



## About Your Kit

**What Will You be Learning:** Youth will mix concepts of math and art in this kit. The math concepts included are shapes, symmetry, and patterns. For art, youth will be learning basic watercolor art techniques and color theory (mixing colors).

**Youth Ages:** In 4-H, youth are divided into Age Groups based on common developmental characteristics. Juniors are youth 8-10 years old, Intermediates are youth 11-13 years old, and Seniors are youth 14 and above. The activities in this kit are ideal for all age groups but Juniors may benefit from the help of an adult.

### Targeted Life Skills:

Thinking: Learning to learn, Decision-making, Problem solving, Critical thinking.

Managing: Planning/organizing, Wise use of resources.

Working: Self-Motivating.

Being: Self-Esteem, Self-Responsibility.

**Time:** Estimated time the activity will take is marked above the activity. Allow additional time for drying and clean-up. Activities do not need to be completed all in one sitting. Break out this kit when you have time and put it away for fun later!

### Optional Supplies to Enrich Your Learning:

- Calculator
- Ruler

Cleaning supplies and instructions for cleaning are not included.

## Using 4-H's "Do, Reflect, Apply" model, engage youth in learning:

**DO:** "Doing" is an extension of the education step. It involves hands-on activities that allow the youth to learn. Doing provides experience that supports the learning process. This is why you'll see "Do" instructions with each Activity.

**REFLECT:** "Reflecting" focuses on sharing and processing the activity. In this step you encourage and facilitate discussion. To maximize learning, grown-ups can ask questions provided in the Blue Reflection Boxes for great discussion. Older youth can participate in self-reflection by asking themselves the supplied question. Consider journaling your answers and revisiting them after a short time for deeper insight.

**APPLY:** "Applying" is the step where youth have the opportunity to think about how they can apply what they have learned to their lives and the world around them. This step asks them to think beyond their own growth.

Apply what you learn in this kit to the Essential Elements of 4-H, Belonging, Mastery, Independence, and Generosity on page 11 of this kit!

**Based on the Art of Math Discover Club Kit by Utah State University Extension.**

For the full curriculum visit [utah4h.org/discover/](http://utah4h.org/discover/)

## Do: Using Watercolors

 For All Ages

### Gather These:

From your house –

- Small dish of Water
- Ruler (if you want one)



From your kit –

- Heavy Paper
- Pencil
- Watercolor Pallet & Brush
- Square of Parchment Paper



### Need Help?

**Amy's Art Table YouTube  
Watercolor Tutorial**  
<https://bit.ly/3j2B3kX>

### Then Do This:

1. Get your brush wet and dip it into the water color you want to use.
2. Mix your brush around in the paint. Pick up the color with your brush and put it on your parchment paper. Repeat until you have a small puddle of colored water.
3. Use your brush to move the colored water onto your heavy paper. Now you're painting!
4. To change the color of your paint try these different ways of painting
  - a. mixing in more water to your small puddle
  - b. picking up more paint from your paint pallet
  - c. wetting your brush with just water and gently wetting the paper before you start mixing and using your watercolors
  - d. layering your art by allowing your paper to dry between drawing layers

### Other fun suggestions:

**Draw over your paper with crayons than paint over with watercolors.**

**Paint with watercolors than sprinkle kosher salt over your wet paper.**

## Do: Art Challenge Using Watercolors

 For All Ages

### Gather These:

From your house –

- Small dish of Water
- Ruler (if you want one)
- Pen or Pencil



From your kit –

- Heavy Paper
- Watercolor Pallet & Brush
- Square of Parchment Paper



### Then Do This:

1. Make a list of the first 5 things you think of when you think of “Summer”. For example, maybe you think of green trees, flowers, sandcastles, watermelon, or popsicles.

There are no wrong answers!

2. Pick one of the items you wrote down and paint it with watercolors.
3. Share your painting using the hashtag #4HGrab&Go or by sending a photo to your local WSU Extension 4-H Office.

1.	_____
2.	_____
3.	_____
4.	_____
5.	_____



Henri-Edmond Cross (ca. 1905-1908)



Winslow Homer (1836-1910)

### Expand Your Learning!

See examples of famous Watercolors from the Metropolitan Art Museum [www.metmuseum.org](http://www.metmuseum.org)

# DO: A Guide to Color Theory & Mixing Paints

 For All Ages

Apply the watercolor techniques you practiced earlier and learn about Color Theory

## Gather These:

From your house –

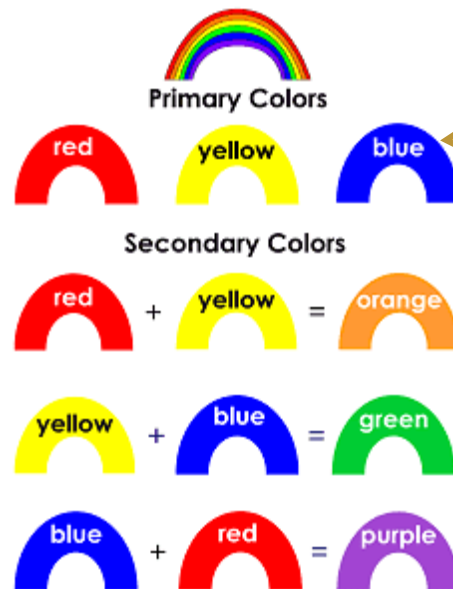
- Small dish of Water

From your kit –

- Heavy Paper
- Watercolor Pallet & Brush
- Square of Parchment Paper



“Colour are the smiles of nature.  
-James Henry Leigh Hunt”



These are the Primary Colors. Do you see them in your paint pallet?

 Intermediates & Seniors

These are Secondary Hues if you want to try adding more of a primary color to make making more shades of colors.

## Do This:

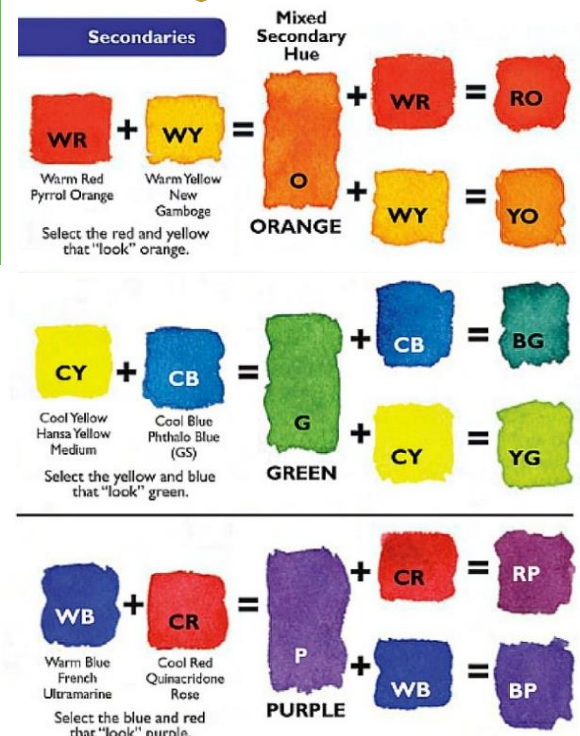
- 1) Get your brush wet and pick up a small amount of your first Primary color (Red, Yellow, or Blue). Create a small pile of usable paint on your wax paper or a nonporous surface like an old plate.
- 2) Clean your brush with water and pick up your second Primary color (Red, Yellow, or Blue). **Make two separate piles of paint on your wax paper.**
- 3) Slowly mix the two colors.
- 4) If the combination of your colors isn't creating the secondary color (Orange, Green, or Purple) you desire you could try:
  - a. Adding **more** of one or both Primary Colors
  - b. Adding a small amount of black paint to **darken**
  - c. Adding more water to **lighten**



## Expand your learning!

Visit the Smithsonian website and learn about the Science of Color. [library.si.edu](http://library.si.edu)

Do you know why you can see colors? [askabiologist.asi.edu/explore/seeing-color](http://askabiologist.asi.edu/explore/seeing-color)





## Do: Time to Build a Complex Shape

 For All Ages

### Gather These:



From your kit –



- Your choice of one of the Papers with pattern
- Colored Pencils
- Scissors
- Glue Stick

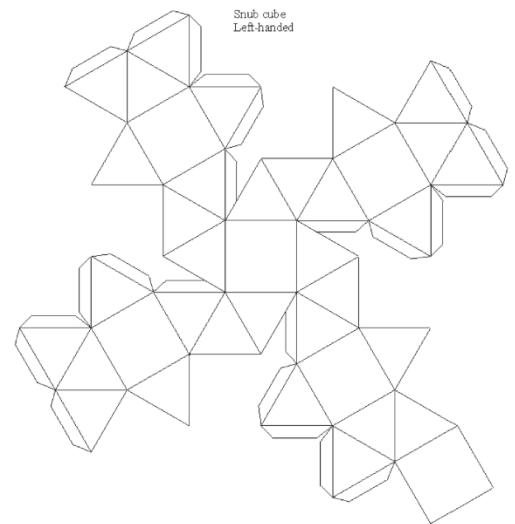
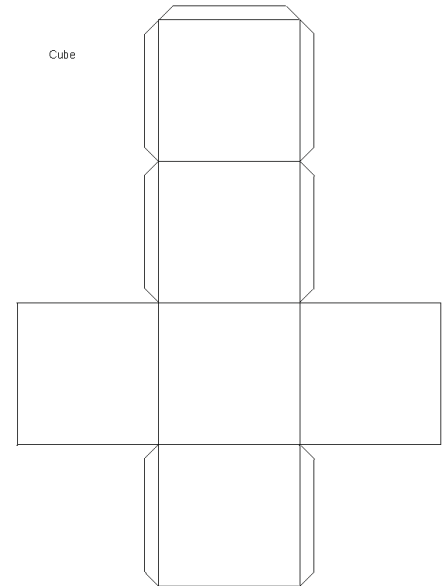
### Do This:

1. Find the shape patterns included in this kit that you wish to build.
2. **(Optional)** Use colored pencils or your watercolors, or your other coloring materials to give your soon-to-be polyhedron some color.
3. Cut along the outside of the shape.
4. Fold at creases (you may need to fold it all the way into the shape to see what should be pasted to what).
5. Put glue on the tabs and paste your shape together until it becomes a full polyhedron.

### Reflect:

Where do you see complex shapes around you?

When you started folding your shape together did it matter what order you folded in?



### Expand your learning!

Borrow a book on origami from your local Library or find an online template and fold to your heart's content! For added fun count the different shapes that make up each polyhedron you create. Try to beat your personal best.



[This Photo](#) by Unknown Author is licensed under [CC](#)

**Gather These:**

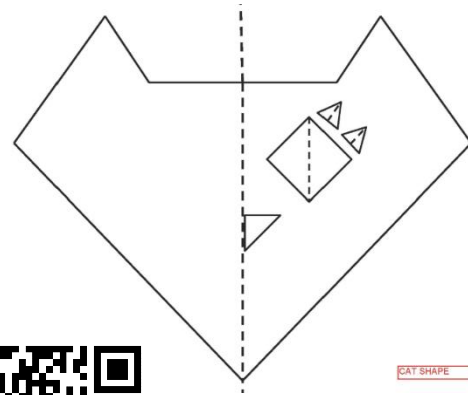
From your kit –



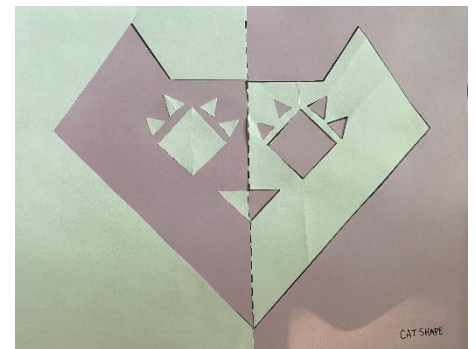
- Cat Shape
- Colored Paper
- Colored Pencils
- Scissors
- Glue Stick

**Need Help?**

Watch our Tutorial

<https://youtu.be/b8DzBblHsyl>**Do This:**

1. Fold the cat shape in half along the dotted line, creating a line of *symmetry*.
2. Cut along the outside of the cat (along the solid black line). Set the outer edges aside, do not throw it away.
3. Keep your cat folded in half. Cut out the triangle nose, again cutting along the solid black line. Set the nose aside.
4. Fold the cat shape along the dotted line for the cat's diamond eye (creating a line of symmetry) and cut out the eye by cutting along the solid black line. Set the eye aside.
5. Follow the same steps (in step 4) for the triangle eyelashes. Folding along the dotted lines and cutting the solid black lines. Set the eyelashes aside.
6. Unfold your shape and see the symmetry you've created. Is everything symmetrical? [If done correctly, then yes].
7. Now cut the cat shape in half, down the line of symmetry (dotted line).
8. Cut the outer edge you set aside in half along the line of symmetry (dotted line).
9. Paste one of the halves of the outer edges to the left or right side of your **colored paper**.
10. Take the left side of the outer edge and paste on the left side of your colored paper. Take the right side of the cat face and match it up to the opposite side of your outer edges, pasting that to the right side of your colored paper creating a full cat face again.
11. Find the nose that you set aside. Cut the nose in half along the dotted line. Inside the outer edge half (the left side of your colored paper), match the half of nose to the cut out side of the nose on the cat face.
12. Find the diamond eye that you cut out and set aside. Paste on the left side of your colored paper so it will be symmetrical to the cut out for the eye on the cat face.
13. For the eyelashes, you can choose whether to make them symmetrical or not. If you want them to be symmetrical, paste them like a mirror object to the ones on the other side. If not, paste them somewhere else (like maybe below the eye instead of on top of the eye).

**Final Symmetrical Cat** 

## Do: Symmetry Challenge

 For All Ages

Gather These from your Kit:

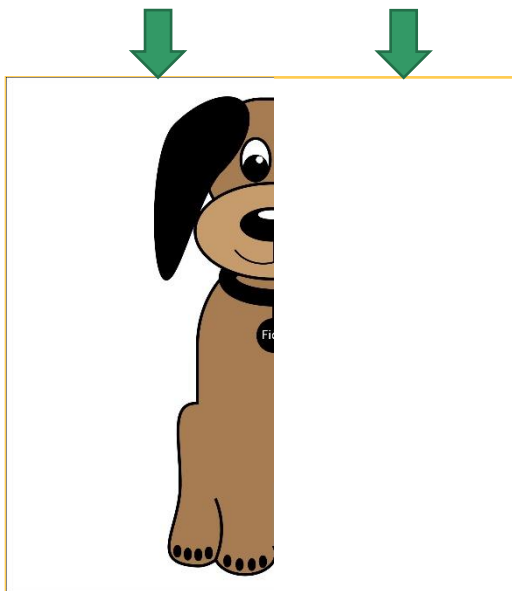


- Blank Paper
- Colored Pencils
- Scissors
- Glue Stick
- Image of Choice
- Pencil

Do This:

1. You will need to choose one of the provided images for this activity.
2. Take your chosen image and fold it in half. Carefully cut along the fold.
3. Paste the half sheet onto your piece of blank paper.
4. On the blank side, try to draw in the other half of the face/object to match the pre-drawn side.

Try drawing the outline of the other side of this photo for practice.



### Expand Your Learning!

On your next walk around your yard or neighborhood look for examples of symmetry and draw or write down what you see. Look at buildings, houses, stores, trees, flowers, animals, and people.



An object that has symmetry can be divided into two pieces.  
Learn more on the next page.



## Learn: Symmetry

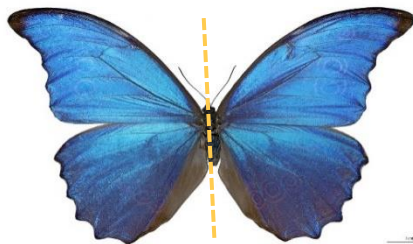
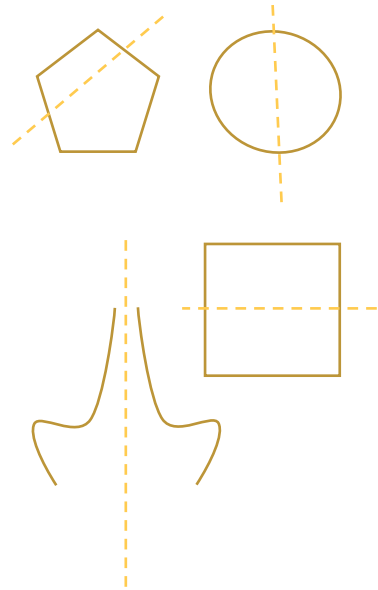
 For All Ages



Here's another way to think of symmetry: If you were to draw a line from top to bottom through the very center point of a circle, would both sides look exactly the same? If yes, then that's symmetry. Can you do the same thing with a square? That's some more symmetry. Many objects in nature have symmetry.

Think of a butterfly. If you were to imagine a line straight down the center of a butterfly and fold it in half, you would find symmetry. That imaginary line is called the line of symmetry. We represent it by a dashed line. On either side of that dashed line, you should have a mirror image. Mathematicians love discovering these sorts of natural symmetries of shapes because it helps to map out the patterns of objects we see every day.

What has *more* symmetry, a circle or a square? [The correct answer is a circle, because a square only has 4 symmetries and a circle has an infinite number of symmetries]. No matter how many times you turn that circle, its position will not appear to change. However, you know that a square has been rotated when someone turns it except for when it is turned 90, 180, 270, and 360 degrees. It appears to change in all the other rotations in between.



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)

**Need Help Understanding Symmetry?**  
Watch this video from FreeSchool  
<https://bit.ly/30oyy51>



### Reflect



- What kind of shapes can you create that have symmetry?
- How did folding the object help to see the symmetry?
- Can you find symmetry without folding?



### Apply

- Why might artists choose to use symmetry (e.g. drawing)?
- What other objects in your day-to-day life have symmetry?
- When might it be a good idea to create something with symmetry?

## Do: Creating Your Own Pattern – Tessellations



What is a tessellation? A tessellation is a pattern that sort of looks like a puzzle. It is created by taking a shape and moving it (without rotating it) using **translation** **symmetry**. You might need some help from an adult.

### Gather These from your Kit:



- Heavy Paper
- Index Card
- Scissors
- Pencil
- Colored Pencils or Watercolor Supplies

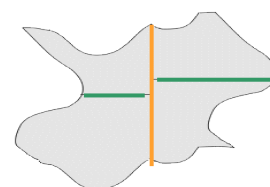
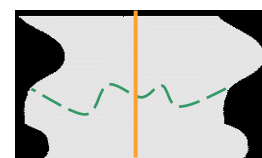
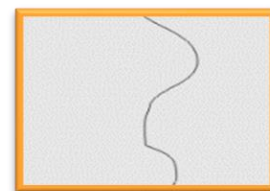
### Need Help?

Watch a video walking you through this activity step by step.  
<https://youtu.be/bp0Wjufo4Ng>

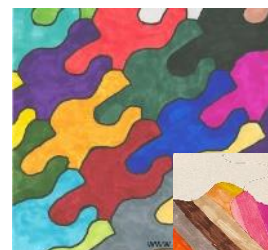


### Do This:

1. Start with cutting your index card into a square. **Draw a wavy line from the top of your index card to the bottom.**  
 Try not to make the line too complicated and make sure you can cut along the line (no sharp corners).
2. Cut along your line and then tape the index card back together with the flat sides touching.
3. **Draw another line that connects the two cut edges.**
4. Cut along the **line you just drew** and then swap the sides and tape your new pattern together.
5. Take your heavy paper and trace your created pattern piece. Once you have your pattern started move your piece over until an edge lines up with the previous tracing. Keep repeating until your entire paper is covered by the pattern. Now you have a full tessellation!



**Now make your tessellation a true work of art by adding color!**



**SHARE : Post on Social Media using the Hashtags #4HGrab&Go and #4HGrowsHere You can also tag your County 4-H Page.**

JOANN



SHARE YOUR 4-H CRAFT CREATIONS  
#JOANNLOVES4H

**Want to purchase additional craft supplies? You can save 15% every day with every purchase as a 4-H Rewards Member with JOANNS**  
[www.joann.com/4-h/](http://www.joann.com/4-h/)

## References

The 4-H Youth Development Program utilizes current best practices and research-based techniques for teaching youth new skills. This page gives credit to the experts and agencies from whom we got materials or concepts for this kit.

A Simple Method For Creating Tessellations From Rectangles. (n.d.). Retrieved August 17, 2020, from <http://sofia.nmsu.edu/~pmorandi/math112f00/EscherRectangle.html>

Belmonte, C. & Pappas, C. (n.d.) Painting by Number, Scientia Review. Retrieved from <http://www.scientiareview.org/pdfs/208.pdf>

Cross, H. (1905). Landscape with Starts [Digital image]. Retrieved August 21, 2020, from [https://www.metmuseum.org/art/collection/search/459189?&pkgsids=613&ft=\\*&offset=0&rpp=20&pos=3](https://www.metmuseum.org/art/collection/search/459189?&pkgsids=613&ft=*&offset=0&rpp=20&pos=3)

DeRosier, C. (2016, January 01). Tessellation Art. Retrieved August 17, 2020, from <https://www.cindyderosier.com/2016/01/tessellation-art.html>

Short, S. (2020). Susie Short: Working with a Split Primary Color Palette. Retrieved August 18, 2020, from <http://danielsmith.com/blogs/susie-short-working-with-a-split-primary-color-palette/>

Winslow Homer (American, 1836–1910). *Flower Garden and Bungalow, Bermuda* (detail), 1899. Watercolor and graphite on off-white wove paper, 13 15/16 x 20 15/16 in. (35.4 x 53.2 cm). The Metropolitan Museum of Art, New York, Amelia B. Lazarus Fund, 1910 (10.228.10)



4-H

WASHINGTON STATE UNIVERSITY  
EXTENSION

WSU Extension programs, employment, and volunteer service are available to all without discrimination. Concerns regarding potential discrimination may be reported through your local Extension office or directly to the WSU Office for Equal Opportunity, web: [oeo.wsu.edu](http://oeo.wsu.edu), email: [oeo@wsu.edu](mailto:oeo@wsu.edu), phone: 509-335-8288