every time you open the action to load it. Most target guns do not reset the safety when the action is opened.

You should have also covered chokes, their function and how to choose the proper one for what you will be shooting. Screw in chokes should be in place and you should never fire a gun fitted with them without the choke in place. Most fixed choke barrels have markings on the barrel that tell you what choke that barrel has. The three basic chokes that most guns come with are, Full, Modified, and Improved Cylinder.

Full-The tightest with an effective range up to 50 yards

Modified- Medium range choke with an effective range of 25 to 40 yards
Improved Cylinder- Short range choke 20 to 35 yards.

Let your students check the chokes to make sure they have the proper chokes in the guns they will be using.

Ammo should have also been covered with the students before we start letting them handle ammo and load the guns. Show them where the gauge is stamped on the barrel and make sure they only have the proper ammo for the gauge gun they will be using. The length of the shell is also stamped on the barrel. Go over ammo selection (Target loads vs. Game loads) this will be important when the students start buying their own ammo to bring to practice.

Firing the Next Shots

We are going to pick up where we left off at the range. Start out by letting the students watch a target, finger point at one, and finger point and bang at one. We want to keep reinforcing the pointing and not aiming. Go ahead and load the firearm, put the gun in the proper place on the shoulder and let the student shoot one. Take the gun back just like you have been doing. The next step is to get the student to assume the gun ready position that was covered previously. Hand them the unloaded gun using the same “Thank You”, “You’re Welcome” procedure we have been using. Tell them to bring the gun to their face then back to their shoulder. Let them practice this several times. If they are mounting the gun satisfactorily take the gun and let them rest a little bit. While you have the gun tell them that you will be handing them the ammo and letting them place it in the gun. The next step is for them to close the action making sure to keep the muzzle in a safe direction. Let the student mount the gun and if needed you put the muzzle in the correct hold point position. Get them to call for the target and shoot it.

We have added several new steps for the student to think about. Try to keep their focus on the target. If needed you can go back to mounting the gun for them to get them back to breaking targets (Last resort).

After they have mastered loading and mounting the gun the next step will be letting them handle their own ammo and keep control of the gun. Be sure to go over cease fire and what they need to do because up until now you were taking the gun from them every time they shot. This is going to be a judgment call that each instructor will have to make as to when to let them assume this responsibility.

Caring for Your Shotgun

James V. Peter, Jr. *

Objectives

Participating

1. Assemble the equipment and supplies needed to clean a shotgun.
2. Understand and practice the proper methods of cleaning a shotgun.
3. Understand and demonstrate the proper way to care for, store and transport a shotgun.
4. Have fun while learning.

Roles for Teen and Junior Leaders

- Demonstrate various stages of shotgun cleaning
- Assist shooters with assembly and use of the equipment
- Assist individual shooters with stripping or assembly of shotguns after cleaning.

Parental Involvement

- See Roles for Teen and Junior Leaders above.
- Provide shotguns for the cleaning program
- Provide necessary equipment for teaching the lesson.
- Arrange for or provide transportation.
- Arrange for or provide refreshments.
- Assist instructor in conducting the lesson.

Best Time to Teach
Any time of year when fired shotguns are available

Best Location
Classroom or shop area

Time Required
Approximately 1 hour

Materials/Equipment
- shotguns of various action types and models
- cleaning rods
- cleaning jags
- bronze brushes
- cleaning swabs
- cleaning patches
- powder solvent
- lubricant oil or light grease
- moisture protectant
- wiping rag
- action brush or toothbrush - punches and other tools for stripping shotguns

References
The Basics of Shotgun Shooting
H.W. Sheets, National Rifle Association
Washington, D. C. 1985.
Manufacturer's owner manuals
Cleaning product or kit manufacturer's literature

* County Extension director and agricultural agent for the Dubois County Office of Purdue Cooperative Extension, Jasper, Indiana.

Teaching Outline

Presentation	Application
I. Proper shotgun care important	
A. A big investment 1. Quality shotguns valuable 2. Value increases over time 3. Care determines value	DISPLAY several shotguns of different ages and types. DISCUSS ages, original values and current values.
B. Cleaning 1. Reduces wear 2. Prevents damage 3. Aids functioning	ASK how proper cleaning and storage can enhance value and utility. DISCUSS answers.
C. Storage and transportation 1. Protects shotgun 2. Protects other people 3. Protects you	
II. Cleaning	DISCUSS some general guidelines for cleaning shotguns used under various conditions and levels of use.
A. When to clean your shotgun 1. After each use 2. As needed 3. Frequency dictated by use • clean dry conditions, little or no shooting –light wipe down • wet, dusty or salty conditions – thorough cleaning • heavy shooting – thorough cleaning	STRESS importance of deep cleaning under wet or salty conditions. LABEL several shotguns with a variety of conditions and ASK shooters to recommend cleaning strategies. DISCUSS choices.
B. Equipment and supplies 1. Cleaning rod • proper length – 10 cm (6 inches) longer than barrel • proper size • accessories - bronze brush of proper gauge - cleaning jag - bore swab 2. Cleaning patches • proper size • cotton - flannel - muslin • synthetics	DISPLAY and DISCUSS proper tools and equipment for cleaning shotguns. DEMONSTRATE proper use of equipment and materials on a single shotgun as it is being shown.

3. Solvents
   - bore cleaning
     - powder residue
     - unburned powder
     - plastic residue
     - lead fouling
   - general purpose or special purpose

DISCUSS nature of some solvents and their function.
CAUTION shooters to have adequate ventilation.

4. Lubricating and corrosion resistance
   - light machine or gun oil
   - gun grease
   - moisture replacers
     - oils
     - silicone-based

DISPLAY various lubricating and corrosion preventive materials.
DEMONSTRATE their use on at least one shotgun

5. Other products
   - wiping rags
   - small brush
   - pipe cleaners
   - punches
   - screwdrivers
     - fitting gun screws
     - seldom necessary

C. Cleaning procedure

1. Minimum cleaning
   - wipe down external metal
   - wipe down stock

DEMONSTRATE and ADAPT cleaning techniques on one or more shoguns representing different action types, makes and models. AID individual shooters with specific elements of cleaning task.

2. Bore and surface cleaning
   - swab bore with patch and solvent
   - dry patch
   - oily patch
   - lightly lubricate moving parts of action
   - wipe down metal surfaces with moisture barrier

3. Field stripping and cleaning
   - bore
     - remove barrel from action
     - bronze brush and solvent
     - dry *lightly* oil bore and chamber
   - barrel exterior
     - dry and clean surface
     - apply moisture barrier
   - action

NOTE differences in cleaning needs among different types of actions.

CAUTION shooters that too much oil or lubricant is often worse that not enough. TINY amounts are usually adequate.

- remove action, bolt and operating rods
  - follow instructions from manufacturer
  - get help if needed
- brush loose fouling from action and bolt
- swab fouling or dirt from action rods
- brush or swab dirt and fouling from interior of receiver
- lubricate action rods and interior moving parts very lightly

STRESS importance of having a DRY operating surface for gas operated semi-automatics like Remington 1100 and similar actions.

- magazine tube and semi-automatic gas metering system
  - clean surface fouling
  - thoroughly dry surface
  - use dry lubricant or leave dry
  - reassemble action and operating mechanism.
- wipe all metal parts with moisture protectant
- excess oil or grease
  - fouls action
  - rots wood
  - use with care

REINFORCE hazards and potential damage from excessive amounts of lubricant.

4. Preparation for storage
   - thorough cleaning
   - moisture protectant
   - chemical drying agent in storage area

D. Stock care
1. Varies with stock finish
2. Oil finish – linseed oil
3. Varnish – thinned varnish
4. No petroleum oils

DISPLAY different types of stocks and proper use of stock treatments.

EMPHASIZE infrequent need for treatment.

III. Storage

STRESS that proper storage begins with a clean, safe shotgun.

A. Safety
1. Check before storing
   - clean
   - empty and safe
2. Secure from children and other unauthorized use

DISCUSS security needs and different levels of protection.

B. Security
1. Any locked storage
   - Security for family

- security for guns in friendly hands

2. Gun safes
   - security for family
   - security for guns
     - theft
     - fire

IV. Transportation

A. Legal bounds vary
1. State and local laws differ
2. Federal laws apply in inter-state travel
3. Your responsibility
4. Air travel restrictive

OBTAIN summaries of state and local regulations on transportation of firearms and MAKE them available to participants.

B. Sources of information
1. National Rifle Association
2. State associations
3. Common carriers

REFER shooters to common carriers for information on their transportation regulations.

C. Safety
1. Secure storage and protection of firearm
2. Empty – personally checked

STRESS personal responsibility for safety.

D. Avoiding image problems
1. Think of other people
   - appearances
   - potential impact on others
2. Consideration for others

E. Avoiding thieves
1. Out of sight
2. Locked, secure storage

DISCUSS image problems and avoiding temptation for thieves when transporting firearms.

V. Summary

A. Shotguns as investments

B. Care and storage important
1. Value
2. Functioning
3. Reliability

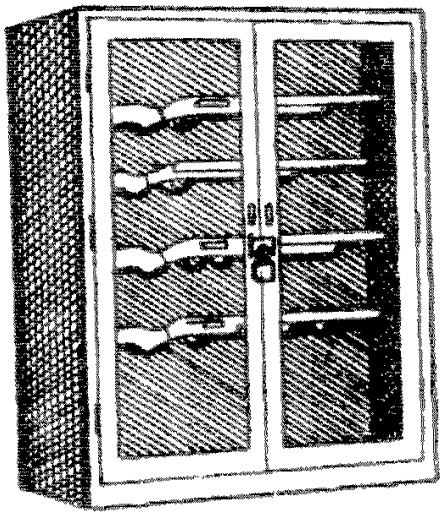
C. Safety a consideration

D. Transportation

USE questions to summarize the content of the lesson. Have each shooter CLEAN a shotgun under supervision and with assistance from a volunteer or teen leader.

Lesson 6 Narrative

Purchasing a shotgun is a major investment. Those made by modem manufacturers, even some very inexpensive models, are designed to give years of service. With proper care and use, they should last a lifetime and become treasured bonds across generations of shooters. Keeping your shotgun clean and properly maintained ensures years of trouble-free service and also maintains the gun's value. That can be helpful if you wish to sell or trade it for a different model or gauge later. Proper care supports appreciation of shotgun values as well. Nearly all models have increased in real value in the past and the trend is likely to continue.



Proper storage is also important. Storage must provide proper protection for the shotgun, preventing children or other untrained persons from having access to it. Security is also essential.

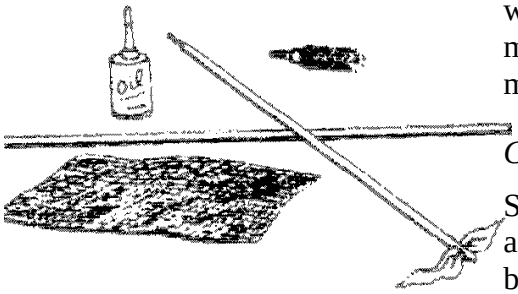
A shotgun must be protected from damage during transport. It also must meet all laws governing transportation of firearms. Finally, proper transportation must provide security for the gun. Proper storage, transportation and cleaning of your shotgun protects your shotgun, other people and you.

Cleaning Your Shotgun

How often should I clean my shotgun? Ideally the shotgun should be cleaned after every use. The degree of cleaning varies with the amount of use and the conditions under which that use took place. If used very little or merely carried without shooting under dry conditions, a simple one-pass bore swabbing and wiping the exterior surfaces may be adequate. After heavy use, or any time the shotgun is used under wet conditions or exposed to salt water or acid rain, cleaning may require complete disassembly and thorough cleaning inside and out. The same procedure should be followed if the shotgun is going to be stored for an extended time.

Cleaning Equipment and Supplies

Most commercial cleaning kits supply the basic necessities for proper shotgun cleaning. Your shotgun owner's manual or the manufacturer will tell you what is required in proper maintenance. Assemble the materials and equipment needed to do the job. General cleaning and maintenance requires the following items.



Cleaning Rod and Accessories

Shotgun cleaning rods usually have a relatively large shaft diameter and an adapter to handle standard shotgun cleaning aids. They should be at least 10 centimeters (6 inches) longer than the barrel being cleaned. Most shooters find a need for a bronze bore brush in the right gauge, a cleaning jag to hold cleaning patches and a cloth bore swab or mop of the proper gauge. The rod and its attachments

with an appropriate solvent is used to remove dirt, powder residue, unburned powder, lead fouling and plastic residue from the bore. It is also used to dry the bore and to apply rust preventive materials.

Cleaning Patches

A good supply of cleaning patches is necessary for any firearm cleaning session. They should be the proper size for the firearm you are cleaning. They can be made from soft absorbent cloth, old T-shirts, flannel or muslin. Commercial patches from these materials or synthetics designed specifically for cleaning shotguns are also available. These patches are used to remove fouling from the bore and to apply solvents or protective coatings.

Solvent

Several excellent general gun-cleaning solvents are available commercially. The residues and dirt that accumulate in the shotgun bore may be difficult to remove. Read the label and match the solvent to the task. Some solvents contain noxious compounds and must be used in a well-ventilated area. General-purpose solvents work well for cleaning a shotgun. Those products specifically designed to remove metal fouling from rifle barrels may not work properly.

Lubricating and Corrosion Protection Products

The moving parts of the shotgun require very light lubrication with a light machine oil, gun oil or gun grease. Use the minimum amount needed to accomplish the task. Excess lubricant can foul the action, slow functioning or induce rot in wood parts of the shotgun. Metal parts may also require use of some corrosion protection product.

Gun oil may be adequate for minimally demanding conditions. Synthetic products often provide tougher and more durable protection. Check the manufacturer's recommendations for the types and amounts of lubricants on your particular shotgun.

Other Gun Cleaning Materials

Screwdrivers with blades designed to fit gun screws or punches may be helpful in disassembly and cleaning operations. The cleaning kit should also contain one or more clean rags, a chamber brush, a small brush or toothbrush and a small supply of pipe cleaners. These will be helpful in cleaning actions and other hard to reach spots.

General Cleaning Techniques

Although it is impossible to tell you how to clean every specific shotgun action type, model and make, some general procedures are commonly used. Each part of the shotgun is cleaned using techniques that are easily transferred from gun to gun.

Cleaning the Bore

A fouled bore is cleaned by using a series of tools in sequence. Where easily accomplished, the barrel(s) is removed from the receiver for cleaning. A bronze brush of proper size for the gauge is attached to the

cleaning rod, saturated with solvent and swabbed through the bore to dislodge any fouling. Once the fouling has been loosened, it is removed using a series of cleaning patches on a jag or bore swab. Patches saturated with solvent are followed by clean ones, leaving a dry, clean bore. If desired, a lightly oiled patch may be run through the bore to leave a very thin film of protective oil in the bore. A chamber brush may be helpful in cleaning the chamber. In semi-automatics a clean, dry chamber may be critical to smooth functioning. When applying lubricants, do not fall prey to the notion that "if a little bit is good, a whole lot is better." Too much lubricant is worse than none at all.

Action Cleaning

The interior action parts of slide-action or semi-automatic action shotguns need periodic cleaning. Most of them are easily removed modules. They can be cleaned of debris and dirt with a brush and solvent. When the fire-control mechanism is removed, the action can be further stripped, allowing the receiver, bolt, action rods and other parts to be cleaned as well. Lubricate moving parts sparingly with appropriate materials. On gas operated semi-autos the gas ports need to be kept clean, and the exterior of the magazine tube and the associated gas containment mechanism must be clean and dry. Lubricants tend to collect powder residues and gum the operating mechanism quickly.

Stock Maintenance

Stock maintenance is rarely necessary. Most modern stocks are covered with a polymer or varnish finish that is durable, weather resistant and tough. It does not need oil or other treatment. Scratches or scrapes may be repaired by applying diluted varnishes or thin layers of polyurethane. Oil-finished stocks may be refreshed by using boiled linseed oil diluted with turpentine or mineral spirits.

External Metal Treatment

Light gun oil may be adequate under light duty conditions, but silicone-based materials that displace moisture and prevent corrosion may do a better job. Avoid the temptation to use excessive amounts of any material. A little is enough, a lot just causes problems. Dirt, fingerprints and even solvents in some plastic shotshell cases can start corrosion. Use a lightly treated rag to keep the metal clean and the protectant in place.

Minimum Maintenance

Minimum maintenance should include wiping down the external parts of the shotgun, swabbing out the bore with a dry patch and ensuring the shotgun is empty before it is put in the rack or case.

Bore and Surface Cleaning

The guidelines above for surface metal, stocks and bore maintenance should be followed. The shotgun should be checked once more to be sure it is safe before being put away.

Field Stripping and Complete Cleaning

All the steps outlined above should be followed. If you are not confident about any operation, seek the assistance of a veteran shooter who is familiar with your shotgun, or consult a gunsmith. Professional cleaning may be essential in some circumstances.

Preparation for Long-term Storage

Once the shotgun is thoroughly cleaned and checked to be sure it is safe, it may be placed in storage. As a safety precaution, you may want to use a chemical or electrical desiccant to keep moisture under control. Periodic checks of stored firearms is wise.

Proper Shotgun Storage

All firearms should be stored where they are not easily accessible to small children or other untrained persons in your home. Firearms attract attention and are very tempting items for people to handle. Assume others do not know how to handle any firearm properly until they have demonstrated a sound knowledge of proper handling. Storage to prevent improper handling can be ensured by storing all firearms in a safe condition, storing ammunition separately and using a locked chest or display cabinet. These cabinets provide relatively secure storage among people who do not wish to violate the obvious barrier. They provide very little security from theft. Shooters who want a more secure storage utilize heavy metal vaults or "gun safes." These units are usually bolted to the floor and provide maximum security for your valuable firearms.

All firearms should be stored where they are not easily accessible to small children or other untrained persons in your home.

As a minimum security measure, guns should be locked away, with access by youngsters or visitors denied. Shotguns placed in storage should be clean and protected from corrosive residue, moisture and fingerprints. Long-term storage makes these considerations even more important. Keep your ammunition in a cool, dry place. It is best to store guns and ammunition in separate places. The last thing you should do before storing a gun is to see that it is unloaded. The first thing you should do when taking a gun from storage is to check to be sure it is unloaded. This is especially important when more than one person has access to the guns.

Transporting Firearms

Rules and regulations for transporting firearms differ among states and among localities. Federal law governs interstate transportation and transporting firearms on common carriers like airlines. It is your responsibility to understand and abide by regulations in your area.

The National Rifle Association, state associations, common carriers and the place where you purchased your shotgun may be able to help you understand the regulations on transporting firearms.

Having an unloaded gun in a secure case locked in a secure area will comply with most laws. It is also wise practice in several other ways,

it avoids irritating people who do not like guns or any evidence of their presence in society. By putting yourself in their place, you may be able to see that avoiding the obvious gun in the vehicle avoids problems. It also prevents thieves from locating your shotgun readily and liberating it for their personal gain. Inaccessibility and secure storage are a wise choice when traveling.

Summary

Shotguns have real value that can appreciate over time. The care and cleaning of the shotgun has a major impact on that value as well as on the functioning and safety of the gun. Cleaning is relatively simple, but specific differences exist among action types, makes and models. We practiced the fundamentals of keeping the shotgun clean and in top condition. Considerations for proper storage and security were also discussed. Finally, we considered some of the elements of shotgun transportation, including legal considerations, security and public Image of shooters.

Summary Activities

1. Allow each individual or coach-pupil pair to clean a shotgun under the supervision of a qualified volunteer or teen leader.

2. Arrange a presentation on local firearms laws and regulations by an appropriate person.

3. Use a question and answer format to review the content of the lesson with the shooters.

4. Display several shotguns with descriptions of situations related to their use and have shooters prescribe appropriate cleaning needs.

Exhibit and Sharing Ideas

1. Enter important things you have learned in your shooting journal.
2. Demonstrate the proper way to clean a shotgun for a parent or other interested adult.
3. Construct a display of shotgun cleaning equipment and supplies, cleaning techniques for a given shotgun, shotgun storage or transportation laws or suggestions.
4. Develop a method demonstration of firearms cleaning, storage or transportation.
5. Explore the value of a *selected* make and model of shotgun over a period of 20 or more years. Show how shotgun condition may affect value. Write a report or construct an exhibit about findings.
6. Conduct a corrosion prevention experiment with several products under controlled conditions using small pieces of steel. Organize results and display in a science fair format or similar public display.

Fact Sheet 9

Shotgun Fit and Ammunition Selection

Proper shotgun and ammunition selection is vital for young people to successfully learn to shoot a shotgun. Shooting form faults will develop if shooters have difficulty handling the physical size, weight and recoil of a shotgun. Very young or small shooters are quickly tired by excessive gun mass or poorly fitting guns. They also feel recoil more severely, sometimes to the point of bruising and pain. That almost invariably results in flinching and the development of form faults. They are likely to see shotgun shooting as an ordeal rather than a challenging and fun activity. Since this is a voluntary activity, they may lost interest and drop out under those conditions.

Interest in shooting, desire to shoot better or prove ones self or similar motivations may drive the shooter to use equipment beyond his or her capabilities. The instructor must assist the shooter with selecting a shotgun and load to promote success. Success enhances the shooter's self-image and increases fun and interests. It also increases desire and willingness to learn.

Proper Gun Fit

Most shotguns are designed to fit the "average" American male, approximately 5'9" tall, of average build and weighing 170 pounds. Most people, particularly young people do not fit that description. As a result, the dimensions of the shotgun stock are not correct for the young shooter. Stock length is usually excessive for beginning shooters. The larger youth may be able to compensate for that length, but many smaller shooters will need to have a shorter stock to properly handle the shotgun.

Several manufacturers market youth models having stocks with a length of pull in the 12- to 13-inch range. In several cases, those stocks are interchangeable with "adult sized" stocks at a modest cost. An alternative is to have the stocks cut to the proper length by a competent person. When the shotgun is mounted properly, there should be approximately 2 inches of space between the shooter's cheek and the base of the thumb of the dominant hand. Two inches is the width of 2 or 3 fingers. Save the piece that is cut off so it can be reattached as the youngster grows. In addition to stock fit, the length and mass of the barrel is critical. The balance point of the gun should be between the hands for optimum gun handling. The shorter barrels of youth models work well with the shorter stock to keep the balance point between the hands, increasing handling ease. These guns are also lighter in weight and easier for smaller students to use.

GUN FITTING

Without a proper gun mount fitting a gun is a waste of time and effort. Once the shooter understands and can accomplish a decent gun mount we can begin to check for proper gun fit. There are several measurements involved in fitting a gun. Please keep in mind this is not intended to be make you a stock fitter but is only intended to approximate an acceptable fit for a new shooter. One can spend thousands of dollars on a custom fitted gun stock but the average new shooter cannot afford or be willing to spend that kind of money when first starting out. Keep in mind the object of fitting is to make the gun shoot where the shooter looks.

Length of Pull (the distance from the center of the trigger to the center of the recoil pad)

Much has been written about the proper length for a shotgun. The old method of holding a gun in the crook of ones' arm shows nothing but the relative length of the arm to the length of the stock. It is worthless in determining proper stock length.

In a pre-mounted game like trapshooting or skeet shooting length is to some extent a matter of comfort. Too short a gun encourages head lifting, and results in "whippy" gun movements. Too long a stock puts the weight of the gun further out, makes it more difficult to support and restricts movement on angle targets. So what is the proper length? When properly mounted the gap between the thumb knuckle of the strong hand and the cheek should be at least ~~1~~ two to three fingers wide. I believe longer is better so long as the shooter can still move comfortably to the angle targets.

So how do you change the length? If the gun is too short a thicker recoil pad or spacers may be the quick answer. It is not even necessary to fit the new pad and spacers until such time as you can determine you have what you want. If the gun is too long a thinner pad may be enough. You can even try removing the pad entirely on a temporary basis. This generally will shorten the gun at least and inch. This is temporary only! At a minimum, put some heavy duct tape over the exposed wood. One of the purposes of the pad is to protect the stock from splintering. In the end the only solution may be to cut the stock off, but proceed slowly.

Drop at the comb (the difference between the height of the top of the comb and the rib)

The critical measurement is the drop at the comb. To repeat, the critical measurement is the drop at the comb. It is this element of stock fit which determines the vertical position of the eye above the rib. Most female shooters and many kids require very little drop at the comb because the distance from the bottom on their cheekbone to the center of the pupil of the eye is extremely short.

There are several ways to check the alignment of the eye with the rib. The first is to ask the shooter to mount the gun with eyes closed and then on opening the eyes without moving the head tell you what he/she is seeing. Have the shooter mount the gun in front of a mirror eyes closed. Stand behind the shooter looking over the shoulder into the mirror. Have the shooter open both eyes and observe the position of the eye relative to the rib. You should be able to see all or at least most of the pupil of the eye above the rib.

If the comb height is correct the shooter should see directly down the rib with the center bead (if present) under the front bead. Some folks prefer the classic figure eight approach (front bead directly on top of the center bead). The preferred result is the shooter should see some rib, approximately ¾ of an inch between the beads. In any case the shooters eye must be above the rib or the tendency will be to lift the head to see the target because the gun is in the way of the shooter's vision. Too low a comb will sometimes cause even strongly one eye dominant shooters to switch dominance because the vision of the strong eye is blocked by the gun.

Keep in mind that the drop may be influenced by the position of the shooter's cheek on the comb. Most combs have more drop at the front of the comb and less at the back. As a result if the shooter puts the cheek in a different position on the comb the apparent drop will be different.

If the comb is too low it may be changed by the addition of such products as the Meadow Industries comb raiser, the Bear Tooth Comb raising kit or several other products available for that purpose. You can also increase the height with layers of moleskin being careful to go up and not out to the sides (more later). Once you have found the correct height use a larger piece of moleskin cut into a long oval to cover your handiwork and provide a smooth surface for the cheek. You can also use layers of Molefoam covered by electrical tape once the appropriate height is attained. Again, be careful not to add to the thickness of the comb. Up, but not out, is the key. This is doing it on the cheap but it works and works well. Ugly but effective.

If the comb is too high there are only two choices. Find another gun or stock or cut down the existing stock. If you choose to cut down the comb of an existing stock be careful the front of the comb is not higher than the back. If this happens your shooter will look like he/she did 10 rounds with Mike Tyson as the front of the comb recoils back into the face.

Cast (the alignment of the comb with the rib)

A gun whose stock is bent to the right is said to be cast off, bent to the left it is cast on. Cast controls the horizontal relationship of the eye and the rib. Frequently ~~a~~ right-eye dominate shooters need some cast off to line up their strong eye with the rib. Left-eye dominate shooters may need cast on to accomplish the same thing. Most mass built guns have little or not cast. If the shooter makes a proper gun mount and the eye is not lined up horizontally with the rib of the shotgun, changes to cast must be made. If we think of the eye as the rear sight of the shotgun (essentially, it is) and if the eye is lined up to the left of the center of the rib the shooter will tend to shoot to the left.

Changing cast is much like changing drop at the comb. Adding moleskin layers to the side of the stock will move the shooters eye further to the left (in shooters shooting right dominate). If however, you need to move the eye toward the stock there are two solutions. Having the shooter cant the gun slightly toward their face will sometimes solve the problem. Canting is generally not a good idea because I feel shooters have a difficult time doing so consistently and it does affect point of impact. Having said that, as inconsistent as it may be to do, sometimes it is the only choice available. Removal of some stock material from the side of the stock should be done with great care. Any material removed should be done evenly front to back with an eye toward not creating a “dishing” effect which will then recoil into the face. It is also critical that the comb not develop a knife like edge to transmit recoil to the face.

Some shotguns, Beretta autos in particular, come with spacers that can be put between the stock and the receiver to change drop at the comb and cast. Some shooters may be willing to go to the expense of having an adjustable comb and butt installed on their guns which allow for significant changes in length of pull, drop at the comb, and cast.

Pitch (the angle between the recoil pad and the rib)

Most mass produced guns now come with 0 pitch. Some shooters, particularly ladies, and barrel-chested men find that even with a good firm gun mount they are getting hit sharply in the face,

sometimes to the point of developing a “mouse” on the cheek. This can frequently be solved by introducing some down pitch. A quick and dirty solution to the problem is to loosen the recoil pad and insert a wedge of material (a small piece of wood, plastic or the folded up body of a shell will work) under the heel (top portion) of the pad and re-tighten the screws. Increasing the spacer until the thump goes away and then have a wedge shaped spacer inserted between the stock and recoil pad or have the stock cut at an angle for a permanent fix.

Finally, many shooters with small hands need some help with ***the grip***. Adding layers of moleskin to the front of the grip moving it forward until the shooter can comfortably reach the trigger with the first joint of the trigger finger. Afterward wrap the grip with tennis racket grip tape to keep the moleskin in place. This also forms a palm swell which helps the shooter position the strong hand. Even shooters who do not need to move the front of the grip forward sometimes find the grip tape helpful. In addition to forming a palm swell it has a tacky surface.

Not all shooters require all the changes to gun fit described here, proceed slowly, making any changes in small increments.

Action Types and Gauges

Light weight makes the shotgun more responsive and easier to hold, but it also increases the felt recoil. One of the best ways to handle the combination of handling and recoil is to use a gas operated semi-automatic shotgun. Although the laws of physics remain (for every action there is an equal and opposite reaction), gas operated actions spread the recoil over a longer time span. That reduces felt recoil, producing more of a push than a sharp blow. Most young people find the recoil of either 20 gauge or 12 gauge semi-autos acceptable.

Avoid the temptation to use smaller gauge guns with smaller shooters. Smaller gauge shotguns actually handicap the shooter. They have sparser patterns with less density at their edges. As a result, they require the shooter to center the target more precisely in order to break the targets consistently. For that reason, they are less effective as teaching tools. Avoid the temptation to go to 28 gauge or .410 shotguns. These guns belong in the hands of experts, and are extremely frustrating for beginners. To ensure success put more shot in the air with better pattern density. That increases the odds for the shooter. Stick to 12 gauges for shooters who can handle them, and plan to use 20 gauge guns for those who need a smaller one.

Barrel Length and Choke

Barrels 21 to 26 inches long help keep the balance point of the shotgun between the hands, easing the process of swinging to the target. That characteristic is very important to smaller students and it can be gained without serious loss of power.

Shotshells loaded with smokeless powder consume their powder within the first 14 to 18 inches of the barrel. Although slight increases in velocity and energy are attained with longer barrels, the gains are relatively insignificant. The belief that longer barrels shoot “harder” is a holdover from the days of black powder. Longer barrels have advantages in some situations. They provide a longer “sighting radius” and a smoother swing than shorter barrels.

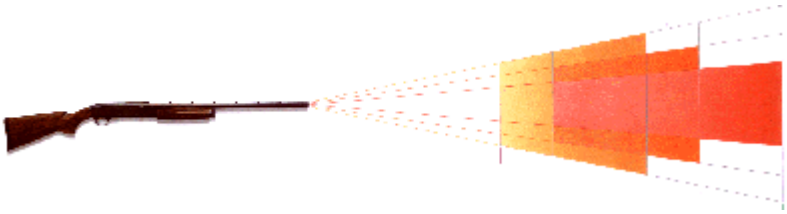
A large pattern is advantageous while the basics of shotgun shooting are being learned. Since the ranges are relatively short, skeet or improved cylinder chokes are preferred for instruction, even when trap fields are being used. Combining those chokes with small shot keeps the pattern both wide and dense, ensuring success for the learner.

Ammunition

Like the considerations on size and mass of the shotgun, selection of ammunition for instruction involves several competing factors. The weight of the shot charge and the weight of the powder charge determines the velocity and the potential recoil. Increasing the powder charge increases both velocity and recoil. Increasing the shot charge decreases the velocity while increasing the felt recoil. Light target loads in either 20 gauge or 12 gauge will give optimum performance. Extra light loads using one ounce of shot in a 12 gauge yield lighter recoil with minimal loss of pattern density. Using fine shot, #8 or #9, puts more shot in the pattern, increasing pattern density without increasing recoil. mild recoil, modest velocity and good pattern density contribute to success. Using heavier shot charges or increasing velocities beyond normal target levels increases recoil without contributing significantly to shooting effectiveness.

Shotgun Chokes

Chokes
Constriction in a shotgun's muzzle is referred to as "choke." The three most common chokes are full, modified and improved cylinder. Lead, Steel and Tungsten-Iron pattern differently in each of these chokes.



- Improved Cylinder Choke - Excellent for short range 20-35 yards.
- Modified Choke - Best patterns at medium range 25-40 yards.
- Full Choke - Shot pattern effective at a long range up to 50 yards.

To determine which load provides the best pattern density and most even pellet distribution, it is necessary to pattern a variety of loads at different distances.

Shotgun Gauges
The gauge of a shotgun means the number of lead balls that have the same dimension as the bore of the shotgun and weigh one pound. For example, it will take 12 lead balls the size of a 12 gauge shotgun bore to weigh a pound. The only exception is the .410, which is measured in inches.

10 Gauge **12 Gauge** **16 Gauge** **20 Gauge** **28 Gauge** **.410**

ENHANCE CONCENTRATION BY:

1. Remove distractions

2. Shoot single targets

3. Shoot from one position

4. Single flight path

5. Gunfit / Low recoil

* 2nd to Safety!

Most important item to success of the shotgun shooter?

* <u>CONCENTRATION</u>

(Shooters ability to concentrate)

Essential information

What essential piece of information is reviewed at the beginning of each lesson?

The lesson Objectives

Why the Questions?

Questions during the 4-H Shotgun training sessions are used to:

Arouse curiosity, Cause people to think, and review what we have learned, demonstrated, talked about during classes and workshops.

Shooting shotguns fitted with choke tubes

Question Should shotguns fitted with choke tubes be fired without the tubes in place?

Answer **Absolutely not!** Firing without the choke tubes in place can damage threads in the bore of the gun, continued firing could cause wear and improper fit of choke when it is installed.

Result can be a partial barrel obstruction or wad, shot, or slug catching the edge of the choke upon exit. Damage to firearm could occur and or injury or death to person shooting the shotgun, or persons in the immediate area.

Shot Distance

A lead shot pellet is heavier than a steel shot pellet of comparable size. (lead is denser than steel) Therefore, lead carries down range energy better than steel. Lead shot pellet being the heavier, will go a greater distance than the steel shot pellet of comparable size. To overcome this performance problem a hunter must use larger steel pellets to maintain the same performance. The accepted norm is to drop down two shot sizes for comparable performance. For example, #4 lead shot would be very similar to #2 steel shot.

Note:

The smaller the shot size (#) the larger the physical size of the shot.

The larger the shot size (#) the smaller the physical size of the shot.

Shotgun I & II

Shot Size

AVERAGE PELLET COUNT FOR SHOTSHELLS

TUNGSTEN-IRON				
Weight of Shot in Ounces (Grams)				
Shot Size	**7/8 (24.80)**	**1 (28.35)**	**11/8 (31.89)**	**13/8 (38.98)**
4	122	140	157	192
2	82	94	106	129
BB		54	60	74

TUNGSTEN-POLYMER				
Weight of Shot in Ounces (Grams)				
Shot Size	**1 (28.35)**	**11/8 (31.89)**	**11/4 (35.44)**	**13/8 (38.98)**
6	255	253	281	309
4	135	152	169	186

STEEL Weight of Shot in Ounces (Grams)									
Shot Size	**3/4 (21.5)**	**15/16 (26.58)**	**1 (28.35)**	**11/8 (31.89)**	**11/4 (35.44)**	**13/8 (38.98)**	**11/2 (42.52)**	**19/16 (44.30)**	**15/8 (46.06)**
7	316	395	422	475	527	580	633	659	685
6	236	295	315	354	394	433	472	492	512
5	182	228	243	273	304	334	364	380	395
4	144	180	192	216	240	264	288	300	312
3	118	143	158	178	197	217	237	247	257
2	94	117	125	141	156	172	187	195	203
1	77	97	103	116	129	142	154	161	167
BB	54	67	72	81	90	99	108	112	117
BBB	46	58	62	70	77	85	93	97	101
T	39	49	52	58	65	71	78	81	84
F	30	37	40	45	50	55	60	62	65

LEAD Weight of Shot in Ounces (Grams) (3% ANTIMONY)													
Shot Size	1/2 (14.17)	11/16 (19.49)	3/4 (21.25)	7/8 (24.80)	1 (28.35)	11/8 (31.89)	11/4 (35.44)	13/8 (38.98)	11/2 (42.52)	15/8 (46.06)	17/8 (53.15)	2 (56.70)	21/4 (63.78)
9	292	402	439	512	585	658	731	804	877	951	1097	1170	1316
8½	249	342	373	435	497	559	621	683	745	808	932	994	1118
8	205	282	307	359	410	461	512	564	615	666	769	820	922
7½	175	241	262	306	350	394	437	481	525	569	656	700	787
6	112	155	169	197	225	253	281	309	337	366	422	450	506
5	85	117	127	149	170	191	212	234	255	276	319	340	382
4	67	93	101	118	135	152	169	186	202	219	253	270	304
2	43	60	65	76	87	98	109	120	130	141	163	174	196
BB	25	34	37	44	50	56	62	69	75	81	94	100	112

Introduction

Shotgun Shooting in a Nutshell

Shotgun shooting involves placing a cloud of shot where a target will be when the shot reaches that location. The pattern or shot cloud is relatively large, so precise aiming is unnecessary. Aiming is a serious form fault in shotgun shooting. Timing and pointing are the keys to consistent shotgun shooting. The process involves several fundamental steps for successful target hits.

Determining Eye Dominance

Ronald A Howard Jr. and James V. Peter, Jr. *

Eye Dominance

Most people have a dominant eye, just as they have a dominant hand or foot. When a person looks at an object with both eyes, the dominant eye aligns directly with the object unless an obstruction interferes with a clear line of sight. Under normal conditions, when a finger is pointed at an object, or two or more objects are aligned visually, the dominant eye determines the alignment. Just as some people are truly ambidextrous, a very small number of people have indeterminate eye dominance. The majority, however, have a dominant eye. In most cases eye dominance and hand dominance are on the same side, but many people are cross-dominant. That is, their handedness and eyedness are on opposite sides.

Humans have binocular vision – they get slightly different images from each eye and blend them in the brain to yield one image and a sense of depth or distance. With both eyes open, you have a wider field of vision with more peripheral vision and better motion detection. In shot, you simply see better when both eyes are used. Experience shows that shooting skills are learned more easily and often better developed when a shooter learns from the dominant eye side. Where eyedness and handedness are on the same side, new shooters easily use the dominant side. Cross-dominant shooters have a greater challenge, but they do better when they learn to shoot with the dominant eye.

Some shooters, particularly those with successful experience in shooting with the non-dominant eye, are reluctant to switch. The switching process usually involves a brief period of reduced success and frustration, followed by improved skill levels beyond their original level. Some experienced shooters have learned to shoot one-eyed, closing the dominant eye or obstructing it with a shield, blinder, spot of tape of a small object on the lens of the shooting glasses. Others have learned to override their dominant eye through practiced concentration or to compensate in some other fashion. Fewer than 1 percent of all shooters must shoot one-eyed because of dominance switching. In most cases, the shooter learns to use both eyes and shoot from the dominant-eye side. Learning one-eyed or with the dominant eye obstructed or closed increases stress and fatigue, and reduces concentration and quickness. Results indicate reduced performance levels, increased frustration for the shooter and slower learning.

Leaning to shoot well is a challenge. You need every advantage to meet that challenge effectively. Learning from the dominant-eye side is a major advantage.

How to Determine Eye Dominance

Four basic methods for determining eye dominance are described. Those that provide a check for “cheating” are more effective in an instructional setting. Regardless of the method selected, the exercise should be repeated several times. Instructors should remain alert for eye-dominance related problems with shooting performance.

Coach-pupil Method

Shooters should get into their coach-pupil pairs, standing several arm-lengths apart and facing each other squarely. The “pupil” should place one thumb over the other, then cross the fingers of the top hand over those of the bottom one. This leaves a small, triangular opening. Raise the hands, keeping both eyes open, and center the “coach’s” nose in the triangular opening. At this point the coach should note which eye is visible in the opening. Then the “pupil” should bring his or her hands slowly back to the face, keeping the “coach’s” nose in the opening. The hands should come to the dominant eye. Coaches must watch closely for wavering between the eyes, an indication of “cheating” or forcing the hands to a predetermined eye. The exercise should be repeated several times to confirm original results with both partners checking their eye dominance.

Option: Shooters could cup their hands together, leaving small openings between the bases of the little fingers and the thumbs. A card or a sheet of notebook paper with a small hole centered in it could also be used.

Distant-object Method

Use any of the methods of making an aiming device outlined above. Center a distant object in the opening. Make sure both eyes stay open and face the object squarely.

Finger-point Method

With a pointing method, a distant object or a partner is used. The finger is pointed naturally at the object with both eyes open and the face square to the object. The eyes are covered or closed alternately. When the dominant eye is closed or covered the finger appears to jump away from the original location.

Tube Methods

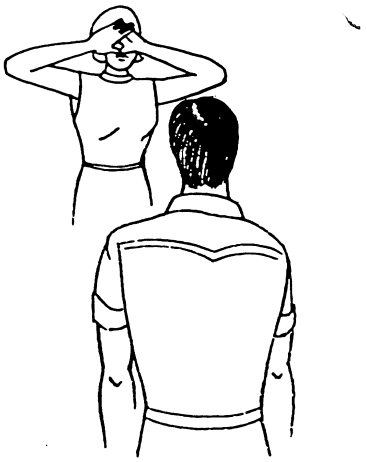
Kaleidoscopes, toilet paper tubes and similar objects can be used with many young people to determine eye dominance. When the person is not aware of being tested for eye dominance, the tube will almost always be brought to the dominant eye. This also occurs with spotting scopes, telescopes and similar tools where one-eyed viewing is needed.

Troubleshooting for Coaches and Instructors

Some shooters will bring the opening back to their own noses because they are looking at the paper or their hands rather than at the target. Those who use the finger-point method will see two fingers if they focus on their hand rather than on the target. If inconclusive results are obtained, try another method. Make note of that shooter, however, and watch for evidence of switching dominance in the act of shooting. Consistently missing to one side of the target usually indicates an eye-dominance related problem.

A Note of Caution

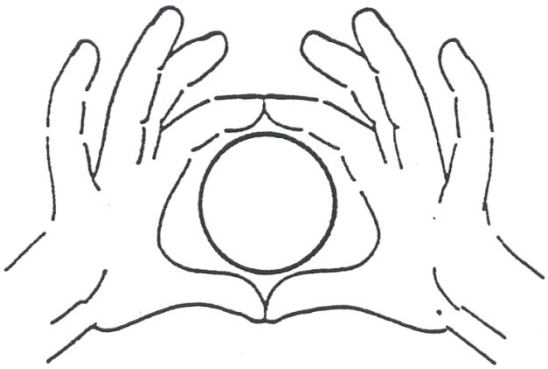
Vision problems can have a serious impact on shooting ability. Often they go undetected by the shooter or those around them. Unless you are an ophthalmologist or optometrist, avoid “diagnosing” vision problems, but be aware of the types of problems a

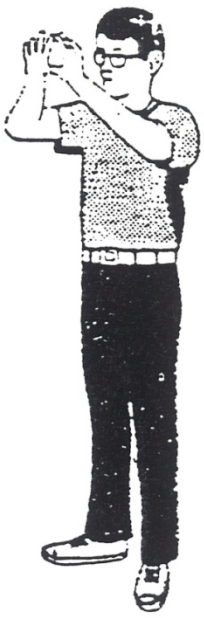


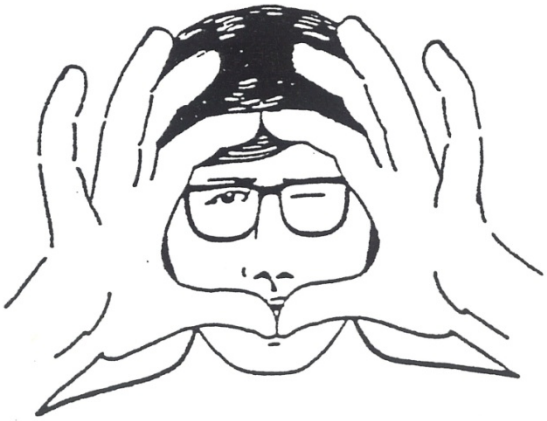
shooter with vision problems may face. Discuss any potential problems you observe with the shooter and his or her parents. Like teachers who notice reading problems or other vision related difficulties, the shooting instructor may notice things that even the shooter misses.

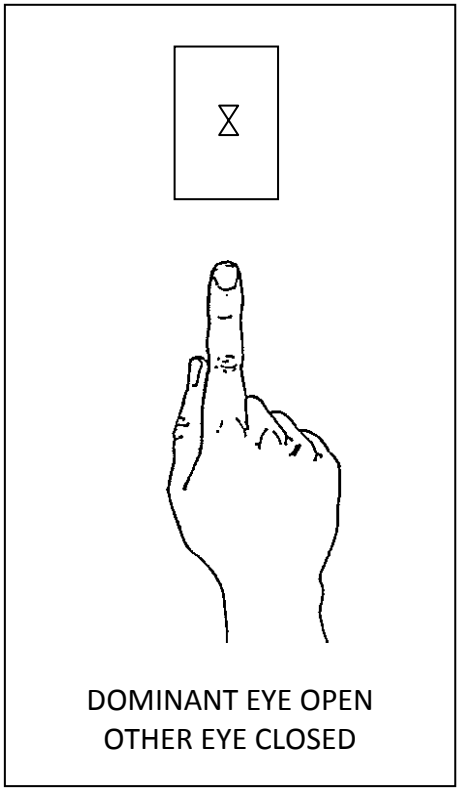
Finally, be sure that all shooters are wearing adequate eye protection while they are on or near the firing line. Some people recommend the use of shooting glasses even for archers. Eyes are precious and vision is vital to shooting. Let’s do our part in protecting them.

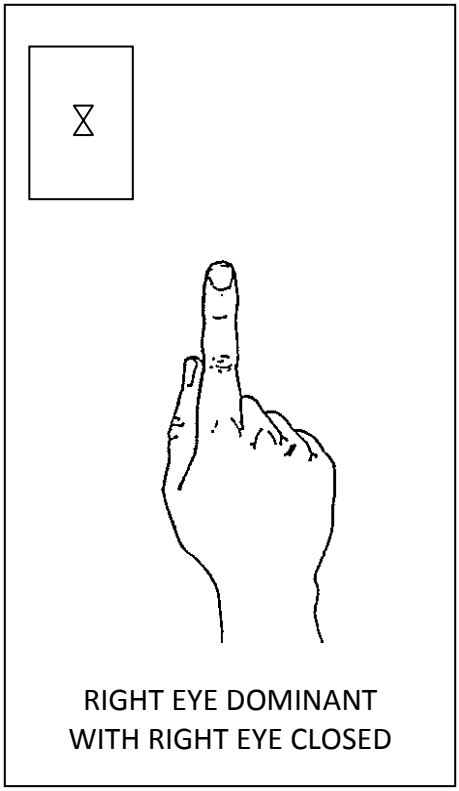
DOMINANT EYE

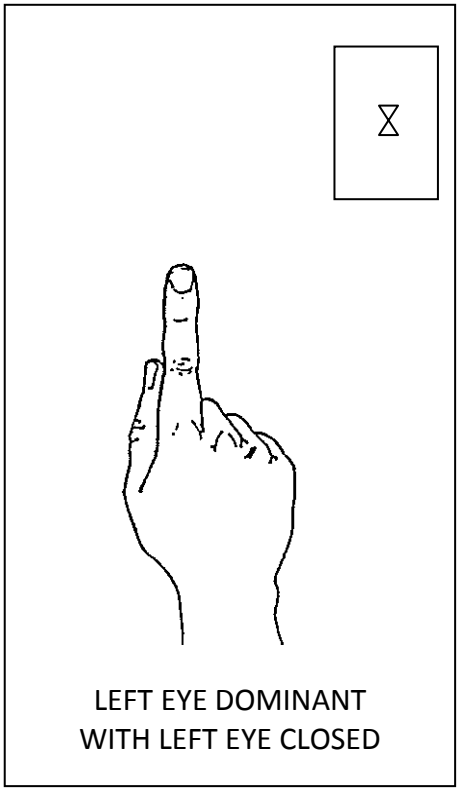












Check for Eye Dominance
With both eyes open, point your finger at a small object 10 - 20 feet from you.

Right Eye Dominance
Close your left eye and the object will not move.

Close your right eye and the object will appear to jump to the left of your finger.

Left Eye Dominance
Close your right eye and the object will not move.

Close your left eye and the object will appear to jump to the right of your finger.

Figure A-1: Two fingers of left hand simulate rear sight. Index finger *at* right hand simulates front sight. Represents perfect sight alignment.

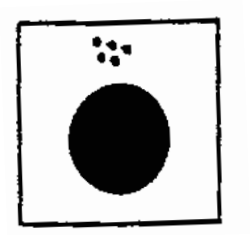


Figure A-2*:* Keeping tight hand stationary, move left hand down to simulate moving rear sight down.

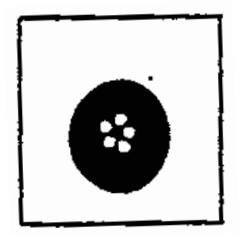
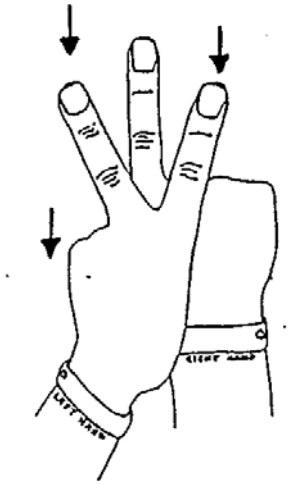
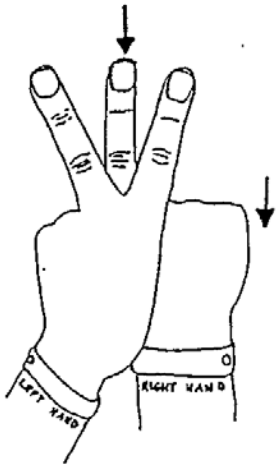


Figure A-3: After the rear sight (left hand) is moved down, realign sights. Thus, right hand moves down to simulate moving muzzle down.





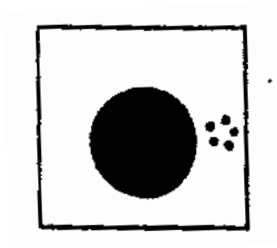


Figure B-1: Two fingers of left hand simulate rear sight. Index finger of right hand simulates front sight. Represents perfect sight alignment.

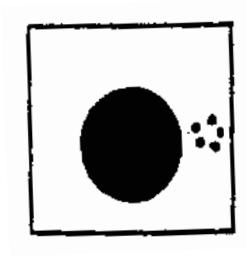


Figure B-2*:* Keeping right hand stationary, move left hand to the left to simulate moving rear sight to the left.

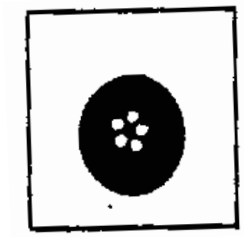
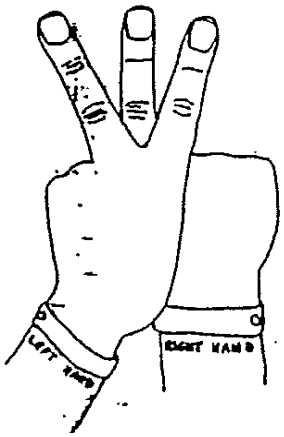
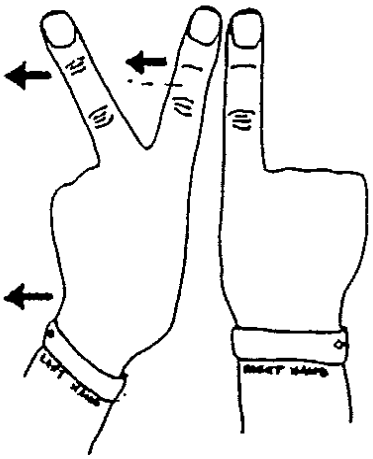
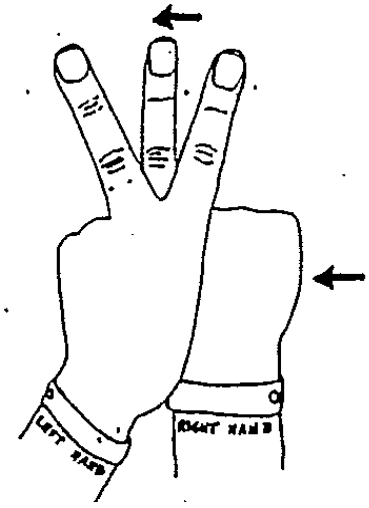


Figure B-3: After the rear sight left hand) is moved left, realign sights. Thus, right hand moves left 10 simulate moving muzzle left.







Non-threatening Hands-on Instruction

James V. Peter, Jr.*

A major element of shooting is stance. When working with shooters, particularly beginners, instructors frequently must use their hands to position them or correct their form or assisting them with equipment and shooting clothing. Even though close contact with the shooter is essential for effective instruction, the instructor must be careful to avoid any action that could appear improper or cause the student anxiety. A few simple actions can ensure a working relationship between instructor or coach and student without any question of anxiety or impropriety.

Respectful, non-threatening treatment of shooters begins with demonstration. Use a junior leader or an assistant to demonstrate proper posture or position and then as to how instructors will handle/assist shooters to correct their posture or position. By telling the shooter what you are about to do you can further reduce his or her anxiety. Ask permission before touching and tell the shooter you are going to push his or her torso forward, raise an elbow or reposition a hand. The posture of your hands when contacting the student can also ease anxiety. Except in an unsafe situation where immediate and decisive action is required, it is seldom necessary to "grab" a student or the firearm. When your hands are held relatively rigid with the fingers straight and the thumbs resting on the top of the hands, they are much less threatened. Pressure from the palms of flattened hands (fingers not curled) can accomplish most positioning and controlling needs. This is called "Non-threatening Hands On Instruction."

Non-Threatening Hands On Instruction

- Positioning or Stance
- Equipment & Shooting Clothing
- Always Respectful
- Use Demonstrations
- Request Permission to touch
- In response to students need
- Avoid Breasts, Buttocks, and Groin
- Should Be Open & Not Secretive
- Governed by Age
- Always Appropriate When Safety of the Individual or Group is At Stake

Examples and Advice

Assisting with coats, shooting vests or shooting coat or jacket. There are a number of adjustments that can be made on a shooting jacket/coat that help the fit and performance of the individual. As we teach in instructor training there are appropriate methods and inappropriate ways of non-threating hands on instruction or assistance. Utilizing same gender assistance or students helping students may be the most appropriate for the situation. Age of participants, gender, and individual permissions are also factors that must be considered. The one exclusion is when the immediate safety of the individual or others is at stake.

Trajectory and Trajectory Experiments

Ronald A. Howard Jr. *

Many people think that bullets, shot or arrows travel in straight lines just like light. It does not take much shooting experience to realize that projectiles and light behave quite differently. The physics of projectiles (ballistics) is discussed at the end of this fact sheet for those interested. The main purpose of this material is to help you understand how trajectory enters into shooting.

Under normal conditions, light travels in straight lines. Changes in the density of substances it passes through may deflect it, but within substances of fairly uniform density (like air) light travels in straight lines. Electromagnetic forces, like magnets can bend light, but it has no mass (weight).

Projectiles like bullets or arrows have mass. As a result, they respond to gravity under normal conditions. As soon as an arrow leaves the string or a bullet leaves the muzzle, it begins to fall, accelerating toward the earth under the influence of gravity. In fact, if an arrow or bullet was fired parallel to the surface of the earth on level ground, it would hit the earth at the same time as one dropped from the same height at the same time much farther away. In addition to their mass, projectiles are solid objects. Pushing them through a dense medium, like air, causes friction and turbulence. Both forces affect the projectile immediately. The projectile begins to slow down as soon as it leaves the string or the muzzle. The slowing influence is cumulative until the projectile finally comes to rest.

These two factors combined cause projectiles to follow a curved flight path. If two straight lines are used to show the line of the bore or the resting position on the string and the line of sight, the line of flight (path of the projectile) would relate to those lines as shown below (Figure 1).

The curved flight path requires that the bore must be pointed above the line of sight to hit a distant object on the line of sight. If the sights are above the bore or the arrow, it must cross the line of sight twice, once while rising and a second time while falling toward the earth. The exact shape of the trajectory curve can be determined by complicated mathematics or by testing. Actual testing yields better results for a given shooter and his or her equipment and is more easily understood.

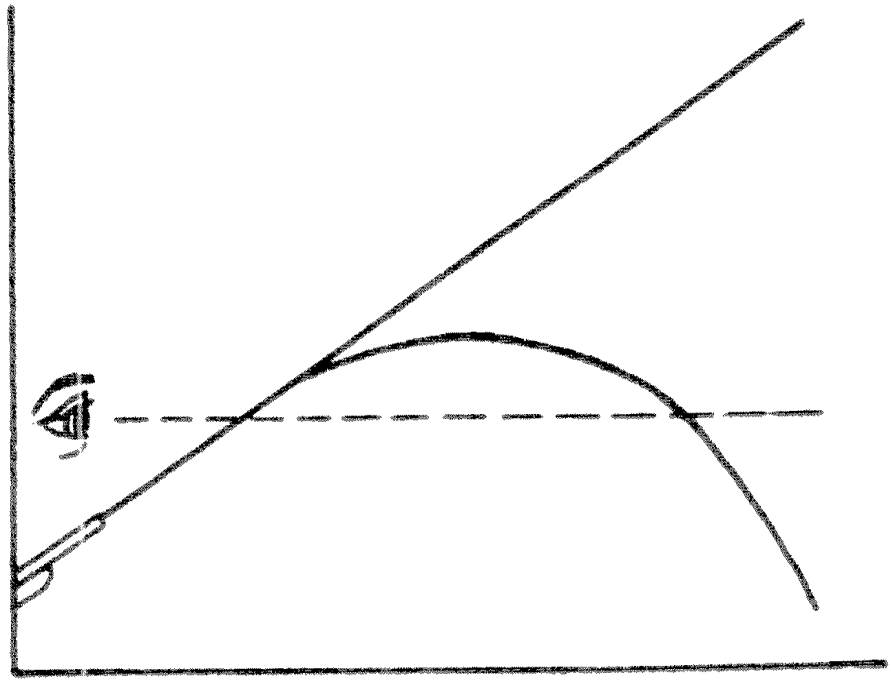


Figure 1. Relationships among line of sight, line of bore, flight path and drop.

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The projectile accelerates toward the earth at a rate of about 9.8 meters/second^2 (32 feet per second^2). If the projectile was fired parallel to the ground, it would drop 4.9 centimeters (0.16 feet) in the first 0.1 second, 19.6 centimeters (0.64 feet) in 0.2 second, 122.5 centimeters (4 feet) in 0.5 second, and 490 centimeters (16 feet) in 1 second (Table 1). In 3 seconds it would have dropped 44.1 meters (144 feet). If a projectile were able to travel at a constant velocity of 60.96 meters/second (200 feet/second), the trajectory would look like the graph in Figure 2. The actual flight path would curve more sharply downward, since the projectile would be slowing its horizontal motion as gravity pulls it to earth.

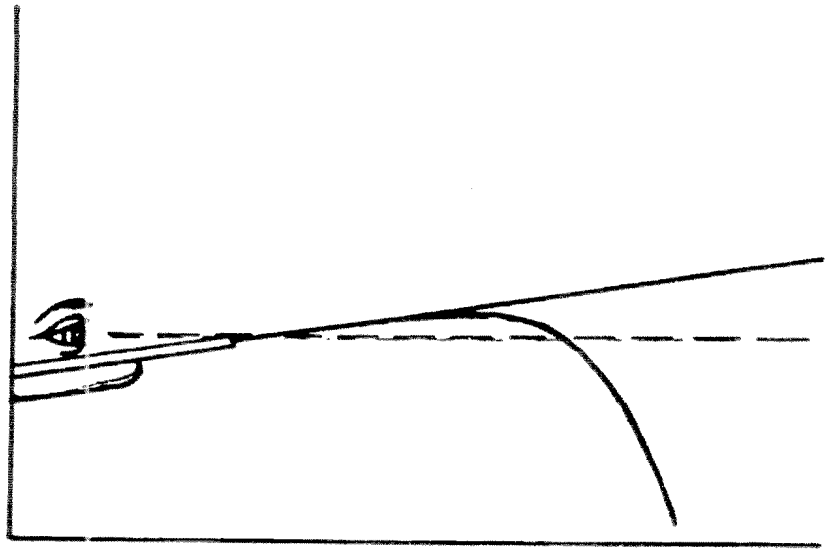

Figure 2. Trajectory of an idealized projectile traveling at a constant 60.96 meters/second (200 feet/second).

You can calculate the trajectory of your personal equipment as you have it set up using the worksheet attached. Shoot the same arrows throughout the experiment if possible. If not, shoot matched arrows with matched fletching. Leave the sight setting the same for all shots, and use the same aiming point for each shot and all distances. Measure from the aiming point to the center of the group of arrows and carefully record the distance above (+) or below (-) the point of aim for each distance. Stop shooting if the arrows are falling short (or nearly falling short) of the target. Plot the flight path of the arrows relative to the line of sight. The elevation angle can be calculated if desired by following these steps.

1. Measure the true draw length of the arrow at full draw (the distance from the anchor point to the arrow rest).
2. Measure the height of the sight pin above the arrow rest.
3. Measure the height of the center of the eye above the bottom of the arrow shaft at the anchor point.
4. Subtract the sight pin height from the eye height.
5. Divide that length by the true draw length.
6. The dividend is the natural sine of the angle of elevation from the horizontal.
7. Use a sine table to locate the angle with that sine value.
8. Plot a horizontal line through the eye and sight to the center of the target.
9. Plot a line starting with the distance from the eye to the anchor point below the line of sight at the calculated angle of elevation above horizontal. This is the line of the shaft or the line of the bore.
10. Plot the true line of flight at the distances selected.

This same procedure can be used with rifle bullets, but a longer range is needed and the differences in impact points should be recorded in centimeters or inches rather than meters or feet.

For Those Who Want to Know More

Ballistics is the science of projectiles. It focuses on the dynamics of projectile flight and the energy stored and released by the projectile. One of the components of ballistics is the study of trajectory, the flight path of projectiles. In shooting, trajectory related the straight line of sight to a target with the curved flight line of the projectile. The ballistics of bullet or arrow trajectory involves complex concepts in physics and engineering.

Newton's first law, the law of inertia, states that objects tend to remain at rest or to travel in a straight line at a constant speed unless they are acted upon by an outside force. For projectiles, the forces include the energy that accelerates them initially, the acceleration of gravity, friction of the air and drag. Projectile mass, shape and even construction can influence those forces. Complex formulas have been developed to calculate the projectile's ability to retain its energy and velocity (speed

in a direction). Sectional density and ballistic coefficient are two measures of the "slipperiness" of a projectile.

A projectile starting at rest is accelerated by the stored energy of the limbs, air charge or expanding gases of the fired round. The internal ballistics (those inside the firearm bore or while the arrow is on the rest) limit the motion to horizontal and vertical vectors (components of the total velocity of the projectile). Under most conditions the horizontal velocity is greatest.

External ballistics are more complex, and they begin as soon as the projectile leaves the bore or the bow. The horizontal vector of velocity is measured by its horizontal speed toward the target. The vertical vector is measured by its speed upward, perpendicular to the surface of the earth. Both the horizontal and the vertical vectors of velocity begin to decrease immediately. Friction and turbulence in the air reduce the horizontal velocity. The pull of gravity reduces the vertical velocity. Note that a negative acceleration or velocity in the vertical component means the projectile is moving toward the earth rather than away from it. Wind currents or the rotation of the projectile may cause a lateral movement.

High initial and retained velocities result in a "flatter" trajectory. That is, the arc of the projectile from the shooter to the target is less peaked. The less time the projectile is in flight, the less outside forces influence it. The obvious conclusion is that "faster is better." However, obtaining optimum ballistic performance involves balancing competing factors rather than simple maximization of any one factor. Limits are imposed by the chemical structure of the powder, strength of the materials used, mass of the firearm and the strength or recoil resistance of the shooter. Other factors, like barrel life, consistency in energy release, economics, projectile construction and many more reduce the upper limit toward some optimum value.

Changing a single factor of the internal ballistics can result in major changes in external ballistics. Altering the mass of a projectile results in changing its shape. Both sectional density (a measure of the mass divided by the diameter or basal area) and ballistic coefficient (a measure of the bullet's ability to overcome resistance of the air, which involves sectional density in its calculation) are related to the shape of the bullet. Optimizing mass and initial velocity with performance and terminal velocity involves many factors.

The results of changing bullet mass may be surprising. An empirical test could be done using bullets of similar shape and diameter but different weights. Thirty caliber bullets are available in flat-based spitzer shapes in weights from about 110 grains to 200 grains. Interested shooters could fire a test series with bullet weight and compare trajectory curves to determine the optimum bullet weight for that shape in their rifle.

Both momentum and energy are related to the velocity and mass of the projectile. Momentum is the product of the mass and the velocity. Kinetic energy (the energy of moving objects) is the product of the mass and the square of the velocity divided by two.

Projectile use is a major determining factor in balancing momentum and energy. When a projectile comes to rest, the remaining energy and momentum are translated into penetration and shock. On target ranges bullets and arrows need only enough momentum and striking force to penetrate the target. The shot must have enough remaining energy and momentum to break clay targets. In hunting situations, small game arrows, shot and bullets kill by hydrostatic shock. The energy of the striking bullet displaces water in the tissue, causing immediate disruption of vital functions. Momentum is not critical, but kinetic energy is. Big game arrows kill by penetration and hemorrhage. Very little hydrostatic shock is produced, so momentum is much more important than kinetic energy. Big game bullets must combine shock with adequate penetration to reach vital areas. Considering the use of the projectile adds complexity to making ballistic decisions. This may explain the large array of arms and ammunition available today.

Many ballistic experiments can be tried by shooting sports participants. Most would be worthy of entry in science fair competitions under the categories of physics and engineering. Altering one factor at a time, such as sectional density or velocity, may offer easier explanations of the events taking place. For the shooter more interested in performance on targets or game, the arms and ammunition companies have tables that can assist in selecting the appropriate combinations of factors to do the job at hand. Wise shooters will test the listed values for themselves using their own firearms, particularly where the shape of a trajectory curve is concerned. Their observed data is much more valuable than the theoretical data from the tables.

Table 1. Theoretical values for drop from the acceleration of gravity and distance traveled for idealized projectiles fired parallel to the surface of the earth at a constant velocity of 60.96 meters/second (200 feet/second) and 914 meters/second (3000 feet/second) is given below. The lower velocity corresponds to a very fast arrow. The higher velocity approximates a high velocity center-fire rifle cartridge.

Time	Distance Dropped		Distance Traveled @200ft.sec		Distance Traveled @3000ft.sec	
(sec)	(cm)	(ft)	(m)	(ft)	(m)	(ft)
0.1	4.7	0.16	6.1	20	91.4	300
0.5	19.6	0.64	12.2	40	182.8	600
0.3	44.1	1.44	18.3	60	271.2	900
0.4	78.4	2.56	24.4	80	365.6	1200
0.5	122.5	4.00	30.5	100	457.0	1500
0.6	176.4	5.76	36.6	120	584.4	1800
0.7	240.1	7.84	42.7	140	693.0	2100
0.8	313.6	10.24	48.8	160	731.0	2400
0.9	369.9	12.96	54.9	180	822.6	2700
1.0	490	16.00	61.0	200	914.0	3000
1.25	765.6	24.00	78.2	250	1142.5	3750
1.5	1102.5	36.00	91.4	300	1371.0	4500
1.75	1500.6	49.00	106.7	350	1599.5	5250
2.0	1960	64.00	121.9	400	1828.0	600

Trajectory Worksheet

This worksheet will help you determine trajectory of an arrow using your equipment. Distances and trajectory measures should be made in the same measurement units, either metric or English units. The suggested increment of distance for English units is about 5 feet. For metric units try an increment of 1 or 2 meters. Measure the distances above or below the line of sight in either inches or centimeters. If those distances become too great, feel free to convert them to feet or meters. Record the following information before you start.

Height is sight above arrow rest (bore) _____

Height of pupil above nock of drawn arrow _____

Distance* (m or ft)	Point of Impact**(cm or in)	+=above line of sight -=below line of sight

Shotgun and Ammunition Selection

James V. Peter, Jr.*

Proper shotgun and ammunition selection is vital for young people to successfully learn to shoot a shotgun. Shooting form faults will develop if shooters have difficulty handling the physical size, weight and recoil of a shotgun. Very young or small shooters are quickly tired by excessive gun mass or poorly fitting guns. They also feel recoil more severely, sometimes to the point of bruising and pain. That almost invariably results in flinching and the development of form faults. They are likely to see shotgunning as an ordeal rather than a challenging and fun activity. Since this is a voluntary activity, they may lost interest and drop out under those conditions.

Interest in shooting, desire to shoot better or prove one self or similar motivations may drive the shooter to use equipment beyond his or her capabilities. The instructor must assist the shooter with selecting a shotgun and load to promote success. Success enhances the shooter's self-image and increases fun and interests. It also increases desire and willingness to learn.

Proper Gun Fit

Most shotguns are designed to fit the "average" American male, approximately 5'9" tall, of average build and weighing 170 pounds. Most people, particularly young people do not fit that description. As a result, the dimensions of the shotgun stock are not correct for the young shooter. Stock length is usually excessive for beginning shooters. The larger youth may be able to compensate for that length, but most smaller shooters will need to have a shorter stock to properly handle the shotgun.

Several manufacturers market youth models having stocks with a length of pull in the 12- to 13-inch range. In several cases, those stocks are interchangeable with "adult sized" stocks at a modest cost. An alternative is to have the stocks cut to the proper length by a competent person. When the shotgun is mounted properly, there should be approximately 2 inches of space between the shooter's nose and the base of the thumb of the dominant hand. Two inches is the width of 2 or 3 fingers. Save the piece that is cut off so it can be reattached as the youngster grows. In addition to stock fit, the length and mass of the barrel is critical. The balance point of the gun should be between the hands for optimum gun handling. The shooter barrels of youth models work well with the shorter stock to keep the balance point between the hands, increasing handling ease. These guns are also lighter in weight and easier for smaller students to use.

Action Types and Gauges

Light weight makes the shotgun more responsive and easier to hold, but it also increases the felt recoil. One of the best ways to handle the combination of handling and recoil is to use a gas operated semi-automatic shotgun. Although the laws of physics remain (for every action there is an equal and opposite reaction), gas operated actions spread the recoil over a longer time span. That reduces felt recoil, producing more of a push than a sharp blow. Most young people find the recoil of either 20 gauge or 12 gauge semi-autos acceptable.

Avoid the temptation to use smaller gauge guns with smaller shooters. Smaller gauge shotguns actually handicap the shooter. They have sparser patterns with less density at their edges. As a result, they require the shooter to center the target more precisely in order to break the targets consistently. For that reason, they are less effective as teaching tools. Avoid the temptation to go to 28 gauge or .410 shotguns. These guns belong in the hands of experts, and are extremely frustrating for beginners. To ensure success put more shot in the air with better pattern density. That increases the odds for the shooter. Stick to 12 gauges for shooters who can handle them, and plan to use 20

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gauge guns for those who need a smaller one.

Barrel Length and Choke

Barrels 21 to 26 inches long help keep the balance point of the shotgun between the hands, easing the process of swinging to the target. That characteristic is very important to smaller students and it can be gained without serious loss of power.

Shotshells loaded with smokeless powder consume their powder within the first 14 to 18 inches of the barrel. Although slight increases in velocity and energy are attained with longer barrels, the gains are relatively insignificant. The belief that longer barrels shoot "harder" is a holdover from the days of black powder. Longer barrels have advantages in some situations. They provide a longer "sighting radius" and a smoother swing than shorter barrels.

A large pattern is advantageous while the basics of shotgun shooting are being learned. Since the ranges are relatively short, skeet or improved cylinder chokes are preferred for instruction, even when trap fields are being used. Combining those chokes with small shot keeps the pattern both wide and dense, ensuring success for the learner.

Ammunition

Like the considerations on size and mass of the shotgun, selection of ammunition for instruction involves several competing factors. The weight of the shot charge and the weight of the powder charge determines the velocity and the potential recoil. Increasing the powder charge increases both velocity and recoil. Increasing the shot charge decreases the velocity while increasing the felt recoil. Light target loads in either 20 gauge or 12 gauge will give optimum performance. Extra light loads using one ounce of shot in a 12 gauge yield lighter recoil with minimal loss of pattern density. Using fine shot, #8 or #9, puts more shot in the pattern, increasing pattern density without increasing recoil. Milk recoil, modest velocity and good pattern density contribute to success. Using heavier shot charges or increasing velocities beyond normal target levels increases recoil without contributing significantly to shooting effectiveness.

Practicing Your Shotgun Skills

James V. Peter, Jr.*

When shooters have a sound understanding of shotgun shooting fundamentals on straight-away targets, move on to greater challenges. Limit shooting to a maximum of five rounds in succession to prevent shooters from tiring. If necessary, the ball and dummy exercises can be repeated until fundamentals are understood. After several repetitions most shooters will be ready to move on to greater challenges, like learning to hit angled or crossing targets.

Moving from predictable straight-away targets to those that vary in angle or take an angled flight path adds a whole new set of variables. If the shooters have progressed according to plan, they should be ready to hit crossing targets. On a skeet field, the shooters should be introduced to high 7 first. They should then move progressively toward station 1, establishing themselves at each station before moving on to the next. On trap fields, the shooters can start shooting at angling targets, slowly moving back from the trap house to the 16 yard line.

Several suggestions are listed below for increasing the challenge using ground-mounted portable traps.

1. Slowly increase the angle of the target's flight in relation to the shooter. Consider the position of the trap operator and maintain angles and shooting positions that protect him or her.
2. Alter the position of the target on the throwing arm of the trap to vary the direction taken by the target with each call. Begin with moderate angles and slowly increase them to about 45 degrees.
3. Adjust the elevation of the thrower arm head to vary the height and trajectory of the targets.
4. Allow the trap operator to release the target within a few seconds of the shooter calling for the target, with the release being at their discretion.
5. Try throwing doubles from the same trap.
6. Rather than mounting the shotgun before calling for the target, have the shooter call for the target from the gun-ready position, mounting it only after the target is thrown.

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Clover Clays

James V. Peter, Jr.*

Note: Clover clays have been around for many years. I do not claim to have invented it, but this version is mine.

The objective of clover clays is to teach the shooter to handle targets at varying angles. The shooter is exposed to targets with known flight paths and surprise targets. This game can also be sued to introduce doubles from different traps. The shooting situation is set up as illustrated below.

Equipment Needed

- spring operated ground traps – 2
- posts or stakes – 3 (2 orange and 1 white)
- engineers flagging tape or rope
- compass
- measuring tape

Set Up

The two traps should be set up about 45 meters (50 yards) apart on a common base line. Station 1 is located at the left hand trap. Station 3 is at the right hand trap. Station 2 is located midway between the traps on the baseline. The white stake indicates the crossing point for the targets thrown from the two traps. It should be located approximately 23 meters (25 yards) in front of station 2. The orange stakes should be set approximately two-thirds of the way from the white stake to the traps. They mark the boundary of the safety zone. Under no circumstance should a shotgun be permitted to point inside the orange stakes.

The traps should be fixed in position with the appropriate location on the throwing arms marked to throw targets so they will cross over the white stake. Each trap should be operated by an experienced range assistant. The instructor should accompany the shooter to each shooting location, maintaining control of all ammunition and watching the shooters to assure that the guns never swing inside the orange safety zones. A single round will be dispensed for each shot, except on doubles. These will only be dispensed after the shooter is ready and in the shooters' box. Except when the shooter is preparing to fire, the action on the shotgun must be kept open and exposed to view for safety reasons.

Three levels of challenge are outlined here for shooters of different skill levels.

Beginners

Station 1: One target from trap 1

Station 2: One target from trap 1 and one from trap 2

Intermediates

Station1: One target from each trap

Station 2: One Target from each trap

Station 3: One target from each trap

Advanced

Station 1: Single targets from each trap and a pair of targets thrown simultaneously from both traps

Station 2: Single targets from each trap

Station 3 Single targets from each trap and a pair of targets thrown simultaneously from both traps.

These patterns are merely suggestions. An unlimited variety of possibilities exists.

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Detecting and Correcting Shotgun Shooting Errors

James V. Peter, Jr.*

Detecting and correcting errors made by shooters can be a challenge. Some instructors consider this skill to be a science. Others consider it a mystical art. There is truth to both opinions. The ability to recognize symptoms of shooting errors, analyze what the shooter is doing to create the situation and then help him or her to correct the action is an acquired skill. It becomes more effective with time and experience, but a gift of perception is often needed. This fact sheet outlines some common shooting errors, how to recognize them and how to suggest correcting them.

Detecting errors I important, but understanding how to correct them without causing the shooter to lose confidence or focus on the fault is more critical. Emphasize the positive actions to develop proper form fundamentals. Demonstrate the correct actions when appropriate. Use your creativity to get the shooter to do the proper thing. Remember that the shooters are young. Have reasonable expectations for the shooters while challenging them to do their best.

Eye Dominance

Eye dominance problems can be obvious or very subtle. One of the most obvious is noticing that the shooter is tilting his or her head across the comb in an effort to align their dominant eye with the barrel. Mysterious misses, those with no readily apparent reason, are among the most frustrating of the eye-dominance problems. This may occur when the shooter concentrates on the barrel (sighting or aiming) rather than focusing on the target. When that occurs, the barrel may become an obstruction to the dominant eye, causing the focus to switch to the other eye. Consistently shooting to one side of straight-away targets, or consistently missing either ahead of or behind crossing targets often indicates a dominance problem. When crossing targets from both sides are being shot, the shooter may hit targets from one side easily while being a long way (1 to 2 meters or 4 to 6 feet) behind targets from the other side. Some shooters will complain that they are seeing the side of the barrel.

The most obvious solution for eye dominance problems is to switch the shotgun to the other shoulder, changing the handed-ness of the stance to the dominant-eye side. This is the best solution to eye-dominance problems, even if the shooter has considerable experience from the “wrong” side. In most cases, the shooter will adapt quickly and be “cured.” Some shooters will not switch sides or physically cannot switch sides due to injuries or other problems. They can be helped by interfering with the vision of the dominant eye. The eye does not have to be covered or closed. Adequate interference can be achieved by placing a spot of tape about the size of a notebook reinforcement ring on the lens of the shooting glasses. Place it where it will block the center of the dominant eye when it is in shooting position. A small square or strip of cellophane tape placed vertically over the center of the safety glasses also works well. This technique maintains the advantages in peripheral vision and depth perception that come from binocular vision but forces the non-dominant eye to assume the directing role for the point. One-eyed shooting is necessary in very few cases. Where the shooter switches dominance almost randomly, one-eyed shooting is the easiest way to get them on target. They can either cover or close the non-shooting eye. *This alternative should be used only if all others have been tried without success.*

Coping with an eye dominance problem causes the shooter to use an unfamiliar position that feels awkward. They may become

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frustrated when scores drop and their form feels uncomfortable. Patience and positive reinforcement are essential. Give shooters enough time to adapt and to reinforce the fundamentals of good shooting form as they develop this new skill.

Shooter Not Relaxed

Excessive tension causes many types of shooting errors. Experienced instructors may refer to seeing sawdust between the knuckles of excessively intense shooters. Although not true literally, white knuckles and obviously flexed forearm muscles are a strong indication of excessive tension. Deterioration of scores after a miss is another one, usually attributable to peer pressure. Tense shooters may fidget on the firing line, express a lack of confidence or fear of missing, spend an excessive amount of time preparing to shoot or shoot very late and deliberately.

Being too tense causes other problems, so the symptoms of excessive tension may be masked as other difficulties. The shooter may stop his or her swing or look up to see the target break. They may lunge at targets, losing the smooth swing needed for consistent performance. They may spot shoot targets or take excessive leads; or they may ride the target and aim rather than point. They may fiddle with their foot, body or gun position, changing from a sound one to one that is contorted and unstable. *Unless broken by positive action from the instructor, excessive tension will almost always continue to worsen, feeding upon itself and destroying the shooter's confidence. Instructor intervention is essential to assist these shooters!*

Correcting excess tension can be an exhaustive process, particularly with shooters who hold themselves to a standard of perfection they are not ready to achieve. One of the most important tools is to eliminate peer pressure by isolating the shooter for instruction. One-on-one instruction with a gentle, cooperative coach usually succeeds. Allow the shooter to observe others. Throw a few targets without shooting. Return to the finger point and dry firing sequence in private. Reduce the challenge, for example return to straight-away targets, to rebuild confidence. Be careful and patient. Excessive tension is frequently a symptom of problems with self-confidence, self-image or perceptions of personal worth based on shooting performance. *Damage control is essential in any instructional technique.*

Improper Stance

Targets are hit with the shot, but missed with the feet. Stance and foot position are vitally important to good shotgun shooting. Stance problems may be easy to detect, but instructors may overlook them when working on other problems. Poor stance causes problems with getting on targets, establishing proper leads and following through the shot properly. New shooters can drift from a good stance to a poor one gradually and without noticing it. Performance deteriorates and they alter other elements of their form to compensate. Stance should be checked frequently by the instructor.

Observing foot position relative to the target-breaking zone is one of the best ways to detect stance problems. One of the most common faults is adjusting the stance to the area where the target will appear rather than where it will be broken. The body comes under increased tension as the target breaking zone is approached. The result is shooting behind, having the stance "fly apart" at the end of the swing or having a short, abrupt follow through or none at all.

Preventing stance problems is easier than curing them. Verbal reminders of proper stance and physical readjustment of stances early in the learning process helps to fix a proper stance in the shooter's mind. Practicing a preparation routine before every shot is valuable for beginning and experienced shooters alike.

Correcting stance problems is relatively simple if the problem has not become fixed by too much practice. Concentrate on the elements of a good stance. Avoid emphasis on form faults. Adjust foot spacing for comfort. Adjust foot orientation to the area where the target will be broken. Without moving the feet, swivel the body from the hips until the target can be seen easily. Using a spring analogy may help. The spring should be under tension when and where the target is first acquired. It should be relaxed and free when the target is broken.

Other elements of the stance must be considered as well. Shooters vary greatly in the amount of knee flex or body lean. Slight amounts of knee flex and lean into the gun are desirable. Shooting from a crouch is tiring. Rebuild stances carefully, avoiding the notion of one best posture for all shotgunners in all situations. Change only one element of the stance at a time to avoid confusing the shooter.

Some stance faults must be addressed quickly. One of the most

common is leaning away from the target. It results in severe recoil. Shooters suffering a pounding from recoil are less likely to enjoy themselves and learning will suffer. They will also develop faults that are more difficult to detect and cure. Fear of recoil, improper gun fit and excessive gun mass are common causes of this fault. Switching to a lighter or shorter gun helps the situation greatly, even when the problem is fear. Demonstrating the recoil absorbing action of a proper stance also helps.

Improper Head Position

Improper head position often results from improper gun mounting or improper fit. Anticipating recoil and wanting to see the target break are also commonly involved. Shooters who try to swing the shoulders rather than from the waist will also have problems coordinating the positions of the head and the gun.

Consistently shooting over or under targets, randomly missing high or low or punishing recoil to the face or cheek commonly indicate poor head position. Shooters may "peek" by lowering the gun as the shot is fired. Most shots go low, even though the target was being tracked properly. Others may "raise their heads" shooting over the target. Both problems are based in improper gun mounting.

The shooter's head should be erect and relaxed. The shotgun should be brought to the shoulder and face during the mount. Emphasize proper shotgun mounting each time a shooter raises the gun. Practice the mount, swinging from the hips and following through. These exercises will cure most head position problems. In extreme cases use dummy ammunition to let the shooter see what is happening. Stock fit, particularly length of pull, drop at the comb and drop at the heel, may need to be addressed. A shooter adapting to a stock that does not fit may move the head as the gun is mounted, causing head position problems. Following targets or pieces through the entire flight cures or prevents problems.

Aiming

Shotguns must be pointed, not aimed, if the shooter is going to become a good shotgun shot. The desire to make sure of each shot can cause shooters to aim at targets rather than point. Riding the target is a common symptom of aiming rather than pointing. Shooters suffering from this fault often fire very late. In extreme cases they may be unable to fire, particularly on crossing targets. They may show a pre-occupation with the barrel or the beads on the shotgun. They may fidget on the stock, trying to get their head position set. In some cases the follow through will be non-existent or very brief and abrupt.

Focus on the fundamentals of sound shotgun shooting to give positive correction. Emphasize that the shooter should focus attention on the target rather than the barrel. Try to get the shooter to fire more quickly, shooting as quickly as they can touch or pass the target with the muzzle. Ask the shooter to exaggerate the follow through and pay no attention to the target after firing.

No Follow Through

An inadequate follow through is most often revealed by consistently missing behind crossing targets or consistently shooting under rising targets. Watch carefully to see if the shot is being fired with a still shotgun or the swing stops abruptly at the shot.

There are several causes of improper follow through. Aiming or spot shooting (pointing at a spot where the shooter hopes to intercept the target) are common causes. The shooter may simply stop swinging as the shotgun is fired or immediately after firing. Another common cause of poor follow through is "riding the target." This may come from trying to make sure of a hit or from failing to shoot as soon as the muzzle is pointing at the target. Poor body position may cause the shooter to run out of swinging room, stopping the swing short. Some shooters stop the gun because they are trying to see the target break. They seem to lift their heads as they fire, stopping the gun at the same time.

Positive correction of follow through problems starts with the shooter. Relaxing the grip, stance and sense of pressure to achieve a hit can be helpful. Clothing that may restrict the swing should be exchanged for something that allows more freedom of movement. Position the shooter so his or her stance allows freedom of movement through the target breaking zone. The shooter may follow a piece of the broken target or dry fire and lead targets into the ground. In extreme cases, tell the shooter where the gun should be pointing at the end of the follow through. A slightly muzzle heavy shotgun may help to smooth the swing and follow through.

Flinching

All shooters tend to flinch at some time. Minor flinching is inconsequential to a shotgun shooter. Intense flinching, however, can destroy the shooter's ability to hit targets with a shotgun. Flinching is the result of anticipating either the report of the shotgun or its recoil. Past

experience, poor form, excessive shooting and improper gun fit are the major causes of flinching.

Flinching often causes erratic performance on targets. The shooter is usually not conscious of the problem. Flinching may be the cause of otherwise unexplained misses or complaints about noise, recoil or soreness. The easiest way to demonstrate it is to use a ball and dummy technique, watching the shooter carefully when the dummy rounds are being used.

Preventing flinching is much easier that correcting it. Establishing sound fundamentals with properly fitted guns and adequate protective gear prevent most problems. Correcting flinching problems starts with an analysis of the reasons for flinching. Determine whether the gauge and load being used is appropriate for the size of the shooter. Make sure the gun fits adequately. Check the shooter's ear protection to make sure it is adequate and is being used properly. Add an additional layer of protection, using plugs and muffs if needed. Use dry-firing practice and ball and dummy procedures to work through the shooting sequence without the noise and recoil. Finally, position the body to act as a recoil absorber and demonstrate how to ride with the recoil rather than fight it. Explain that a firm, snug hold and a slight to moderate lean into the shot will convert most of the recoil into a push rather than a blow. Patience is essential when trying to correct recoil sensitivity and flinching. Work with the shooter carefully using positive reinforcement and avoiding excessive pressure.

Range Setup and Operation for Shotgun Instruction

James V. Peter, Jr. *

Instructors working with beginning shotgun shooters face two major challenges. Running a firing line with new shooters who are in the process of learning safety while learning to shoot is the first challenge. The second challenge is teaching the fundamentals in a positive manner with a high probability of success. Both are discussed here.

The range setup considers effective teaching while assuring the safety of the trap operator, shooter, coach, instructor and others on or near the range. The instructional approach follows a step-by-step process designed to emphasize positive behaviors and actions. Potential problems are identified and corrected before the student begins live firing. Instructors using these techniques experience excellent success rates. Shooters hit their first target about 85 percent of the time. The key to this early success is to proceed carefully, observing each individual shooter. Taking the time to prepare the shooter for success, using proven methods and watching for the proper moment to insert a live round are the keys. When the shooter is ready, load a live round and watch them break the target.

Remember, each shooter is different. Shooting cannot be taught on an assembly line basis. The instructor must treat each young person as an individual with individual needs, preparing each one for success on their first shot. Once the initial success is achieved, shooters will progress at their own pace; and different target angles should be introduced when they are ready to handle them.

Range Setup for Group Exercises

Shooting safety begins with the setup of the range. A safe shot-fall zone of slightly over 300 meters (330 yards) is needed. Adequate buffer zones along each side of the shooting area should be visible and controlled. If any potential for violation of the shot-fall zone is likely, install physical barriers and adequate warnings to prevent access. All range personnel must be constantly alert to intrusions.

A **safety zone** behind the firing line should be established. It must be clearly marked to control spectators and shooters not on the firing line. A physical barrier is more effective and less likely to be violated than a line on the ground. Brightly colored engineer's flagging tape or rope supported by light stakes or lath work effectively. Spectators must be told clearly that they must not interfere with the operation of the range or distract the shooters. In the event that distractions or interference are encountered, all teaching should stop until the situation is corrected. A silent stare from the entire group can be an effective means of letting an offender know they are out of line. Distraction from spectators should not be discounted. It carries a potential danger for all persons on the firing line.

The **firing line** must be clearly marked and managed to maintain safety, facilitate group control and maintain positions of group members during instruction. Like the safety line, the firing line must be clearly marked, Lime, rope or engineering tape are effective markers for the firing line. The trap operator must remain behind the shooters, so the traps should be set up slightly behind the firing line. Since the operating arm of the trap is on the right side of the trap, the shooter should be positioned on the firing line about 2 meters (5 to 7 feet) to the left of the trap. A marked shooter's box or a 1 meter (3 foot) carpet square help to keep the shooter in the proper position. The instructor must be positioned to the right and slightly behind the shooter where he or she can protect the trap operator if necessary. This position is convenient with right-handed shooters, but less convenient for left handers. If the shooter is on the right side of the trap the shooter risks being struck by pieces of broken targets. Once the coach-pupil process is started, the coach will stand in the instructor's position.

When the shooters are learning without firearms, the *instructor* must stand where all participants can see and hear the instructions clearly. The best locations are in the center of the front of the

class or at one end of the firing line. With firearms, the instructor should be at one end of the firing line with an assistant at the other end. The chief instructor or range officer may prefer to stand behind the center of the group with assistants covering both ends of the line. Until the shooters have demonstrated understanding and practice of shooting safety, an assistant instructor should be located at every shooting position.

Trap Operation for Group Instruction

Study the directions for setting up and using the trap carefully. Test the trap several times before the class and mark the proper location on the trap arm to throw straight-away targets. Be sure the trap is firmly anchored so a safe, repeatable target flight path can be followed. Instruct the group in trap operation, demonstrating the proper way to cook, load and fire the trap. Caution them about the power of the throwing arm spring.

The operator must remain behind the shooters and clear of any muzzles. Students should be no closer than 2.5 meters (8 feet) on either side of the trap during the group exercises. Only one shooter should be stationed at each trap during the individual instruction phase.

Instructional procedures for Group Instruction

Basic shotgun shooting instruction involves five steps before shooters actually take a shotgun to the line. These steps can be completed with all shooters on the line at one time in a group setting. Complete this sequence:

1. Introduce the clay target – At the outset of the instruction hold up a clay target to allow all shooters to identify it, note its shape and coloration and see how it is made.

2. Watching the flight of several targets – Have all shooters line up along the firing line, taking care to keep all persons clear of the active trap. Explain that the target is requested by calling "pull." Call for five targets, and have the shooters watch their flight. Ask them to describe the flight of the targets. Demonstrate and discuss the flight path, noting the target direction and speed and its path from the trap to the ground.

3. Recheck eye dominance – Make sure of each shooter's eye dominance before having them follow a target with an index finger. Eye dominance and handedness start playing a role, starting with following a target with a finger point.

4. Following targets with a finger point – Have all shooters take a boxer's stance on the firing line with the non-dominant foot forward Have them extend their non-dominant or forward hand at about a 45 degree angle with the index finger extended. Explain that they are to keep both eyes open, point at the target with their finger and follow the target to the ground. Throughout the flight the shooter should keep their concentration on the target, not on the finger. Call for a target and have the students follow its flight repeating the process with at least three to five more targets.

   This exercise teaches the concept of pointing rather than aiming and helps the shooters to concentrate on the target rather than the finger. It also helps to develop the hand-eye coordination needed to hit a moving target. If the shooter is having problems with target alignment, this is the time to adjust the stance to the proper position.

5. Point at a target and BANG! – Repeat the exercise above, but have the shooters say "Bang" sharply when their finger first touches the target. Throw three targets before pausing to discuss the results. Each shooter should start from the ready position with the finger pointed at a 45 degree angle. Call for a target. Each shooter should swing smoothly and quickly to the target and call "bang" as the target is touched, following through to the ground.

   The instructor should watch for two potential problems at this point. If all the shooters seem to say "BANG" in unison, stress that each shooter should indicate when they have "touched" the target. It is very unlikely that all shooters will touch the target with their fingers at the same time. Repeat the exercise with an additional five or more targets. Watch for shooters that are a little later than the majority of shooters in getting on the target. These

shooters are likely to be aiming or riding the target rather than "shooting" as soon as they get on it. That problem tends to resurface. Take the time to correct the problem now by having the shooter "shoot" as soon as they touch the target.

A third problem of relatively minor importance is a timid "bang." Stress that shotgun shooting requires an aggressive approach. In spite of feeling foolish, the shooter should speak loudly when "shooting" targets with their index finger. The relatively timid shooters may need more support and reinforcement later.

Procedures for Individual Instruction

A coach-pupil technique is recommended for this stage of the instruction. It is extremely effective when it can be used without risk to the shooters. Two young people form each coach-pupil unit. One shooter acts as the pupil while the others serve as the coach. The coach loads the shotgun, assists the shooter with positioning and form and observes the field for safety. While assisting the other shooter, the coach is reinforcing the main points and processes of the lesson. After one shooter completes an instruction sequence, roles are reversed and the instruction is repeated.

Some instructors prefer to use a three-shooter group for shotgun instruction, putting one on the trap as well. If the young people are mature enough and strong enough to handle the trap duties, they derive some of the same benefits gained by the coach and pupil. The triad can be rotated on the same basis. Using the method provides additional focus on safety, involves more shooters in the learning process at any given time, improves shooter performance and increases learning effectiveness.

Some instructors feel uncomfortable using the technique until the shooters have had considerable experience on the firing line. Only you can decide whether your group is ready to use the coach-pupil method. Consider your experience and confidence, the number of students in the class and their level of maturity. An assistant instructor or advanced teen leader should be at each shooting station during the early stages of instruction, even if the coach-pupil method is used. Some instructors use the method through out the individual instruction process. Others wait until after they have completed the dry firing or ball and dummy exercises to use coach-pupil methods.

Dry Firing

As in other shooting sports, shotgun shooters can benefit from dry firing. The shooter goes through the shooting process using snap caps or dummy rounds. That allows the shooter to concentrate on the fundamentals without the complications of recoil, noise and peer pressure. Form faults or other problems can be identified and corrected before the target, recoil and noise mask them. Dry firing allows the instructor to develop readiness to succeed before the first live round is fired.

This is the time to establish a protocol for passing a shotgun between people on the firing line. Since the coach or instructor will be loading the shotgun in the beginning, the shooter does not know whether it is loaded or not. The uncertainty is an important part of the instructional method. Shooters must maintain control over the shotgun at all times, and both the coach or instructor and the shooter must take responsibility for a safe transfer. The coach or instructor keeps a firm grip on the shotgun with the muzzle pointed safely down range until the shooter signals that he or she has it under control by saying "thank you." The coach or instructor should say "you're welcome" prior to releasing their grip on the gun. That brief exchange of courtesies does much for establishing mutual interaction and responsibilities, as well as preventing guns from being dropped accidentally.

Safety Review

Before proceeding to a live firing exercise, pause and review all range safety operations with the shooter. Discuss the range layout briefly, including the shot-fall zone and any danger areas. The firing line and positions for all persons at each firing point should be reviewed. The safety zone behind the firing line should be reviewed. All spectators should understand their role and the importance of not disturbing the shooters. Remind shooters to ask questions immediately if they do not understand any part of the instruction. Review the fundamental rules of safe firearms handling, including passing firearms between people on the line. Only instructors will handle ammunition, and they will have only one gauge of ammunition in their possession at any one time. Since the actions at each shooting station follow the progress and rhythm of the shooter, each one operates more

or less independently. Range commands will be few. “Live ammunition on the range!” indicates that the range is not hot, and no one should move forward of the firing line. “Cease fire!” or “freeze!” means that all shooting should stop immediately. Anyone noting an unsafe condition should give the cease fire command. Finally, all persons on the range should review the basics of trap operation and safety and see a target thrown.

Ball and Dummy

This technique combines dry firing exercises and live firing. All ammunition remains under the instructor’s control. After each “shot” the shooter hands the gun to the instructor, who shields the action from the shooter’s view and “loads” before passing it back. The shooter should not know whether a live round or a dummy round has been loaded. The shotgun is always treated as if loaded, and the shooter “fires” on the target with every intention of breaking each one. The instructor watches the point and timing, slipping in the first live round when it seems that the shooter is consistently “hitting” the target with the dummy rounds. Allow the shooter to fire several live rounds interspersed with dummy rounds to check for sound fundamentals. Watch particularly for flinching and a strong follow through.

Follow Target to Ground

Encouraging the shooter to follow the target to the ground after pulling the trigger helps most shooters develop a smooth follow through. If the target is broken, the shooter should follow the largest remaining piece to the ground. The process keeps the shooter watching the target and maintains the unity of the upper body with the shotgun. It also keeps the head on the stock, developing strong shooting form. Occasionally a shooter will begin aiming or riding the targets. If that problem arises, have them exaggerate their follow through.

Mechanics of Dry Firing and Live Firing

Dry firing may be divided into two elements, dry pointing and dry firing. Dry pointing involves shooter pointing at the target with an unloaded gun without pulling the trigger. In dry firing the shooter “fires” a shotgun loaded with a dummy round. This helps shooters become accustomed to wearing their eye and ear protection, stresses the fundamentals of pointing a shotgun at a moving target and reinforces safe gun handling through practice. It also allows the shooter to practice the gun-ready position and a proper gun mount. Finally, it helps develop a smooth swing and follow through.

The exercise involves the following steps.

1. The instructor checks to be sure that all persons on the range are wearing eye and ear protection.
2. Each instructor brings a student (or a pair or triad) to the firing line. They explain that the actions will be closed on the shotguns, so they should always be treated as though they are loaded and ready to fire.
3. The student assumes a “boxer’s stance,” and the instructor checks the stance for form and alignment.
4. The instructor “loads” the shotgun and closes the action. Prior to handling the shotgun to the shooter using standard protocols, the instructor states “the gun is loaded and ready to fire.” Prior to handing the gun to the shooter, the instructor should also check to see that the safety is off, giving the shooter one less thing to think about. While passing the shotgun to the shooter the instructor should cradle the trigger guard with the fingers of the left hand.
5. The shooter assumes a “gun-ready position,” and the instructor checks the shooter’s position.
6. On command the shooter mounts the shotgun. The eyes are shifted to the area where the target is expected to appear.
7. When the shooter is ready to call for the target, the shooting finger is placed inside the trigger guard.
8. The shooter calls for the target by saying “pull.”
9. As the target appears, the shooter swings to the target, pointing the muzzle at a rising clay target.
10. As the muzzle touches the target (or passes it if the target has any crossing angle) the shooter pulls the trigger using a crisp pressing action. Early on the shooter may jerk the trigger, but with practice he or she should overcome that tendency. Watch for a tendency to ride the target, raise the face off the stock or halt the follow through. If any of these things occur, correct them

now, before going to live firing.

11. The shooter should follow through, tracking the target all the way to the ground.
12. After the follow through is completed, the shooter hands the shotgun to the instructors using the standard protocols, and the exercise is repeated several times.

Live Firing

After the shooter is proficient with dry firing, let the procedure evolve into a al and dummy exercise. This exercise is actually a continuation of the dry-firing exercise interspersed with live firing. The shooter should fire no more than five rounds during this exercise. Continue to reinforce safe gun handling and proper shooting form. Each shooter should fire the first shot when they are ready. The learned and practiced fundamentals should be continued. Finally, at the discretion of the instructor, the shooter learns to load the shotgun personally.

The shooting procedure outlined above is followed with the exceptions noted below.

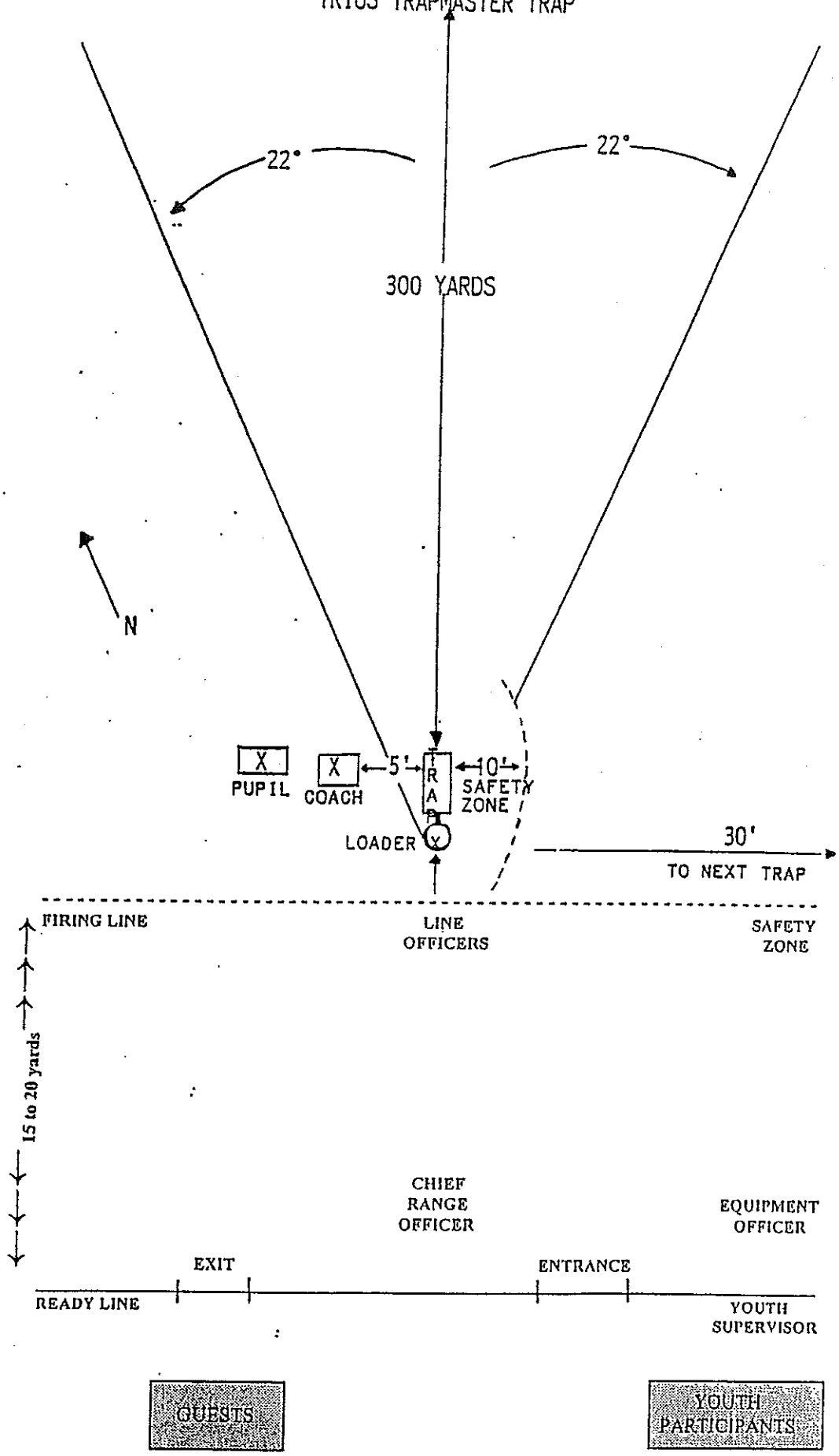
1. After the shooter is on the target with fundamentally sound form three or four times under dry firing conditions, the instructor loads a live round.
2. After the first shot, hit or miss, the instructor must be supportive of the shooter.
3. Insert one to three dummy rounds before another live round is inserted.
4. Repeat the ball and dummy exercise as needed. If additional rounds remain after the shooter has demonstrated an ability to hit targets consistently, allow the shooter to load and fire.

   Take the time needed to ensure success on the first shot, working with one shooter at a time. Be particularly careful when passing the shotgun to the shooter. If the shooter has problems on the first attempt, continue the dry-firing exercise, but do not dry fire more than five or six times in a row. More than this tends to frustrate the shooter, increase fatigue and reduce concentration. If fatigue is evident, either allow the shooter to leave the line and rest briefly (bring them back to the line quickly so their confidence is not hurt) or allow the shooter to fire one round, even if it is likely to miss. This gets them through the anxiety of the first shot. Knowing when to load the first live round and how to handle a shooter who is developing slowly will come with experience.

Keep the shooting fun and enjoyable. Keep things moving, be positive and enthusiastic. Remember that beginners tire easily and that they are easily confused by over-instruction. Be sure that shooters off the line are positively involved and supervised. Do not instruct the other shooters at the expense of the individual on the line. Keep the fundamentals in mind, maintain a safe and secure range and keep the shooting fun.

SHOTGUN RANGE

TRIUS TRAPMASTER TRAP



Shotgun Shooting from the Gun-Ready and High-Gun Positions

James V. Peter, Jr. *

Beginning instructors will find this brief review of shotgun shooting fundamentals useful. Take time to review the fundamentals as you prepare for teaching. Remember, shooters are made, not born. Shooting skills must be developed by establishing the fundamentals before moving to more advanced shooting skills.

This teaching method has the shooter call for the target with a high gun-the gun mounted at the shoulder. This reduces the number of variables the beginning shooter must address and promotes faster learning. Although many shotgun games permit the gun to be mounted before calling for a target, teaching the gun-ready position is also important in this process.

Have beginning shooters start from the gun-ready position. Have them mount the gun on command or at will before calling for the target. This will teach the ready position used in international skeet, sporting clays or hunting without the added variable of inconsistent gun mounting during early stages of learning. As the shooters' experience and skill increase, the low gun or gun-ready position may be added to the process. Have them practice the process of mounting the gun, swinging to the target, shooting and following through with a coordinated and smooth motion.

Eye Dominance

Shooting is learned more easily if the dominant eye performs its natural function. First, the dominant eye must be determined (*see Fact Sheet 3: Determining Eye Dominance).* When the dominant eye and the dominant hand are on the same side of the body, instructors have very little difficulty convincing shooters to shoot from that side. When the shooter is cross dominant (eyedness and handedness differ), the eyedness should take precedence even if the shooter has been shooting from the "wrong" side.

Shotgun Shooting Fundamentals

Shotgun shooting involves placing a cloud of shot where a target will be when the shot reaches that location. The pattern or shot cloud is relatively large, so precise aiming is unnecessary. Aiming is a serious form fault in shotgun shooting. Timing and pointing are the keys to consistent shotgunning. The process involves several fundamental steps: stance, gun-ready position, mount, swing to the target, trigger pull and follow through. Each component is vital to becoming an accomplished shotgun shooter. The following instructions are given in relation to the dominant eye, thus "dominant side" means the dominant-eye side, and "off" or "non-dominant" side refers to the non-dominant eye side. Using these "ambidextrous" instructions increases the instructor's effectiveness.

Stance

Stance refers to the position and posture of the body relative to the target. Proper stance forms the foundation for proper shotgun shooting. An experienced shooting instructor once said that you hit with the shot, but you miss with your feet. The first component of a good stance is foot position.

The point of reference for taking a stance is the location where the target is likely to be broken. The body should face the intended target-breaking area squarely with the feet comfortably set about shoulder width apart. The off foot should

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be slightly forward of the dominant foot, perhaps 10 to 20 centimeters (about 4 to 8 inches). Most shooters feel comfortable with the weight evenly distributed or slightly (about 60:40) toward the front foot. The knees should be flexed slightly, allowing the hips to rotate freely. This freedom of movement is critical in games that involve crossing targets, since the swing comes from the hips rather than the upper body. If properly aligned, a line through the heel of the back foot and the toes of the front one should point to the target-breaking area.

Most instructors refer to this as a "boxer's stance." The term is descriptive of the upper body, too. The off hand, the one that holds the forearm of the shotgun, is extended partially with shoulder rotated upward to raise the elbow. The dominant hand, the one on the grip and trigger, is held closer to the chest with the elbow raised.

Gun-ready Position

The gun-ready position is the posture assumed by the upper body prior to mounting the gun. The shotgun is held at an angle across the front of the chest with the muzzle on the anticipated flight line of the target. The heel of the stock is held just above the belt or waistline, under the dominant elbow. The butt plate or recoil pad should be near the forward point of the hip, with the stock close to the body (barely touching) to within a few centimeters (an inch or so.) The dominant elbow should be about 5 to 10 centimeters (2 to 4 inches) away from the stock. This position makes mounting the gun easier by locating the butt forward of the arm pit and free from interference by the clothing or the body.

The off hand (the one on the forearm) should be somewhat flexed, with the shotgun balanced between the hands. If the stock dimensions are correct, the hand should be near the middle of the forearm. Some shooters prefer keeping the hand closer to the rear of the forearm for support and control. The grip should be firm enough to control the shotgun, but not excessively tight. Many shooters like to point the index finger toward the muzzle to reinforce pointing rather than aiming the shotgun.

The ideal position for the muzzle is on the anticipated flight line, not obstructing the shooter's field of vision. Being slightly low is preferable to being above the flight line. The shooter must see the target quickly and clearly to hit it.

Both eyes should be open and watching where the target is going to appear. Concentration should be focused totally on the target, not on the background or the barrel of the shotgun.

Mounting the Shotgun

The act of bringing the shotgun into shooting position is called the mount. The shotgun is brought to the face and shoulder in a smooth motion. Vertical movement of the muzzle should be kept to a minimum, with the muzzle acting as a pivot point and tracking the target as the gun is mounted. Raising the stock to the dominant cheek with the head held comfortably erect prevents many of the shooting form faults that plague many shotgun shooters. With practice you can bring the stock to the same position on the face and shoulder each time it is mounted. Consistent placement from shot to shot leads to better shooting and more consistent hits. The comb of the stock should be firmly against the cheek during the entire shooting process.

With the dominant elbow raised to shoulder height, the shoulder forms a pocket that receives the butt of the stock. Although shooting styles differ somewhat, the heel of the stock should not project appreciably above the top of the shoulder. By keeping most of the butt or recoil pad on the shoulder helps to distribute the recoil, as well as position the shotgun for consistent shooting results.

As the gun is mounted, the upper body shifts, leaning forward to place about 60 to 75 percent of the weight on the forward foot. The forward knee is bent slightly, and the shooter's head is positioned almost directly over the front foot. Although this process seems complicated and long, with practice it becomes a swift and fluid motion that blends with the swing to the target and follow through. In the beginning, the shooter mounts the gun before calling for the target.

Swing to the Target

Experienced shooters will start the swing to the target as the shotgun is being mounted, but that process is too complicated for beginning shooters. Beginning shooters should start with a mounted and still gun. Before calling for a target, the shooter shifts his or her visual field to the area where the target

is going to appear. The target is requested by calling "pull." Once the target is seen, the shooter focuses on it and moves the upper body and shotgun to cover it. In the early stages of learning, straight-away targets will be used. The shooter merely points at the target and shoots. Once other types of targets, particularly crossing ones are encountered, the shooter must accelerate the movement of the shotgun to catch and pass the target. That acceleration comes from the legs and hips, which pivot the upper body as a unit. Lead, the forward allowance needed to hit the target, is perceived differently by every shooter. Using a swing-through method is often more effective for field shots and those who are learning to use a shotgun. The shooter starts with the gun behind the target, accelerates through it, fires and continues to accelerate into the follow through. Sustained lead shooters find a forward allowance that works for them, then visually try to tow the target along its flight path with the muzzle, keeping them the proper distance apart.

Trigger Pull

Timing is much more critical than precise location for shotgun shooters. The shooter needs to fire when the barrel is pointing at the intersection point between the flight path of the shot and that of the target. Using the swing-through approach, the shooter fires when the shotgun touches, covers or passes the target. The trigger is pressed with a quick, crisp pull, but it is not snatched or jerked. The smooth flow of motion from the mount to the follow through should not be interrupted by the trigger pull. Firing the shot becomes a conditioned hand-eye reflex with practice, where the eye recognizes the proper relationship between muzzle and target and trips the trigger finger into action.

Follow Through

Follow through is the continuation of the smooth swing to and through the target. It is the most critical element to consistently good shotgun shooting. Follow through should flow smoothly through the recoil until the target is broken. Many shooters follow a broken piece of the target to accentuate their follow through. As target speeds increase, follow through becomes increasingly critical. Like the swing to the target, the follow through involves a properly mounted gun and movement generated from the hips and legs. This movement keeps the gun aligned with where the target will be when the shot charge reaches it.

Combining these elements in a few split seconds takes practice. Coaches must know the components of a good shotgun shot in order to help the learners improve. Keep the challenges simple at the outset. Keep target height and direction as uniform and straight-away as possible. Hold target speed down to modest levels. Keep the shooting sequence as easy as possible by starting with the gun mounted and ready to fire. Watch the shooters to make sure the elements of sound shooting are developing, and work on no more than one correction at a time. Good luck and good teaching.

Penetration and Shock Demonstrations

Ronald A. Howard Jr.*

This demonstration is an effective way of contrasting the actions of firearms and archery equipment. It requires an adequate range. For best results, use a high velocity cartridge loaded with frangible bullets in the rifle. A bow powerful enough to completely penetrate the backstop material completely should be used. Have junior leaders or parents assist.

First, shoot water filled (completely!) milk jugs, oil cans or similar containers with each arm. The targets should be at the same range from the firing line and close enough to hit them easily. The rifle should produce a response resembling an explosion. The bullet has high kinetic energy that is quickly transferred to the water as hydrostatic shock. Since water is incompressible, it moves away from the impact area violently. Water in living things behaves similarly, and the bullet kills by tissue disruption and hydrostatic shock.

The arrow should easily penetrate both sides of the jug, and may pass through the container without too much disturbance, merely causing a leak or making the jug tip over. It has relatively little kinetic energy and causes very little hydrostatic shock. Arrows are penetrating and cutting projectiles, and they kill large game by massive and rapid hemorrhage.

Repeat the performance on jugs filled with sand, hay bales or some similar backstop. The rifle bullet should be stopped by the material, but the arrow should pass completely through again. This should help the youngster to realize that even a relatively light bow has the ability to drive an arrow through material that is capable of stopping a bullet. Use the graphic demonstration as an introduction to a discussion of safety and the functions of both bullets and arrows in taking game animals.

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Glossary of Archery, Ammunition, Firearms and Shooting Terms

ACP – abbreviation for Automatic Colt Pistol, for example .45 ACP

Action – the parts of the firearm that load, fire and eject the cartridge

action release – a device that unlocks the action; normally found on semi-automatic or slide-action firearms; also called a bolt release in some cases

adapter – 1) a fixture on the bow for attaching an accessory, like a bow quiver, stabilizer, cable guard, bowfishing reel or sight; 2) part of the arrow that permits attachment of a nock or point (see screw-in adapter)

adjustable arrow plate – arrow plate that can be adjusted to achieve better arrow flight, usually using set screws or micrometer adjustments

aim-point – an optical sight that superimposes a spot of light on the image of the target

air charge – the compressed air used to propel the pellet in a in a pneumatic pellet gun

alignment – 1) relationship among two or more items; 2) having all elements true, square and in line with each other

ambidextrous – able to use both hands with equal dexterity

ammo – shooter's jargon for ammunition

AMO – Archery Manufacturer's Organization, a trade association of all archery equipment manufacturers

anchor – 1) holding the string at full draw; 2) position of the string, fingers, hand or mechanical release at full draw [see also high anchor and low anchor]

anchor point – a stable reference point for anchoring the string at full draw

antimony – metal often alloyed with lead to produce a harder shot or bullet material

Apache draw – extremely high anchor point, anchoring the nocking point on the cheekbone directly under the dominant eye, preferred for short-range shooting by some archers

aperture – a hole or opening in a sighting device, like the hole in the center of a receiver or peep sight disk

aperture rear sight – 1) device anchored in the string at eye height that the archer looks through at the sight pin; aids in precise sight alignment; commonly used in some archery shooting games, illegal in others; also called a string peep or peep sight; 2) metallic rear sight for a rifle, pistol or shotgun in which the shooter looks through an aperture centering the front sight or front aperture in the opening and aligning the sights with the target; also called a receiver sight or peep sight

apothecary measure – measurement standards used in pharmaceutical and pharmacy measurement

archer's paradox – observation that an arrow must flex to fly true to a mark

arm guard – protective device worn on the inside of the bow arm to keep the clothing out of the string's path and to protect the arm from abrasion by the string

arm-rest standing position – the standing rifle shooting position where the upper arm is rested against the side of the body for support and stability

arrow plate – lateral rest for the arrow; pad or part of the arrow rest holding the arrow away from the side of the riser ATA – Amateur Trapshooters Association, the governing body for American trap shooting in the United States.

arrow rest – a device for supporting an arrow while it is at rest or being drawn

arrow shelf – the flattened area at the bottom of the sight window on bows with a center shot cutout

attitude – the orientation of the body relative to the target

back – those parts of the bow pointing down range when the bow is properly held in shooting position

back quiver – an arrow-holding device designed to be worn on the archer's back, either centered (center-back quiver) or over the shoulder

backer (backing target) – a second target used to verify shots fired into the record target from other firing points

backstop – the ultimate stopping point for a projectile, often an earthen barrier, berm or slope

ball puller – a screw device used to retrieve a ball from a muzzleloader

ball starter – a device used to insert the ball into the muzzle (short starter) or push it a short distance down the bore (long starter)

bare bow – shooting without the aid of sights or other accessories to aid in sighting, purely "instinctive" shooting

barrel – the tube that contains and directs the projectile [see also bore, chamber, rifling, muzzle]

barrel lug – an extension of the barrel or attachment to the barrel used to attach it to the stock

barrel wedge – tapered pin used to anchor the barrel to the stock on muzzleloading firearms

base wad – the wad surrounding the battery cup in a shotshell; may be composed of fiber, rolled paper, plastic or formed from the hull material

BBs – 1) steel projectiles for air guns, approximately .177 caliber; 2) standard shotgun shot size, approximately .18 inch in diameter

bead – 1) the pointing or sighting aid(s) on a shotgun barrel; may be a small metal bead on a threaded post, a plastic or glass cylinder or a similar object; mid-rib beads are smaller; 2) the primary sighting area of a bead-and-post rifle sight

beavers tail forend – broad shotgun forend commonly seen on doubles, with a shape similar to a beaver's tail.

bedded barrel – a rifle barrel completely and consistently in contact with the stock material for the entire length of the fore stock

bench-rest position – a rifle shooting position where the shooter is seated at a bench and the rifle is supported on a rest, cradle or sandbags; often used for sighting-in purposes.

blooper – an under-powered shotshell that fires with an unusually loud, flat-sounding report; shot and wad may or may not exit the barrel; complete safety check should be made before another shot is fired

blunderbuss – matchlock firearm featuring a bell-shaped muzzle and commonly associated with the Pilgrims

blunt – a flat or broadened arrow point designed for hunting small game and killing the quarry by its impact

bolt – 1) moveable locking device that seals a cartridge in the chamber of a firearm, usually contains the firing pin and a means of extracting cartridges from the chamber; 2) a quarrel or arrow for a crossbow; 3) a threaded rod used as a connector

bolt action – firearm action designed around a manually operated bolt; both turn-bolt and straight-pull designs in use

Boone and Crockett Club – one of the major organizations maintaining records of North American big game animal trophies

bore – channel through which the projectile(s) travel while in the barrel

bore size – 1) the diameter of the bore in a rifle, measured in caliber (hundredths or thousandths of an inch) or millimeters (mm); 2) the gauge or caliber of a shotgun

bore swab – cleaning fixture made of fiber or fabric used to apply solvent, remove fouling, dry the bore or apply oil to the bore

bow case – a protective device for the bow; may be either hard (with high impact resistance) or soft (designed to prevent damage by scraping or minor bumps)

bow hand – hand holding the bow when in proper shooting position; the hand associated with the non-dominant, non-shooting or "off" eye

bow-hand side – the side of the body or target associated with the bow hand

bow press - a device to compress the limbs of a bow, usually used in servicing compound bows or checking adjustments in draw weight

bow quiver – an arrow-holding device designed to be attached to the bow; safety demands that the arrowheads be covered by a cowl or shield on all bow quivers

bow scale – a scale used to find the draw weight, peak weight or holding weight of a bow

bow stringer – a device used to string or unstring a conventional bow (recurve or longbow)

Bowyer – a designer and builder of bows

breech block – solid block of metal, either moveable or fixed in position that seals or locks a cartridge in the chamber of a rifle or shotgun

breech plug – threaded plug that seals the breech end of a muzzleloader barrel

bridle – plate that holds internal working parts of the lock in place

broadhead – an arrowhead designed for hunting large game animals and to kill by hemorrhage

buck shot – cold-swaged or cast lead pellets designed to be fired in a shotgun, range in size from No. 4 (approximately .24 caliber) to 000 (approximately .375 to .380 caliber)

buckhorn sight – open rear sight with high, curved sided

bull – 1) abbreviated term for bullseye or center portion of a target; 2) term applied to adult male elk, moose or domestic bovines; 3) content of discussions when shooters or hunters gather to talk

bullet board – loading block holding pre-lubed or patched and lubed bullets or balls, used as a means of speeding loading in a muzzleloading rifle or pistol

bullet mass – weight of a bullet divided by the acceleration of gravity, generally measured in slugs (pounds/32 feet per second squared) although bullet weight is measured in ounces (shotgun slugs) or grains (rifle bullets or balls); must be calculated to determine bullet energy

bullet point – target or field points that curve to appoint like as spitzer bullet (have a radius curve or ogive)

bullseye – center portion of a circular target; aiming dot on a target

butt – 1)target backing device designed to stop and hold arrows without damage, may be made of foam blocks or baled materials like paper, straw, excelsior, sugar cane fiber, marsh grass or plastic foam; 2) shoulder end of a rifle or shotgun stock; 3) a shooting stand or blind

butt plate – protective device attached to the shoulder end of the butt stock, usually of metal, horn, plastic or rubber

cable – wire ropes used to provide mechanical advantage on compound bows and cammed limb bows.

cable guard – device designed to hold the cables away from the path taken by the arrow when it is drawn or shot

caliber – diameter of a firearm bore measured in hundredths or thousandths of an inch or in millimeters

cam – 1) an eccentric wheel with changing radius around its perimeter; 2) eccentric wheel designed to prolong the peak draw weight of the compound bow, altering its draw force curve to increase its efficiency

cam bow – two-wheel compound bow featuring cams rather than round eccentric wheels

cammed limb – limb design with cam action at the bases of the limbs rather than at their tips

cammed limb bow – bow design featuring cammed limbs

cant – holding the bow or firearm at a slight angle to the perpendicular

cap-and-ball – a revolver type intermediate between muzzleloading pistols and cartridge pistols where the cylinder consists of several short muzzleloading chambers with a cap at the rear

caplock – 1) lock designed for use with percussion caps; 2) a rifle or shotgun using a percussion lock

capper – a device used to hold percussion caps and press them into place on the nipple of a muzzleloader

cardinal rules of safety – three fundamental rules of firearm and archery safety including 1) empty and open until ready to fire, 2) muzzle or arrow pointed in a safe direction and 3) fingers off the string or trigger until ready to fire

cartridge arm – any firearm using fixed ammunition

center-of-mass hold – holding the aligned sights on the center of the bull or target, with the firearm or bow sighted to place the projectile at the top or center of the front sight

center-fire – a firearm using a primer or battery cup located in the center of the cartridge head

chamber – rear portion of the firearm barrel, shaped to hold and support a specific cartridge

chambering – v. milling or cutting the breech end of the barrel to the dimensions specified for the appropriate cartridge; n. 1)the process of cutting the chamber in a firearm; 2)the dimensions of the chamber on a firearm or the cartridge for which it was cut

change roles – coach and pupil exchanging responsibilities during coach-pupil instruction

channel – opening or tube

chilled shot – fine shot made with a hard lead alloy containing antimony or tin and antimony

checkpoint – any reference point used by the shooter to be sure the anchor point is properly located

checkering – n. 1) textured surfaces on the firearm stock, frame or hammer designed to increase the security of the shooter's grip; 2) individual diamonds or other patterns within the textured surface; v. cutting or pressing the textured surface on a firearm

choke – 1)a device or barrel structure designed to control the pattern of a shotgun, generally available in cylinder, skeet (or skeet1), improved cylinder, quarter choke, skeet 2, modified or half choke, improved modified, full and extra full; 2)the amount of choke present in a particular barrel; 3)losing concentration under pressure

choke tube – fixed or changeable sleeve containing a choke device

cleaning jag – fitted device attached to a cleaning rod designed to hold a cleaning patch securely and tightly in the barrel

clicker – spring-loaded device attached to the riser near the arrow rest to signal when the arrow has been drawn fully, often used by target shooters who suffer from target panic or freezing as a release signal

climbing block – a portable device used in climbing trees without penetrating the bark

clip – a removable box magazine for rifle, pistol or shotgun cartridges

clout – long-range target game featuring a large horizontal target in concentric circles around a central flag

cm – abbreviation for centimeter, 1/100 of a meter or approximately 0.4 inch

coach/pupil method – teaching technique where two shooters support and reinforce learning, switching roles after each portion of the shooting session

cock – "hammer" of a flintlock action

collet choke – variable choke device where the amount of choke constriction is controlled by turning a collet that controls the attitude of a set of steel fingers within the device

comb – upper edge of the butt stock, the part in contact with the cheek or face

components – elements or pieces that make up a whole, in hand loading it refers to the powder, primers and other items needed to create a new cartridge

composite – made up of several materials (fiberglass and graphite limbs, for example, are composites of those fibers in a plastic matrix)

composite limb – limb made of composite materials

compound bow – bow designed to give the shooter a mechanical advantage during the draw, changing the shape of the draw force curve and yielding a higher efficiency in energy transfer to the arrow

conical point – target point with an abruptly conical shape, tend to deflect more than bullet points when striking other arrows

constriction – difference between bore diameter and choke diameter in a shotgun

controlled access – restricting access to authorized and responsible persons

crimp – 1) folded seal on a shotshell or blank rifle or pistol cartridge; 2) slightly rolled or indented area at the neck of a rifle or pistol cartridge designed to hold the bullet in place

creep – 1) tendency of the drawing hand to ease forward from the anchor point during or prior to release, usually caused by fatigue or excessive draw weight; 2) movement of the trigger without releasing the sear

crest – lacquer indicia applied to the shaft between the fletching and the point and used to identify the arrow (see "signature")

cresting lathe – mechanical device used in applying crests or signatures to arrow

crooked stock – butt stock with considerable drop at the comb and/or heel

cross hair – reticle consisting of a pair of hairs, wires or similar structures arrayed at right angles and centered in the sight

cup grease – heavy grease used to seal the mouths of the chambers in a cap-and-ball revolver

cushion plunger – adjustable and spring-loaded lateral arrow rest or side plate

cylinder pin – pin or post that supports the cylinder of a revolver

dead release – release without increasing tension in the back and shoulder muscles, in extreme cases while the drawing hand is creeping forward

deformation – alteration of the shape of bullets or shot, particularly due to acceleration, contact with the barrel or impact

degrees of choke – amount of constriction or choke in a shotgun barrel

desiccant – a drying agent

dock spike – a long, heavy nail used in construction of piers, docks and similar structures; useful as tent pegs and anchoring pegs for equipment

dot – reticle consisting of a small dot suspended on the intersection of nearly invisible cross hairs

double – shorthand expression for double-barrel shotguns, usually refers to side-by-side doubles

dram – unit of apothecary measure for volume, formerly used in measuring charges of black powder for shotshells

dram equivalent – a velocity or pressure measure giving shotshell performance equivalent to a specified amount of black powder

draw – 1) process of pulling the string back to the anchor point; 2) type of anchoring system used (such as Apache draw, high draw, low draw) cf. "anchor"

draw check – device used to signal when the arrow has been drawn to a consistent length, often used by target shooters to combat target panic or freezing (see "clicker")

draw check arrow – marked arrow used to determine draw length or proper arrow length

draw force – force applied to the string in drawing the bow to full draw

draw force curve – draw force compared to the length the arrow is drawn, shape varies with bow design

draw length – distance from the string to the arrow rest when an arrow is fully drawn to the anchor point

draw weight – force required to draw an arrow to the anchor point

drop – 1) movement of the projectile toward the earth; 2) distance below the line of sight; 3) distance below an imaginary line extended along the rib or top of the barrel toward the butt stock

drop at comb – drop measured at the front of the comb

drop at heel – drop measured at the top of the heel

drop shot – soft lead shot containing pure lead or very soft alloys formed by dropping molten lead through a calibrated screen in a shot tower (as most fine shot is made)

dry point – pointing the shotgun at a target without firing or dry firing

duplex reticle – reticle composed of tapered posts or heavy cross hairs with fine cross hairs in the center

eccentric – wheel with the pivot point located off center so the effective radius changes as the wheel rotates

effective range – distance at which a projectile remains capable of performing its intended task, determined in rifles or pistols by a combination of remaining energy and trajectory, determined in shotguns by a combination of pellet energy and pattern density

ejector – device designed to automatically and completely remove a fired case from the chamber

empty mark – a mark on the ramrod of a muzzleloader indicating the depth of the empty barrel

end – a series of shots fired before the arrows are scored or retrieved

energy – the physical measure of potential to do work, computed as on half the mass multi0lied by the square of the velocity

escutcheon – a metal plate inletted into the stock of a firearm, often used to reinforce a stress point of the stock

extra-full – chokes giving pattern densities in excess of 85 percent of the shot charge in a 30 inch circle at 40 yards

extractor – device designed to lift the cartridge from the chamber sot he shooter can remove it manually

eyedness – having a dominant eye, one that takes precedence in aligning a sight (like a finger tip) with an object when both eyes are open and unobstructed

Fg – coarsest granulation of black powder used in shoulder arms

FFg – granulation of black powder used in big bore shotguns and rifles

FFFg – finer grade of black powder used in small bore shotguns, pistols and rifles (.45 caliber and smaller)

FFFFg – finest black powder used in sporting arms, used only as priming power for flintlock arms

face – 1) the belly of the bow, the part that faces that shooter when the bow is in shooting position; 2) a target

felt recoil – apparent recoil influenced by weight of the firearm, shooting position, stock design, action type and similar features

ferrule – cylindrical or tapered tube designed for attachment of one object to another, for example attaching a broadhead to an arrow

ferrule cement – a heat sensitive cement of low melting point used to attach ferrules to shafts

field point – a heavy point with a more or less elongated tip of smaller diameter than the body of the point, often designed to match broadheads in mass or flight characteristics

fine shot – shot produced by dropping molten metal through screens in a shot tower, commonly from approximately 0.18 inches in diameter (BB) to 0.08 inches in diameter (#9)

finger pinch – tendency of the arrow to swing away from the rest during the draw, usually caused by cupping or curling the hand and cured by keeping the back of the hand flat during the draw

fire control – mechanical parts of the firearm that cause it to fire, including the trigger, sear, hammer, main spring and firing pin

firing point – a designated shooting station or location

fish-tailing – lateral oscillation of the shaft in flight, usually caused by improper spine, improper bow tuning, poor shooting hand form or misaligned nocks

FITA – Federation Internationale de Tir a l'Arc, the governing body for international, Olympic-style archery shooting using large, five color faces over known but relatively long ranges in open shooting fields

flange – 1) a rim or lip on a cylinder, 2) rim or edge on a scoring gauge

flash hole – channel from the priming pan of a flintlock to the breech and main powder charge

flash pan – priming pan of a flintlock

fletch – 1) to apply fletching to an arrow; 2) the type or style of fletching materials used

fletching – feathers or vanes used to steer and stabilize the flight of an arrow

fletching cement – cement used to apply fletching materials

fletching clamp – clamp used to hold the fletching materials in shape and in place during application to the shaft

fletching jig – tool used to hold the fletching clamp in proper alignment with the shaft while the fletching is being applied

fletching style – number and placement of feathers or vanes, selected by considering trade-offs in speed, control, weather sensitivity, durability and noise in flight; common styles include vanes that are in line with the shaft (straight), angled across the shaft (angled), spiraled along the shaft (helical), or wrapped around the shaft (one type of flu-flu); usual numbers and placement involve three vanes at 120 degrees and the index vane perpendicular to the plane of the string and rest, four vanes at 90 degrees or 75 and 105 degrees, and six vanes at 60 degrees

flight – 1) a group of shooters scheduled to shoot at the same time; 2) behavior of the arrow when it is actually in flight

flight line – path taken by a flying target or game bird

flight shooting – long range archery game where arrows are shot for maximum flight distance

flight arrow – a specialized arrow with minimal fletching designed for flight shooting

flint – extremely hard stone used in flintlock firearms and arrowheads

flintlock – 1) lock used on flintlock firearms, featuring a cock, flint, frizzen and flash pan; 2) firearm using a flint-and-steel lock

flu-flu – specialized arrow designed for limited flight distance and often used in shooting flying targets, game birds or small game; use spirally wound full-length feathers or six full-length feathers to slow arrow flight

fly – connecting arm in the lock of a muzzleloader using double set triggers

follow through – 1)continuing the appropriate action of the shooting sequence through the shot until the target is struck' 2)holding the bow and string hands or the firearm in their release or shooting positions until the arrow or bullet strikes the target; 3)continuing the swing on a moving target until the target is struck

forearm – front portion of a stock on firearms with a two-piece stock; forend or fore stock

forend – portion of a stock between the action and the muzzle, also called a forearm or fore stock

forend cap – metal or wood cap covering the extreme end of the forend

fouling – powder residue or bits of metal left in the bore or other parts of the firearm as a result of shooting

four position - rifle matches in which shooters fire stages from the prone, sitting, kneeling and standing positions

four-wheel bow – compound bow design featuring eccentric wheels and idlers to aid in developing mechanical advantages, usually feature less let-off at full draw than two-wheel bows

fowling piece – muzzleloading shotgun designed for bird hunting, usually double-barrel designs

frangible – easily broken into pieces; frangible bullets come apart with explosive results

free-floated barrel – rifle barrel that is firmly bedded at the receiver but does not touch the stock material for the length of the forend

freezing – experiencing difficulty in releasing the string when the arrow is drawn and a sight "picture" is developed, also known as target panic; sometimes used for other shooting problems, like releasing as soon as the sight or other reference point touches the target

frizzen – the hardened steel striking surface on a flintlock, produces sparks of burning steel when struck by the flint

frizzen spring – spring that holds the frizzen in place prior to firing and helps it direct the spark into the flash pan

full choke – choke device nominally delivering pattern densities of 70 to 80 percent in a 30 inch circle at 40 yards

gas check – a gilding metal or other hard metal band at the base of a lead bullet; permits higher velocities and pressures than possible with a lead bullet

gauge – standard shotgun borings, currently 10, 12, 16, 20, 28 gauges; formerly the number of bore diameter lead balls that could be cast from a pound of lead

globe sight – an aperture front sight

glove – protective device fro the shooting hand usually with individual finger stalls for the three drawing fingers

gold – bullseye or center of a five-color, FITA-style target

grain – unit of measure for bullet weight; one grain equals 1/7000 pond

granulation – a grade or size of individual black powder granules

grip – v. to grasp or hold the firearm or bow in a manner that enables the shooter to control the arm; n. 1) the stock or handle of a handgun; 2)the area immediately behind the trigger guard on a rifle, musket or shotgun [see also straight or English grip, pistol grip]

grooves – the spiral channels cut into the bore of a rifle or a shotgun choke

ground quiver – device that is set on or stuck into the soil for holding the arrows upright with the tips on the ground or protected in a tube

grounding – placing the bow on a rack or on the ground to indicate that the archer has finished shooting the arrows in that end

group – cluster of arrows or bullets shot with the same form, aiming point, sight setting and other factors to determine the average point of impact for that combination

half cock – a hammer position midway between the fired and fully cocked position, often used as a safety device

hammer – a spring-loaded striker that provides the force, directly or by transferring it to the firing pin, needed to detonate a primer, percussion cap, battery cup or priming compound in the rim of a cartridge

hang-fire – delayed ignition of ammunition or a muzzleloading charge

handle – grip portion of the bow

hauling line – light line used by bowhunters to raise or lower equipment when using an elevated stand

head stamp – identifying information on the head of a cartridge case

heel – the upper portion of the butt or butt plate of a long gun

high anchor – anchor point locating the nocking point near the corner of the mouth on the drawing hand side, often with a finger touching the canine or eye tooth

high house – the target house on the left side of a skeet field from which the target emerges 10 feet above ground level

high house target – targets thrown from the high house on a skeet field

high velocity – term to signify velocities above target load levels in shotgun ammunition or above some minimum velocity (approximately 2500 feet per second) in center-fire rifles

high wrist – shooting style in which the bow-hand wrist is held in alignment with the forearm

hip quiver – arrow holding device designed to be worn on the belt

hold – 1) position of the aligned sights relative to the target or the intended point of impact; 2)relationship of the hands and archery equipment to the intended point of impact; 3)pause at full draw to check alignment, aiming point and form before release

hold over – holding the sights, sight pin or other reference point above the intended point of impact to compensate for projectile being below the line of sight at the distance to the target

hold under – holding the sights, sight pin or other reference point below the intended point of impact to compensate for the projectile being above the line of sight at the distance to the target

hooked breech – barrel attachment style in muzzleloaders where an extension of the breech plug hooks into a steel base mounted in the rear of the barrel channel, permits easy removal of the barrel for cleaning

hygroscopic – attracting moisture from the air

impact area – the area in which the projectile(s) strike the backstop or ground

improved cylinder – the most open or least constricted of the commonly used field chokes; nominally patterns about 45 to 50 percent of the shot charge in a 30-inch circle at 40 yards

improved modified – choke often used in the bottom barrel of over/under trap guns; nominally patterns 65 to 70 percent of the shot charge in a 30-inch circle at 40 yards

indexing – 1) aligning the cylinder of a revolver with the forcing cone on the barrel; 2) aligning the plug of a scoring gauge with the hole made by the bullet

inert – deactivated, non-functional, incapable of action

inert ammunition – dummy ammunition or ammunition loaded with deactivated or non-functional materials; action-proving ammunition

IBO – International Bowhunters Organization, a governing body for 3-D (three dimensional) target shooting and other forms of shooting developed by bowhunters to test off-season skills

idler – wheel or pulley that changes the direction of a cable without altering the force applied

insert – 1) fitted unit that fits into the hollow shaft of an arrow to permit attachment of either a nock or a point; 2) blades fitted into a broadhead with replaceable blades; 3) small blades at right angles to the main blades on some broadheads (also known as “bleeder blades”); 4) elements in rifle sights that may be changed to suit the conditions or the shooter’s preferences

instinctive shooting – shooting without the aid of sights or other aiming devices on the bow

jacketed bullet – bullet composed of a lead core with a gilding metal or other harder metal bearing surface

jag – a cleaning device designed to hold a patch on the cleaning rod in a specific sized bore

jaws – top and bottom portions of a flintlock cock, designed to hold the padded flint securely

jerking – moving the trigger or shooting fingers with a brief, violent motion

judo head – specialized, spring-loaded head for roving or practice

jumping a target – anticipating the flight line of a shotgun target and moving the shotgun in that direction before the target emerges

kneeling – rifle shooting position; shooter sits on one foot or heel with the lower leg on the other side held vertically; the elbow of the forward hand rests on the knee providing support for the rifle

lacquer – tough paint used in archery application, often with an epoxy or vinyl base

laminated – layers of material bonded together to take advantage of the characteristics of the component materials

laminated limb – limbs composed of fiberglass or other composite materials on the surfaces with cores of wood

lands – raise, spiral ridges left when rifling is cut in a barrel

lanyard – cord attached to an implement to hold or operate it

laser sight – sight that projects a laser dot onto the target

laws of physics – fundamental relationships describing mass and movement of objects and the interactions of those factors

lead fouling – deposits of lead left in the bore of a firearm

length of pull – distance from the butt to the trigger

limb – flexible portion of the bow from the riser to the tip

line of flight – path taken by the arrow in flight

line of sight – straight line from the eye, through the sight to the target

live release – releasing the string while increasing the tension in the back and shoulder muscles (pulling the shooting elbow back), indicated by the shooting hand moving backward along the face or neck on the release

loaded mark – mark on a muzzleloader ramrod to indicate the barrel is properly loaded

loading port – opening through which a firearm may be loaded, usually serves as an ejection port as well

loading ram – lever activated rod on a cap-and-ball revolver that serves as a seating device for the ball

lock – mechanical parts of a muzzleloader or other firearm

lock plate – flat plate upon which the parts of a muzzleloader lock are assembled and held in place

longbow – straight or slightly reflexed bow based upon the old English design; sometimes used in fish and game regulations to designate all bows with the exception of crossbows

low anchor – anchor point locating the nocking point under the chin

low-house – trap house on the right side of a skeet field (station 7) from which the target emerges 3 ½ feet above ground level

low-house target – targets thrown from the low house on a skeet field

low wrist – shooting position in which the shooting forearm is relaxed, allowing the hand to be pushed upward by the pressure of the bow against the palm; position favored by target shooters

lubricated wad – fiber or felt wad treated with a lubricant

m – abbreviation for meter, the base u nit of length measure in metric units; approximately 10 percent longer than a yard

maching – cutting or milling metal to specified dimensions

magazine – 1) part of a firearm where ammunition is stored prior to being inserted into the chamber for firing; 2) a controlled storage area for ammunition or components

magnum shot – very hard shot made with a lead alloy containing a high percentage of antimony

main spring – the spring that is cocked to provide energy to the hammer or firing pin

malfunction – failure of a firearm or ammunition to perform as designed; legally defined in the rules of shooting games

matching chokes- - process of selecting the appropriate choke for the intended use of a shotgun

matchlock – 1) firing mechanism where a match is inserted into a touch hole to ignite the powder charge; 2) firearm using this type of lock

Maxi ball – flat-based muzzleloader bullet developed by Thompson Center Arms

micrometer – measuring device using a graduated dial or set of dials to obtain precise measurements

micrometer sights – aperture rear sights or externally adjusted telescopic sights with micrometer-style, graduated adjustment knobs that permit precise sight adjustment

milling – machining process where metal is removed to form the appropriate part or dimensions

minnie ball – conical bullet for muzzleloading arms developed in the mid-nineteenth century

misfire – failure of a cartridge, percussion cap or powder charge to fire

mimetic – mimicking or practicing a process without actually performing the act; practice steps without shooting

mm – abbreviation for millimeter, 1/1000 of a meter or approximately 0.04 inch

modified choke – shotgun choke patterning approximately 55 to 65 percent of its shot charge in a 30-inch circle at 40 yards; also known as half choke

module – integrated operating element of a firearm, like a trigger group or fire control mechanism

momentum – physical measure of inertia, the mass multiplied by the velocity

musket – smoothbore muzzleloading firearm suitable for use with either shot or ball

muzzle – terminal end of the bore, opening from which the projectile or projectiles emerge

muzzle control – maintaining adequate control of the firearm so the muzzle is never pointed at anything the shooter does not intend to shoot

name tent – folded card used to identify the person sitting at that location

nipple pick – tool for cleaning the opening or channel in the nipple of a muzzleloader

nipple wrench – tool designed to remove or replace a nipple

nitro card wad – heavy treated paper cut to shape and used as an over-powder wad in shotguns

notch or v-sight – open rear sight using a notch or a V-shaped slot as a reference point for sight alignment

NFAA – National Field Archery Association, governing body for indoor and outdoor archery shooting using both conventional and compound bows in the United States

nock – 1) slotted device at the end of an arrow to receive the string; 2) slots in the ends of conventional bow limbs to anchor the string

nocking point – location where the arrow is placed on the string

nocking point indicator – device for maintaining the proper nocking point on the middle serving of a string, commercial and homemade types available

NRA – National Rifle Association, the governing body for rifle, pistol and international shotgun shooting in the United States

NSSA – the Nation Skeet Shooting Association, the governing body for American skeet in the United States

NSSF – National Shooting Sports Foundation, a trade organization of the arms and ammunition manufacturers in the United States dedicated to the promotion of shooting sports.

ogive – curved surface at the front of a bullet

open sight – rear sight with a flat or curved upper surface with or without a notch or groove as a reference point

optical sights – sights using lenses with or without magnification

over-powder wad – wad used to seal the bore and contain the gases produced by the burning powder

over-shot wad – wad used in muzzleloading shotguns or roll-crimped shotshells to keep the shot in place until the charge is fired

palm-rest grip – pistol shooting grip where the supporting hand is cupped under the shooting hand

Partridge sight – sights using a rectangular notch in the rear sight and a flat-topped, rectangular blade for a front sight, often used on pistols

patch box – inletted cover on the side of a muzzleloader stock used to carry a small supply of patches or other materials

patch knife – a small knife used to trim patching materials when using a muzzleloading rifle with patched round balls

pattern – cluster or cloud of projectiles fired from a shotgun using shotshells

pattern control – use of chokes, buffering materials or loading techniques to modify the pattern of a shotgun

PBA – Professional Bowhunters Association, a bowhunting organization with a high ethical standard

peep sight – rear sight consisting of a perforated disk through which the front sight is viewed, also called a receiver or aperture sight

pellets – 1) projectiles developed for use in pellet rifles and pistols, consisting of a hollow-based lead cup; 2) shooter's synonym for shot in shotshells

penetration – 1) depth to which a projectile will travel in a given substance before stopping, a measure of energy and momentum; 2) complex interaction of momentum, diameter, point characteristics and the medium; 3) bowhunters term for the arrow's ability to reach the vital organs of the quarry and exit the far side

percussion cap – hollow cup of copper or gilding metal containing a small amount of pressure sensitive explosive, used to ignite the powder charge in percussion or caplock firearms and cap-and-ball revolvers

peripheral vision – wide angle vision, seeing objects on the edges of the visual field

pilot hole – hole bored into hard materials to start a screw

pistol grip – downward curved gripping surface immediately behind the trigger guard on many firearms

pivot arm – operating arm on a spring-powered trap

plinking – shooting at safe and legal targets of opportunity; informal shooting
plucking – pulling the fingers away from the string rather than relaxing them and letting the string roll away from them, a release form fault
point of impact – location at which a projectile strikes another object or the surface of the earth
Pope and Young Club – organization that maintains records of bowhunting
porpoising – undulating (vertical oscillation) movement of an arrow in flight, usually indicates a form fault or improper bow tuning
possibles bag – bag or pouch used by a shooter to carry all the equipment and materials that he or she "might possibly need"
post – reticle using one or more pointed or flat-topped sighting devices
powder charge – amount and type of powder used in a particular load
powder flask – a non-sparking metal flask used to carry a supply of black powder
powder horn – cow horn modified as a carrying device for black powder
powder measure – calibrated volumetric device for measuring charges of powder
press – 1) act of pulling the trigger back smoothly to fire the arm; 2) device for putting tension on bow limbs to relieve the pressure on the string; 3) tool used in hand loading ammunition
priming flask – small flask for carrying and dispensing small charges of priming powder
priming pan – part of a flintlock containing the priming powder
prone – rifle shooting position where the shooter lies belly down on the ground, supporting the rifle with the arms braced firmly on the ground
projectile – object like an arrow, bullet, shot or stone propelled by mechanical, pneumatic or chemical forces
punch – tool used to transfer the energy of a hammer or similar instrument to a small area
Pyrodex – black powder substitute developed by the Hogdon Powder Company
query – a question or request
quiver – device to hold arrows
ram – rod or other device moved by mechanical, pneumatic or hydraulic pressure within a given course or zone of travel
ramrod – rod used for loading or cleaning firearms
range – 1) safe shooting area; may be further defined by the rules of formal shooting games; 2) maximum distance a given projectile may travel; 3) distance to a target; 4) effective shooting distance of a projectile, firearm or bow
range layout – design of a shooting range
range officer – person responsible for the safe operation of a shooting range
range rod – heavy ramrod for use at a fixed location
range staff – persons assisting the range officer while conducting shooting on a shooting range
receiver – part of a firearm to which all other parts connect; housing for the action, fire control and safety mechanisms
receiver sight – aperture rear sight or peep sight
recoil – reaction of the firearm to the force of a projectile being fired; expression of Newton's law: for every action there is an equal and opposite reaction
recoil control – stock construction, action design, structures or mechanical devices designed to reduce the amount of felt recoil or to spread it over a longer time frame
recoil pad – hollow or solid attachment to the butt of a firearm used to cushion the recoil
record shot – shots fired at the scoring surfaces of a target
recurve bow – conventional bow with the tips of the limb curved toward the back of the bow
reflexed limb – limb that angles toward the back of the bow when the bow is unstrung
release - 1) permitting the bowstring to return to its resting position, firing an arrow; 2) hand-held mechanical device to fire the bow
reloading – handloading, remanufacture of ammunition from basic components
report – firing noises produced by a firearm
reticle – sighting device or structure
rifling – spirally arranged lands and grooves that impart a spin to the projectile or modify the dispersal of shot

rifling process – cutting grooves in the interior of a firearm bore to create rifling

rim – flange at the base of a cartridge case; may be used as a location for a priming compound (rimfire cartridges) or for headspacing and extraction purposes

rimfire – cartridge with priming compound sandwiched between the layers of a folded rim, fired by striking the rim and crushing the priming compound between the metal surfaces

riser – central portion of the bow, including the handle or grip

SAAMI – Sporting Arms and Ammunition Manufacturer's Institute, the industry-supported organization that sets standards for the sporting arms and ammunition industry

sabot – a split sleeve to hold a bullet or ball

St. Charles quiver – hooded quiver worn in the center of the back and permitting the arrows to be removed from the bottom of the quiver

Scattergun – term used for shotgun

screw-in adapter – 1) device permitting quick change of points having threaded shanks; 2) accessory attachment points on the riser of the bow

sear – interlocking surfaces that hold a mainspring, hammer, firing pin or similar device in place until released by moving the mating surface

sear spring – spring that holds a sear in place

self bow – bow built as a single unit

semi-automatic (semi-auto) – self-loading firearm design in which some of the energy developed by the fired cartridge is used to operate the action; may be operated by gas or recoil

semi beavertail forend – forend intermediate in design between the beavertail and splinter designs

serving – windings placed on a bowstring to protect the string loops and the center portion of the string and to provide a smooth surface for a cleaner release

set trigger –trigger used to activate a hair-trigger sensitivity on a firing trigger in a double-set trigger arrangement

shaft – body of an arrow

shaft spider – tracking device inserted in a hunting arrow that leaves a trail of fine thread to aid in game recovery

shaving lead – leaving small shavings or spatterings of lead around the forcing cone of a cap-and-ball revolver

shooting range – 1) safe place to shoot; 2) shooting field or location developed according to the rules of a specific event

shot charge – weight of shot in a shotshell

shot cloud – airborne shot charge or shot cluster

sight – device to assist in aligning the eye with the bore or bow and pointing the aligned system at a target

sight bar – vertical post allowing for elevation adjustment

sight extension – horizontal bar extending the sighting radius for more precise sight alignment

sight picture – combination of a properly aligned set of sights and a target

sight pin – post, pin, or other shape used as the actual sighting device

sight window – cutout area on a bow to permit the arrow a straighter path to the target and to permit the use of a sight

sighting ring – ring around the bulls used for sighting shots

sighter – shots fired to determine and adjust sight settings

sighter bull – bull used for sight adjustment

signature – personalized indicia on the shaft just beyond the fletching to identify or beautify the arrow

silhouette shooting – shooting games where metallic silhouettes are the targets and knocking them over is the criterion for success

silencer – device designed to reduce noise by dampening vibrations of the string or cables or by muffling the report of fixed breech firearms

sin – arrow falling short of the target

single stage trigger – normal single trigger

sitting – shooting position when the shooter sits on the ground supporting the elbows with the knees

six o'clock hold – hold where the bull is situated at the top of the front sight (like a "pumpkin on a post") in order for the projectile to strike the center of the bull

skeet – 1) formal shotgun shooting game conducted on a nearly semi-circular field with eight shooting stations around the perimeter and targets thrown from either end of the base chord; 2) shotgun choke producing patterns of about 35 to 40 percent of the shot in a 30-inch circle at 40 yards, also known as skeet 1; 3) skeet 2 chokes fire tighter 9(nearly modified) patterns

skirt – hollow rear portion of a pellet

slap – 1) arrow striking the cables, riser or rest on the release resulting in fish-tailing; 2) string striking the inside of the forearm or elbow of the bow hand, usually indicating pronation of the shoulder or improper elbow rotation resulting

slide – external operating parts of a semi-automatic pistol

sling – 1) strap used to carry a firearm or steady it in some shooting positions; 2)strap used to hold the bow in the shooter's hand on release of the arrow

smoothbore – firearm lacking in rifling

snap caps – inert devices designed to fit a firearm chamber and permit it to be "fired" releasing the tension on the springs without damaging the firing mechanism

snatching – jerking the trigger to make the firearm fire while it seems to be lined up with the intended point of impact

spin wing – light plastic vane with a curled edge used by many target archers

spine – stiffness of the shaft, a feature of its materials, length, diameter, mass, wall thickness and accessories

spitzer – sharply pointed bullet with a tangent or secant ogive

splinter forend – thin forend or fore arm found on many side-by-side double shotguns

sprue – small projection left when a cast round ball is molded

squeeze – act of pressing the trigger straight back with steady pressure until the firearm goes off

squib load – grossly under-powered load

stabilizer – counter-weight(s) attached to the bow to dampen vibrations during release

stadia wires – multiple cross hairs used as a range finding device in some optical sights

stalker quiver – hip quiver designed to protect broadheads from damage and the shooter from broadhead injuries

standing – shooting position where the shooter stands upright and supports the firearm with the arms and shoulder alone

starter – see ball starter

station – shooting position or location on a shotgun field' trap has five stations, skeet has eight

statistical officer – individual handling the scores and reporting for a shooting event

statistical office – location of the statistical officers

string – 1) bowstring; 2) series of shots fired with the same sight setting and hold; 3) series of shots fired in accordance with the rules or the orders of the range officer

string hand – drawing hand, the hand on the same side as the dominant eye

string hand side – the dominant-eye side of the body, bow or target

string jig – device used for making bowstrings

string nock – notches cut in the tips of the bow's limbs to hold the string in place

string peep – aperture rear sight anchored in the upper part of the bowstring

string silencer – device to reduce string vibrations and string noise on shooting

string tracker – any of several tracking devices used by bowhunters to aid in recovering game animals

stock – wooden or composite materials acting as a handle for the firearm

straight-aways target – target flying on a line directly away from the shooter

straight grip – firearm grip or wrist that follows the straight line from the toe to the trigger guard; also known as an English grip

straight stock – butt stock with relatively little drop at the comb or the heel; tends to recoil nearly straight back and to pitch the shots somewhat high; commonly used on trap guns

sustained lead – shotgun lead obtained by maintaining a set gap between the shotgun and the target (towing the target along with the shotgun)

swing through lead – shotgun lead obtained by starting behind the target, accelerating through it and firing as the muzzle clears the front of the target

tab – protective device for the shooting fingers, composed of one or more layers of material

take - process of rendering game animals into the possession of the hunter, broadly defined by most game agencies

take-down bow – bow that permits the limbs to be removed from the riser for transportation or storage; also permits use of different weight limbs or replacement limbs

tang – metal extension of the action, trigger guard, receiver, breech plug or other part bedded into the stock

tang lever – operating lever of a single-shot or double-shot firearm

target back – reverse side of the target from the one with the bulls printed on it

target panic – inability to release the bowstring when the arrow or sight is properly aligned with the target

telescopic sight – optical sight with or without magnifying lenses, adjusted either internally or externally and containing a reticle or sighting device

thimble – cylindrical support structure on a muzzleloader to hold the ramrod

three position – shooting match including stages fired from the prone, stand and kneeling positions

thrower arm – cushioned arm that propels clay targets from a trap

thumb-lock grip – pistol shooting grip where the fingers and thumb of the supporting hand are wrapped over the fingers and thumb of the shooting hand

tight group – obviously compact cluster of shots fired with the same sight setting, sight alignment and sight picture and demonstrating proper form

toe – bottom edge of the butt of the firearm

touch hole – the opening in a matchlock arm where the match was inserted into the powder charge

tracking the target – moving the firearm along the flight path of the target

trade gun – smoothbore muzzleloader used as a trade item during the fur trade era

trajectory – the curved flight path of the arrow or other projectile

trajectory curve – path of a projectile in flight relative to a line of sight

trap – 1) a device for throwing a clay target; 2) a formal shooting game

trap field – field properly set up for shooting trap

tree sight – specialized sight that compensates for the downward angle of the bow when shooting with the arm lowered rather than extended straight from the shoulder

triangulation – using a series of three or more "shots" to determine the prevision of a shooter's sight alignment

trigger – lever used to release a sear and fire a firearm

trigger control – 1) keeping the finger off the trigger except during a shot; 2) pressing the trigger straight back through a firing sequence without disturbing the sight alignment and sight picture

trigger guard – protective device surrounding the trigger

trigger plate – metal plate that controls the orientation of the trigger

true draw length – distance from the string to the far edge of the arrow rest

tumbler – device in a muzzleloader lock that permits the hammer to fall on firing

two-wheel bow – compound bow design featuring eccentric wheels or cams at end of both limbs and without idlers, usually features more let-off at full draw than a four-wheel bow

uncalibrated – having divisions that are of unequal or unknown units

unhit bull – record bull that has not been fired upon or hit by a shot, usually associated with failure to fire at a bull and firing at another bull more than once

USSA – USA Archery, www.usarchery.org. Formerly was just the name of that part of NAA that was the National Governing Body or official representative of the U.S. to FITA. The NAA has now adopted this as the name of the entire organization.

vane – 1) individual piece of fletching material; 2) plastic fletching material

vernier peep – an adjustable peep or receiver sight used on long range or target muzzleloading rifles and adjusted on a vernier scale

wad – material used to seal a bore, to cushion a shot charge or projectile or to prevent shell components from moving within the case, usually made of treated paper (card wads), fiber, felt or plastic

wad column – total array of wads in a cartridge or charge

web – portion of hand between the base of index finger and the base of thumb

wedge pin – see barrel wedge

wheel lock – 1)firearm lock using a spring-loaded, serrated wheel whirling against a pyrite flint to produce a shower of sparks and ignite a priming powder charge; 2)a firearm with a wheel lock action

whip finish – winding a strand of material over itself to lock the end in place, usually accomplished by winding the material over a loop of strong material, tucking the end of the wound material through the loop and pulling the loop out, drawing the material under itself

wobble area – area through which a firearm moves during sighting and firing

worm – spirally twisted metal pins used for retrieving patches or swabbing the bore with cleaning patches when using a muzzleloader

wrist – the narrow portion of the stock at the grip

zone of fire – the danger area ahead of the muzzle, must be safe before any shooting equipment can be discharged safely.