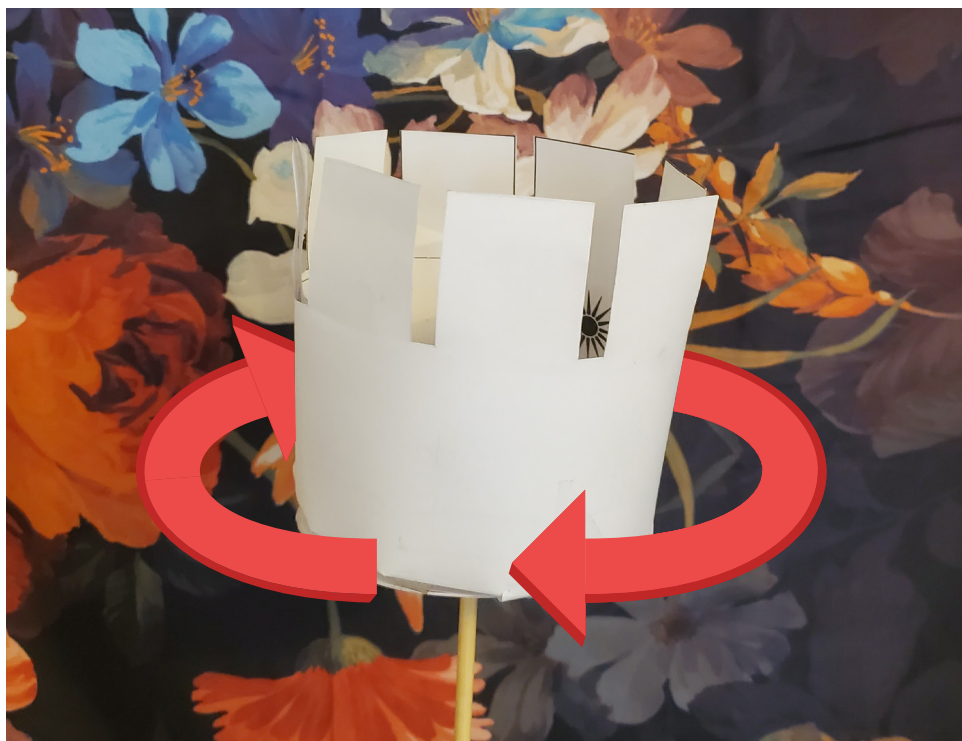


TAKE & MAKE KIT

Zoetrope

TIME: 20 - 40 minutes

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Zoetrope (Wheel of Life) Optical Toy by Auckland Museum, CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=65317816>



Leeds Industrial Museum Zoetrope, photograph by Clem Rutter, Rochester, Kent. (www.clemrutter.net). - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=41275604>

What's in this kit?

Explore optical illusions through an old timey animation device that predates film animation, the **zoetrope**. Learn about how the human brain creates an illusion of movement through rapidly changing imagery. Then create your own optical illusion!

You will learn:

- Frame by frame animation
- Optical illusion

Let's Get Started!

Materials

Paper templates
1 chopstick
Piece of tape
3 sheets of paper

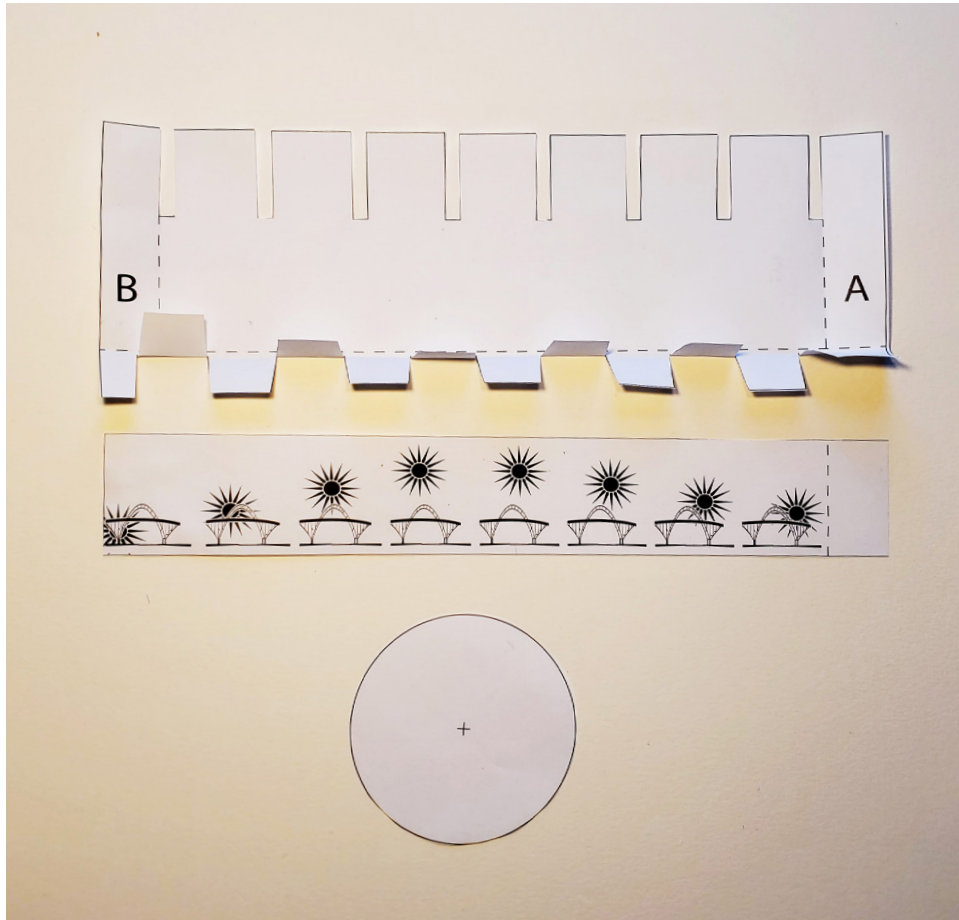
Tools

Scissors
Writing utensil
Gluestick (optional)
Stapler (optional)

Part One: The Zoetrope

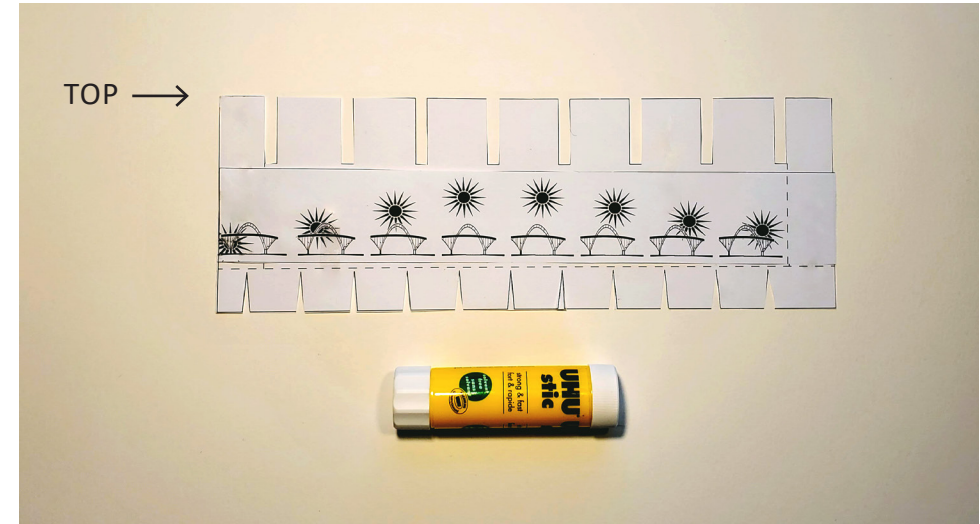
Step 1 - Cut the pieces

Cut out your template. This includes the circle, the long rectangles (animations) and the main piece of the zoetrope.



Step 2 - Tape animation into place

Tape sunrise animation to the main piece with the top of the paper facing the long slit. You can use a gluestick instead if you prefer.

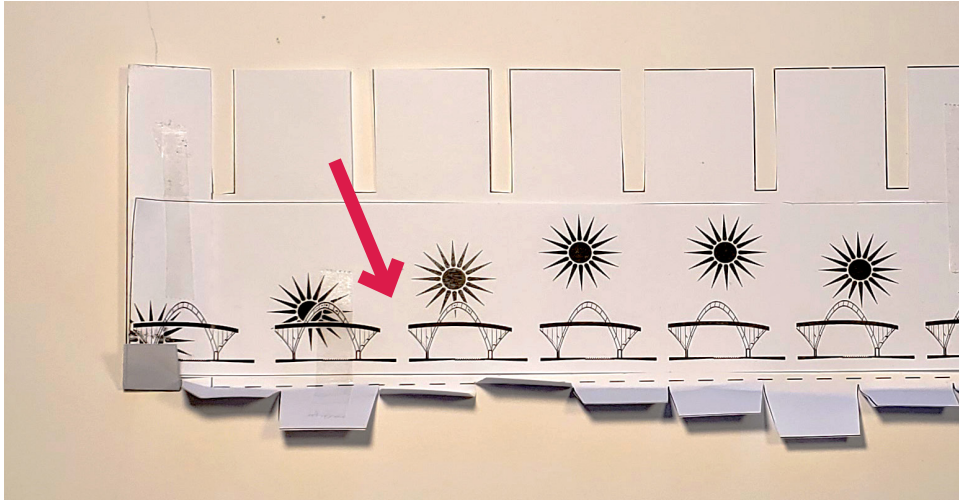


Did you know?

In the early to mid 1800s there were several different optical toys that gave the effect of animated pictures, including phenakistiscopes, praxinoscopes, flip books, and zoetropes like the one you're making today! These toys helped lay the groundwork for the invention of the first motion film in the 1880s. This means that people were inventing and experimenting with motion pictures for over 50 years before the invention of motion film!

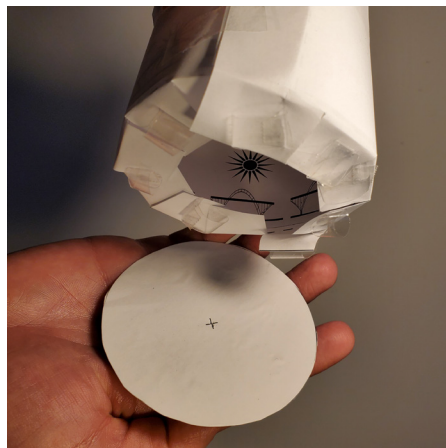
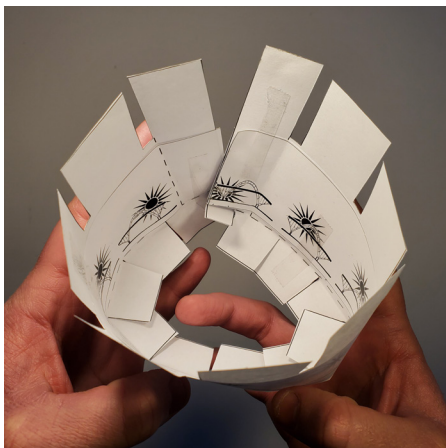
Step 3 - Bend the flaps

Bend along all the dotted lines of the main piece. Make sure the smaller flaps are bent.



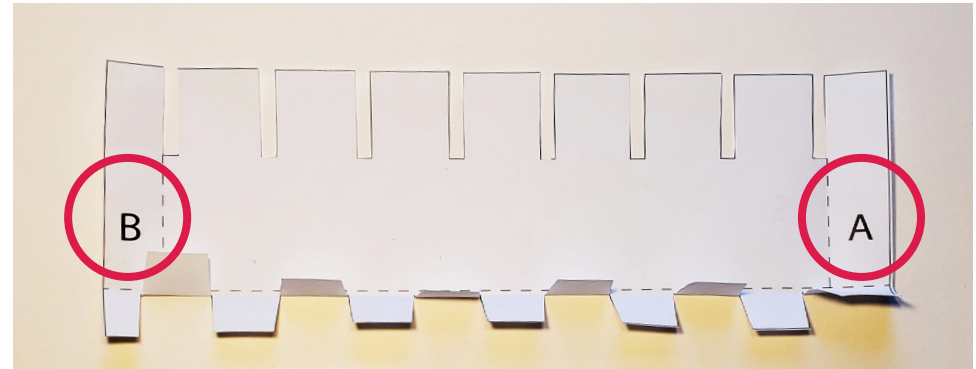
Step 4 - Tape the flaps down

Start taping or gluing the smaller flaps to the circle piece. The larger piece should wrap around the circle making a cylinder. Take this step slowly! If you are taping, cut your piece of tape into small strips. You won't need a lot of tape to adhere it to the circle base. If you are gluing this together, it's important to let the flaps dry thoroughly. Try gluing or taping down 3 flaps at a time.



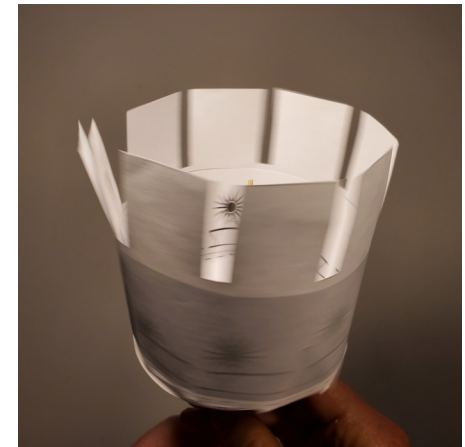
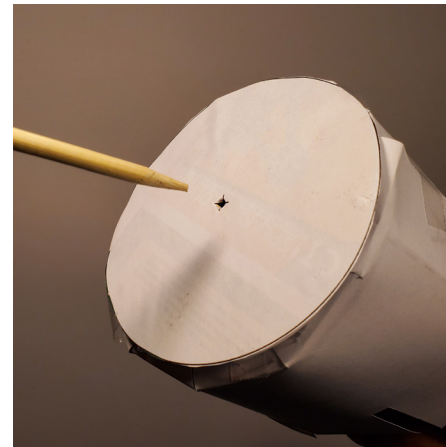
Step 5 - Final touches

Once all the edges have been taped down, you should see flap A overlapping with flap B. Secure this connection in place by adding a piece of tape or glue to the outside where flap A overlaps flap B.



Step 6 - Spin!

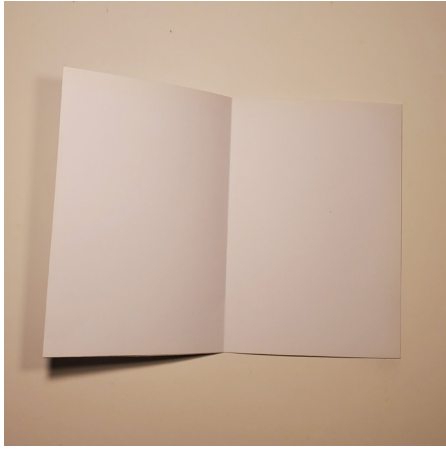
Poke your wooden dowel through the hole in the circle. Spin the zoetrope and watch the animation come to life when looking through the slits.



Part Two: The Flip Book

Step 1 - Fold all sheets in half "Hamburger Style"

Take your 3 sheets of blank paper and fold along the long side. Crease the fold and then open the pages to lay flat. Cut along the fold.



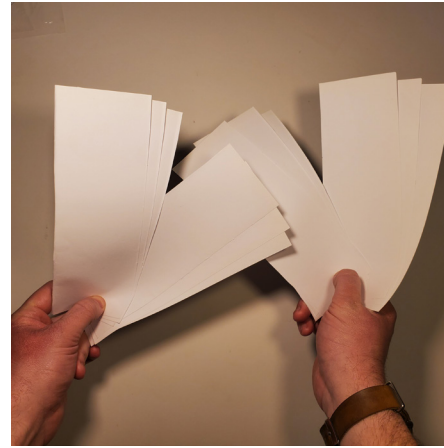
Step 2 - Fold all of your pieces again. "Hot Dog Style"

You should have 6 long pieces of paper at this point. Fold them in half again lengthwise. Open the fold. Cut along the fold making 12 strips.



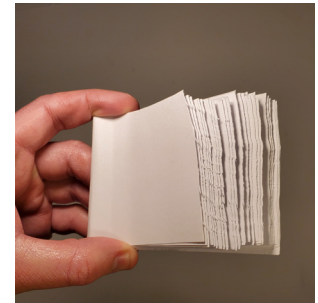
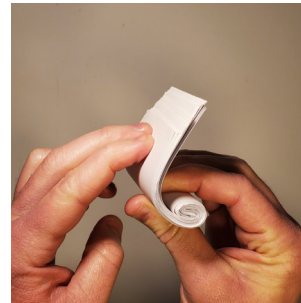
Step 3 - Stack your strips and fold

Stack all 12 strips on top of each other and fold them in half along the long edge.



Step 4 - Roll tightly and cut

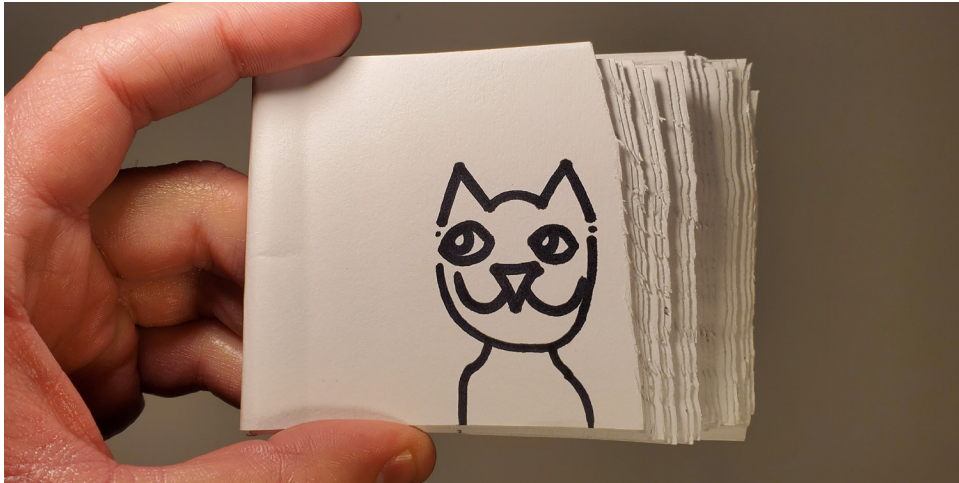
Along the folded edge of the papers, begin to roll the papers into a tight tube. You only need to begin the rotation. While the spine of this book is rolled, bend the papers. While the papers are bent, cut the loose end of the papers. When you release the rolled tube, you should see the pages of your book at varying lengths. Each page should be slightly longer than the last. This makes it easier to flip through the pages.



Step 5 - Draw and animate

Finally you can draw your own animation! Start by drawing a simple form, like a stick figure or a shape. Once you're done with the first drawing, you can turn the page and do the same drawing with a slight movement or variation.

Consider what you want the animation to do before you start drawing. It can help if you use a thick black marker to aid with the visibility. If you start from the back of the book towards the front, you should be able to see through to the previous page. Then you can trace what you drew below while making slight changes with each new drawing.



How does it work?

Have you ever looked at a bright light and looked away, only to still see a faint bright light still in your eyesight? This is called an "after image." The most common after image is a bright camera flash. It might take a few minutes for your eyes to come back to normal, however the camera flash is still visible even after the photo has been taken.

The whole concept of animation is an optical illusion playing on the fact that an image stays in the viewer's sight for just a brief moment after it's seen. This after image effect is known as "the persistence of vision." If an image is replaced while the eye still has an after image of the previous image, the brain creates a sense of motion.

Challenge

What happens if you add color to the mix? Try coloring parts of your animation with markers. Then, experiment with using different colored papers to create a repeating pattern. How does this look with your Zoetrope?

Now, try adding light to the mix. See what happens when you go into a dark room and flash the lights while you spin your Zoetrope. Or see if you can find a strobe light app for your phone, then go into a dark room and illuminate the Zoetrope with the strobe light while it spins. What do you observe?

Go Beyond

What happens if you put a different color of paper in a repeating pattern? Try coloring each frame an alternating yellow and blue.

Try downloading an app to your phone that makes a strobe light effect. What happens when you spin the Zoetrope in a dark room, illuminated by the strobe light?

HANG OUT,
MESS
AROUND,
GEEK OUT.



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