Flowers…the Ultimate Advertisement for a Plant and Welcome Mat for Pollinators

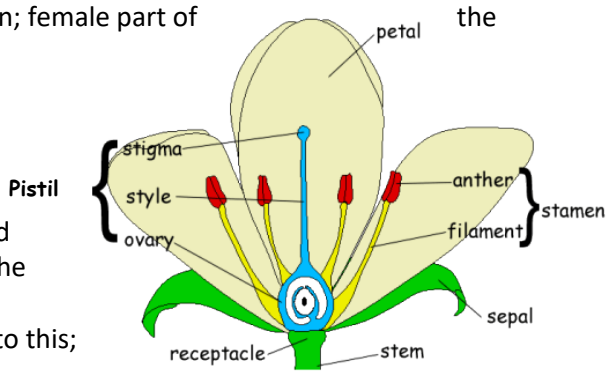
Have you ever heard of the term, "marketing?" It is what companies do to convince you to buy what they sell—think Nintendo, Nike, Hershey's, or Microsoft. Sometimes these companies advertise on TV or Internet. They make their toy, game, food, or shoes look so amazing, that you just have to have them. Well, would you believe that plants have the best marketing tool ever?! Yep, and they are flowers. For the last 200 million years or so, flowering plants, called angiosperms, have been selling their products to whatever buzzed, flapped, or crawled by. They are selling pollen and nectar to pollinators, and pollinators pay them back by doing chores—using their beak, tongue, or fuzzy bodies to move pollen around.

Your Quest:
Learn to identify the parts of a flower and what their jobs are. Dissect (take apart) a flower to see those parts up close. Make a flower of your own, and conduct a quick experiment involving (pretend) pollen. Finally, go outside to discover "biodiversity" in flowers—flowers of different colors, shapes, sizes, and scents that are made to attract different pollinators.

Dissect and Explore a Flower

Terms you need to know:

Anther: part of the stamen that produces pollen
Biodiversity: the variety of animal and plant life in any environment
Filament: long, stringy part of the stamen with anther at the top
Ovary: the place that becomes a fruit; ovules become seeds
Petal: the colored part of the flower; gives the flower its shape; might only be one or many; attracts pollinators
Pistil: a vase-shaped part in the center of the flower that receives pollen; female part of the flower; also called carpel
Pollen: tiny powdery grains on the anther; usually yellow
Pollination: spreading pollen from one flower to another
Receptacle: the bulging part of the stem beneath the flower; holds up the flower
Sepal: the green leaf-like parts under the flower; protect the flower bud
Stamen: thin string-like stalks sticking out of the center of the flower; the anther is on top; the male part of flower
Stigma: the sticky landing platform at the tip of the pistil; pollen sticks to this; the female part of the flower



Materials: *Remember to get permission to cut flowers from someone else's yard.*

- Thick paper, cardstock, or cardboard
- Tape
- Pencil
- Scissors or a knife **with adult help**
- Flower (Large open flowers like lilies are best.)
- 1 helper for tape

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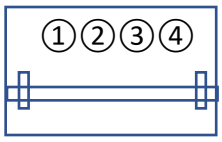
Directions: Numbers on pictures, match numbers below. *Your goal is to gently pull off all the flower parts, press them on the sticky part of the tape, then label them.*

1. Lay your paper down in a "landscape" orientation.
2. Cut a piece of tape about as long as the widest part of the paper.
3. Have your helper hold the tape STICKY SIDE **UP** across the middle of the paper.
4. Tape down the long piece of tape by placing a smaller pieces of tape (sticky side down) at each end.



5. Write down the name of the flower you are dissecting at the top of the paper.
6. **Begin dissecting**! **TIP**: When pulling off the flower parts pull them outward and then down while supporting the part that connects it to the rest of the flower.
7. Cut the stem off about 1-2-inches from the flower.
8. Gently pull off the sepals. They are usually green, but sometimes are the color of the flower. There are the same number of sepals as there are petals. Sometimes they overlap a little, so look for the best one to pull off first. Stick them to the tape and write down the word *sepal.* NOTE: Peruvian lilies have greenish sepals when buds are small. As they mature, they look just like petals. Daffodils have a brown, crinkly *spathe* instead of sepals.
9. Now pull off 1 or 2 petals. Like sepals they overlap. Stick them to the tape, and write down the word *petal*. Look for "nectar guides," dots or lines pointing pollinators to the nectar.
10. Remove the rest of the petals, but after you remove the last petal, touch the base of the petal (part that had been connected), and see if you can feel the sticky nectar.
11. Now pull off the stamens. Be extra gentle because they break. Stick them to the paper and write *stamen* and *anther* and *filament* next to them with arrows.
12. If you can, rub a little pollen off the anther and put that on the tape too. Write *pollen* next to this.

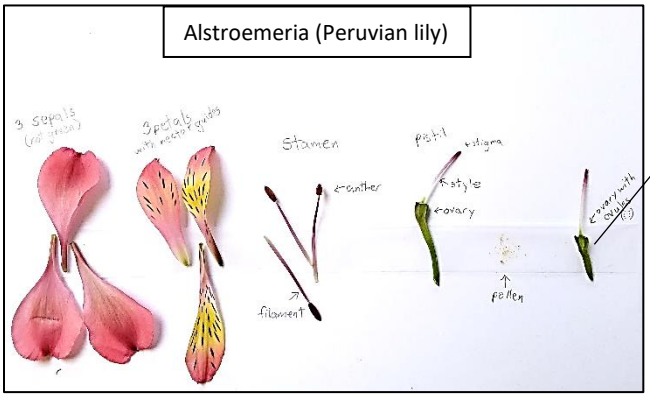
13. Now the tricky part. Find the pistil and carefully slice it in half top to bottom the long way. If you can see inside, label everything, *pistil*, *stigma*, *style, ovary, and ovules* Ovules will become seeds!
14. Try this with a variety of flower shapes and colors, like with a daffodil. They have obvious, visible ovules.

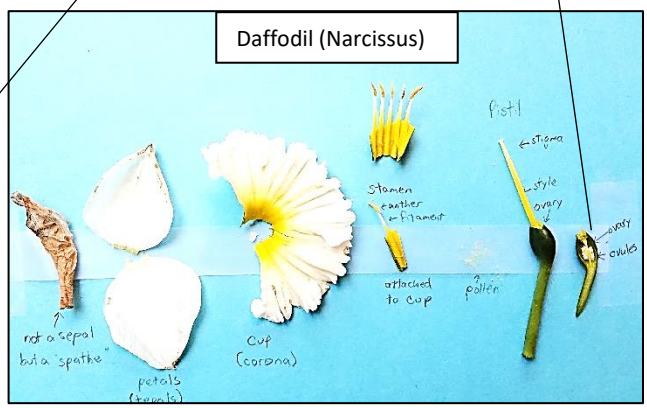
Peruvian lily sepals

Daffodil "spathe"

Peruvian lily Ovary & Ovules

Daffodil Ovary & Ovules





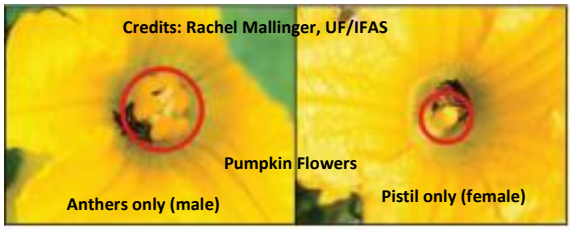
Background

A Plant that has flowers is called an *angiosperm*, and has been around since the early Jurassic period, 145 to 202 million years ago. The name comes from two Greek words: *angeion*, meaning "container," and "*sperma*," meaning seed, so it means a container for seeds. Some say they are more like workshops for seeds, where workers do a job and get paid for their effort. But that worker doesn't want to work for just anybody. They need a place that pays the most. In the case of flowers, they pay workers (bees, birds, beetles, butterflies--pollinators) in pollen and nectar (sweet liquid). This is where marketing comes in. Flowers have to advertise that they pay better than the other flowers. A flower's job is to make seeds, and to make seeds they need the workers. So they put on beautifully colored petals, or sometimes a nice perfume. They might also offer great flat landing pads, or sometimes they offer long Fuchsia-like tube flowers, filled with nectar to attract workers with long tongues or thin beaks. It's a great arrangement! Plants advertise with flowers so they can make seeds, and pollinating workers get nectar and pollen in return.

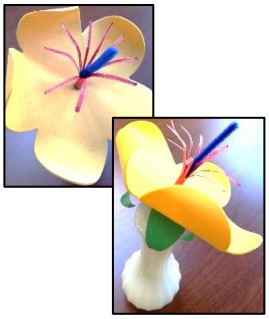
Fuschia flowers (wisc.edu)

Pollen is the key to this arrangement. You see, when a pollinator is sipping on the nectar, pollen from the anthers falls or rubs off onto their body. Some bees use a different approach. They BUZZ pollen off the anther! That's right, their buzz causes vibrations to shake pollen off the anther onto their body. Whichever way it's done, the pollinator carries the pollen on its body to another flower, where a little bit falls or rubs off onto the *stigma* of that flower. This work the pollinators do, moving pollen from flower to flower, is called *pollination.* When pollination happens, flowers can begin to make seeds. It is true that some flowers just need wind to move their pollen around, but most flowering plants need the workers.

It is also true that some flowers appear to be just one flower but are actually hundreds of tiny ones. Dandelions and sunflowers are in this category. The fluffy part in the center is made up of itty-bitty flowers with their own stamens and pistils. Another strange thing is that some flowers are "incomplete or imperfect." They only have anthers or they only have pistils. Even more remarkable, flowers like this can be on the same plant like pumpkins, or on completely different plants like holly!



Make a "Complete" flower

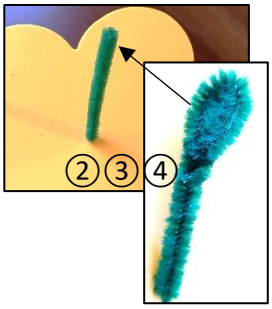


Materials:

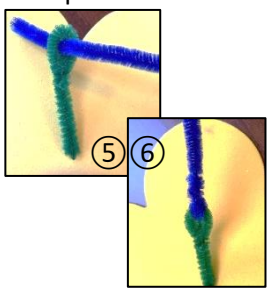
- 1 Piece thick, colorful paper (construction, cardstock) for petals
- Scissors + some adult help
- 1 Green pipe cleaner 12 inches long for stem
- 1 Colorful pipe cleaner 3 inches long for pistil
- Drinking straw for stamens
- White glue
- Optional: color crayons or markers for decorations
- Optional: small piece of green paper for sepals

Directions: Numbers in pictures match numbers below.

1. With your colorful paper, cut the outer edge of a 3 to 4-inch flower shape. Decorate it if you'd like.
2. Poke a small hole in the middle of the flower shape with a nail or tack.
3. Gently stick the pipe cleaner through the hole. While one hand pulls the pipe cleaner, have the other one tightly hold the top and bottom of the paper by the hole, so paper won't tear. Stop when there is about 3-inches of pipe cleaner above the paper flower.
4. Fold over the 3-inch bit of the pipe cleaner about an inch, and twist it around the longer part to make a loop.

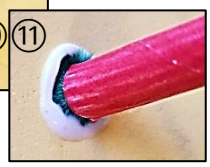


5. Loop one end of the colorful piece of pipe cleaner through the green loop in step 4.
6. Twist it in place leaving about 1 ½ to 2 inches above the loop.
7. Cut about 1 ½ to 2 inches off the straw. If you use a paper straw, you can color it however you'd like, and you can color the tip a different color to represent the anthers.
8. Then make lots of thin, vertical cuts in the straw, leaving ⅓ inch uncut. Give the straw a spikey look. If you use a paper straw, you can now color the inside of your stamen.
9. Push the spikey straw over the connected pipe cleaners.



10. Pull the stem down from below the flower, until the green loop just about touches the flower surface.

Directions continued next page



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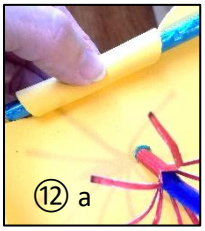
11. Dab some glue on the flower near the hole and then pull the stem down until it touches the flower surface. Let the glue dry while you count to 60.

12. Optional instructions:

a. Roll the edges of your petals around a pencil to give them more shape.

b. Fold over some green paper. Draw a leaf shape with one end on the fold. Cut around the drawing and unfold the "sepal." Repeat for as many sepals as you like. Poke a hole in the center and slide them up the stem until they touch the flower.



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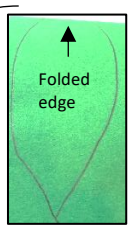
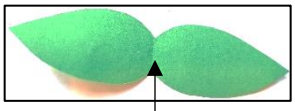
⑫ b





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Jumping Pollen Experiment

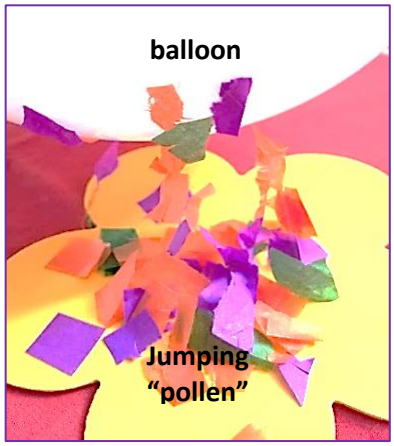
(modified activity from Beekeeping.pdf (illinois.edu))

Materials:

- Colorful paper
- Tissue paper scraps
- Scissors
- Paper
- Balloon
- Your hair or a fuzzy sweater

Directions:

1. Cut out a 3 to 4-inch flower shape on paper.
2. Cut or tear little pieces of tissue paper and put them on your flower. (This will be your pollen.)
3. Blow up a balloon.
4. Rub your balloon (bee) on your hair or sweater for a count of 15.
5. Hold your balloon 6 inches above your flower. Move it closer to the flower until the "pollen" jumps up and onto the balloon.



Why did this happen? Have you ever rubbed your feet back and forth on a carpet and then touched a metal doorknob? You probably got a shock. The friction of rubbing your feet on the carpet gave you an "electrical charge" so when you touched the doorknob—ZAP! It's strange, but both flowers and bees have an electrical charge too. The charge on the pollen is attracted to the charge on the bee's body. So, when a bee gets close to the anther, pollen on it jumps off onto the bee! See this link for more information. Electric fields of flowers stimulate the sensory hairs of bumble bees | PNAS

NGSS—Next Generation Science Standards

(DCI—Disciplinary Core Ideas) touched on throughout

LS1.A: Plants have internal and external structures that serve various functions in growth, survival, behavior, and reproduction.
LS1.B: Reproduction is essential to the continued existence of every kind of living organisms. Plants and animals have unique and diverse life cycles.
LS1.C: Plants need water and light to live and grow. Plants acquire their material for growth chiefly from air, and water.
LS2.A: Plants depend on animals for pollination—make seeds.
LS3.B: Individuals of the same kind of plant are recognizable as similar but can also vary in many ways.
PS2.B: Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes and the forces in each situation depend on the properties of the objects and their distances apart.

CCC (Cross-cutting Concepts)

--Objects and organisms can be described in terms of their parts.
--Systems in the natural world have parts that work together.
--The shape and stability of structures of natural and designed objects are related to their function.

Flower Fun!

Acrostic Poem

Festive
Lovely
Often fragrant
Wonderfully
Eye catching
Rainbow colored
Seed makers

What do you get if you cross a bike and a flower? Bicycle petals!

Where do roses sleep at night? In their flowerbed.

Math FUN

#1 You have 2 flowers. One has 5 stamens and the other has 6 stamens. How many stamens in all?

#2 You had a daisy that had 20 petals on it, and you decided to pull some off. If you pulled 8 off, how many would you have left?

#3 If apple blossoms always have 5 petals, how many petal are there on 5 flowers?

#4 The garden grows 5 white flowers. There are 7 more yellow flowers than white ones. There are 4 fewer blue ones than yellow. How many flowers grow all together in the garden? Answers at bottom of page.

How do two flowers greet each other? Hey bud, how's it growing?

What kind of flower grows on your face? Tulips

What kind of lion never roars? A dandelion

Haiku (5-7-5 syllables)

Totally charming
Color, fragrance, nectar, shape
All advertisements for seeds

Great Websites

- US Wildflower's Database of Wildflowers for Washington
- Look Inside a Flower! | Science Project for Kids - Bing video
- Starflower (wnps.org) Great place to read about native plants and wildflowers
- Huge data base of flowers with photos: Species Descriptions - Burke Herbarium Image Collection (washington.edu)
- A Brief Guide to the Different Flower Types, Shapes, and Growing Patterns | The Seed Collection
- Flower shapes - The Pollinator Garden (foxleas.com)
- Science ideas for young children: Flowers and plant reproduction - MSU Extension
- Coloring Wildflowers (fs.fed.us) coloring pages
- Word Search (fs.fed.us) word-search puzzles

Outdoor flower ideas:

- Take pictures with a camera, then enlarge them to look closely at all the flower parts.
- Identify the kind of plants you see by the flower on them. Field guides help.
- Next time in a grocery store or garden center, look at the diversity of flower sizes, shapes, colors.
- Find lilies. They are really good for looking at flower parts.
- When walking in forests investigate the wildflowers.

Remember to ask permission BEFORE you pick flowers in someone's yard.

Books about Flowers

A Kid's Guide to How Flowers Grow by Ayers, Patricia
A Season of Flowers by Garland, Michael
Bloom Boom! By Sayre, April Pulley
El Abecé Visual De Plantas Y Flores by Codda, Marcela
Fantastic Flowers by Stockdale, Susan
Flower Power: The Magic of Nature's Healers by Paxmann, Christine
Flower Talk: How plants use Color to Communicate by Levine, Sara
Flowers Are Calling by Gray, Rita
Flowers Bloom by Masters, Nancy Robinson
Flowers by Burnie, David
Flowers by Farndon, John
Flowers by Gibbons, Gail
Flowers by Guillain, Charlotte
Flowers by Nguyen, Thu Huyen
Flowers By Number by Shapiro, David
Flowers by Pettiford, Rebecca
Flowers by Whitehouse, Patricia

More Books about Flowers

Flowers for Pudding Street by Carolan, Christine
Flowers, Leaves, and Other Plant Parts by Batchelor, Jacob
From Seed to Plant by Gibbons, Gail
Have You Ever Seen a Flower? By Harris, Shawn
Investigating How Flowers Grow by René, Ellen
My Friends the Flowers by Lach, William
Parts of a Flower by Ransom, Candice F
Por Que Las Plantas Tienen Flores? by Spilsbury, Louise
Roses Red, Violets Blue: Why Flowers Have Colors by Johnson, Sylvia
Sidewalk Flowers by Lawson JonArno
Spring Flowers by Peters, Katie
The Big Book of Blooms by Zommer, Yuval
The Boy Who Grew Flowers by Wojtowicz, Jennifer
The Digger and the Flower by Kuefler, Joseph
The Reason for a Flower by Heller, Ruth
What's in the Names of Flowers by Limburg, Peter R
What's Inside a Flower? By Ignotfsky, Rachel

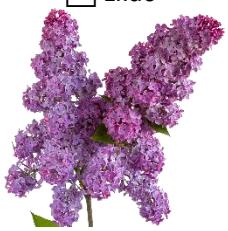
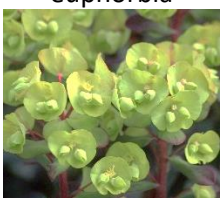
Math answers: #1 5 + 6 = 11 stamens, #2 20 - 8 = 12 petals, #3 5 x 5 = 25 petals, #4 5 + (5+7) + (5+7-4) = 25 flowers

Washington State University and Master Gardener Foundation of King County

Flower Scavenger Hunt Bingo

It might take more than one outing to find all these, but try. Some are wildflowers are found in parks. Go to a garden store or check out flowers in grocery stores if you are stuck.

Check the box for each flower you find. You may not use the same plant or its flower for more than 1 box.

☐ Lantern-shaped flower like Pieris 	☐ Clusters of tiny flowers 	☐ Any red flower 	☐ Any kind of blue flower (this is vinca) 	☐ Bleeding heart  See notes.
☐ Flower with a non-bee insect on it 	☐ Dandelion pistils  See notes.	☐ Flower nectar guides (marks pointing to the nectar) 	☐ Tube shaped flower (fuchsia, fox glove, snap dragon) 	☐ Fuzzy sepals 
☐ Hidden stamens & pistils (primrose) 	☐ Lilac 	☐ Any flower you find that isn't in a  bingo square.	☐ Blue flower 	☐ White flower  This is a dogwood.
☐ Flower that smells wonderful 	☐ Green flower like euphorbia 	☐ Skunk cabbage  See notes.	☐ English daisy (tiny flower in lawns) 	☐ Composite flower (group of tiny flowers forming flat top) 
☐ Bumblebee on flower 	☐ Buttercup 	☐ Iris  See notes	☐ Pink rhododendron 	☐ A flower with a hummingbird 

NOTES: Examine the following unusual flowers. Try to find all the flower parts.

Bleeding heart (*Dicentra formosa*) got its name from the flower's unusual pink, heart shape. Look inside one of these wildflowers. Find the pistil and anthers. Black, shiny seed capsules attract ants, who take them, and "plant" them in their nests. You will find these 6 to 12-inch plants in shady, woodsy places. The flowers attract hummingbirds, and leaves are eaten by the *Clodius Parnassians* butterfly larvae.

Skunk cabbage or swamp lantern (*Lysichiton americanus)* is a shady wetland plant with very large waxy leaves up to 3 feet tall, and yellow flower spikes inside a large yellow petal-like hood. The flowers are the "bumps" on the spike inside the yellow hood, and are what gives off a skunk-like odor. The odor of the flowers attracts insect pollinators that like to eat dead things (carrion beetles and blowflies). Can you smell the flowers from a distance?

Oregon iris (*Iris tenax*) has large purple or blue flowers and strap-like leaves up to 16 inches tall. Petals have different shapes and some have nectar guides. They live in mostly sunny damp places. Find any iris and see if you can find stamens and pistils.

Dandelion (*Taraxacum officinale)* have unusual flowers. They don't even need a pollinator. The pistil and stamen are on the same stalk! Pick a flower and take it apart. Try to find the stamen on the pistil. Try to find the tiny hairs at the base of the flower, these will become the "parachute" used to float the seed away.

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