

## Thaumatrope

### OVERVIEW

Combine science and art in this fun activity!

### WHAT ARE WE LEARNING?

This activity helps us understand how our eyes take in visual images

You can do this without a printer! Instructions below.

### Materials

- Downloaded template and/or white paper
- Cardstock or stiff paper material
- Hole punch
- 2 thin rubber bands
- Glue stick
- Scissors
- Drawing/coloring materials (if creating your own)



### Alternate Materials

INSTEAD OF *\*hole punch\** USE *\*scissors\**. OR instead of *\*a hole punch and rubber bands\** USE *\*a pencil and tape\** (see below). INSTEAD OF *\*tape\** USE *\*glue\**. INSTEAD OF *\*cardstock\** use *\*the side of a cereal box\** or other stiff paper. INSTEAD OF *\*rubber bands\** use *\*string\**.

### "Go the extra mile" materials

If you plan to do this activity multiple times or with large groups of kids you might be interested in a 1/8 inch single hole punch (smaller than standard size) or a device that can create circles, like the "Martha Stewart Crafts Large Circle Cutter."

## INSTRUCTIONS

1. Print one of our finished or blanks templates, or draw two 2.5 - 4 inch diameter circles on a blank piece of paper.
2. If you are drawing your own image, do that now. (See tips for how to do this below).
3. Cut out your two circles with images (see image 1).
4. Cut out a 3rd circle of a similar size from cardstock or stiff paper (see image 1).
5. Optional: Make a small line on both sides of the "top" of your blank circle, (image 2). This will help you line up your design when you glue the two sides on.
6. Glue the two decorated circles onto either side of the blank, cardstock circle. **\*\*The trick is that one side should be upside down in relation to the other.\*\*** To do this, place both gray arrows in the upward position, and line them up with the marks you made in step 5.



Image 1: Two image circles and one cardstock circle



Image 2: Make two small lines on your blank circle to indicate the top

## INSTRUCTIONS (CONT)

- Use the hole punch (or scissors) to punch two holes on each side of the circle. In our templates, do this where you see the faint grey circles.
- Loop the rubber bands through the circles (image 3)
- Twist the rubber bands using your thumb and index finger making the disc spin around.
- Watch to see if you observe a full picture! (Having trouble figuring out how to spin it? Search for thaumatrope videos online)

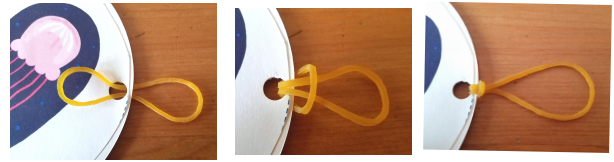


Image 3: Steps to looping through the rubber bands

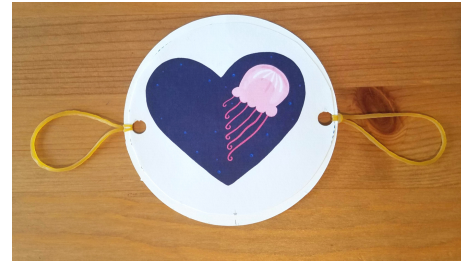


Image 4: Completed thaumatrope!



Image 5: Spinning the disc

## THE SCIENCE

Light enters your eye through your pupil and travels to the back of your eye, where the retina is. The retina sends the light information to your brain, which allows you to perceive the light information as a picture!

When your thaumatrope disc is spinning quickly, your brain is unable view each side of the disc separately and instead combines them into a single image. Compare what you observe when you spin the disc slowly vs. when you spin it quickly.

To learn more about how your brain and body work together to perceive the world around you, download our "Body and the Brain" pdf which has background information, readings, more activities and even a poem!

The thaumatrope activity can be used as part of the 4th grade NGSS science standard 4-LS1-2. "Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways."

## GUIDANCE FOR DRAWING YOUR OWN PICTURE

Consider what kinds of pictures you can make that are easily "split" into two parts. For instance, you could draw a boat on the water (side 1: ocean, side 2: boat), a person stuck in the rain (side 1: person, side 2: rain), or many other possibilities! To start, it's easiest to pick a picture that doesn't require exact alignment to look good. You can even do something simple, like a dog and cat just sitting next to each other. This might especially be a good choice for younger children. (Hint: Look online for picture ideas!)

You may want to start by sketching out what the completed image will look like, then splitting up the elements. After you've drawn your "split" images, make an arrow or small line at the top of one image and the

## GUIDANCE FOR DRAWING YOUR OWN PICTURE (CONT)

bottom of the other for alignment (see steps 5+6 above). Remember you need to glue one image upside down onto your cardstock!

It might take a few tries to get the images lined up right, especially if you are working with younger children. Prepare for this possibility to help avoid frustration!

### Alternative method

If you don't have rubber bands or a string, you can tape your disc onto a pencil/straw etc. and spin the the rod around by rubbing it between your two hands. If you are using the pencil method do NOT glue one image upside down. Both images should be right side up. You can search for more information about this method online.

## ADVICE FOR DOING SCIENCE WITH YOUR KIDS

- Encourage exploration and curiosity - science is about a lot more than facts and content (although these things are important too!)
- Consider writing down your child's questions and ideas during the activity. You may be able to turn these into a future research project or activity!
- Do not worry about not knowing the answer to questions. 1. Many "simple" kids science activities have very complicated, or even unknown(!), science behind them. 2. Even scientists will often not know the answers to questions outside their field. No one knows everything! Be honest about not knowing the answer and suggest trying to figure it out together.
- Deviations from exact instructions can often be fruitful - especially if the child has been inspired and wants to try out another line of investigation.
- In many states, the science standards are called the "Next Generation Science Standards," or "NGSS." They are a little complicated to parse through but in essence they want student to learn not only content (called "Disciplinary Core Ideas" or "DCI") but also the practices scientists and engineers use ("scientific and engineering practices, or "SEP") and also concepts that cut across all fields ("crosscutting concepts" or "CCC").

