The Paley Center for Media

CLASS PROGRAM

Tooned In to Animation

Pre-Visit Activity:

Through the following exercise, you and your students can explore animation and better understand its tools and techniques.

Vocabulary

Go over the vocabulary list provided. Students should become familiar with these words and concepts because they will be referenced in the class.

Animation: A filmmaking technique where the illusion of motion is created frame-by-frame. The word comes from the Latin word, "anima," meaning "life" or "soul."

Animator: The person who draws the moving character in an animated film.

Background: A flat piece of artwork that is the setting for a moving character in an animated film.

Cel: Short for celluloid, a cel is a clear piece of plastic on which the animator's finished drawings are painted. The cel is clear so that when placed over the background, the animated characters appear to be in a setting.

Frame: An individual still picture on a strip of film. Twenty-four frames equal one second of a motion picture.

Frame-by-frame: The filmmaking technique in animation where each frame is exposed one at a time and the object being photographed is slightly altered for each picture.

In-betweens: Drawings that are positioned between the drawings that are at the beginning and end poses.

Ink and Paint: The step in cel animation in which the animator's drawings are placed on cels to be photographed. A drawing is outlined on the front of the cel with black ink, while the back of the cel is painted.

Script: The written story of a film that supplies dialogue, camera moves, background, staging, and action.

Storyboard: A storyboard is a visual representation of a story. Pictures can be sketched on pieces of paper and pinned to a large board, or they can be drawn on a large piece of paper, comic-book style, to represent scenes in a film. A story sketch should show character, attitude, feelings, entertainment, expressions, and type of action, as well as tell the story of what's happening.

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Pre-Visit Activity

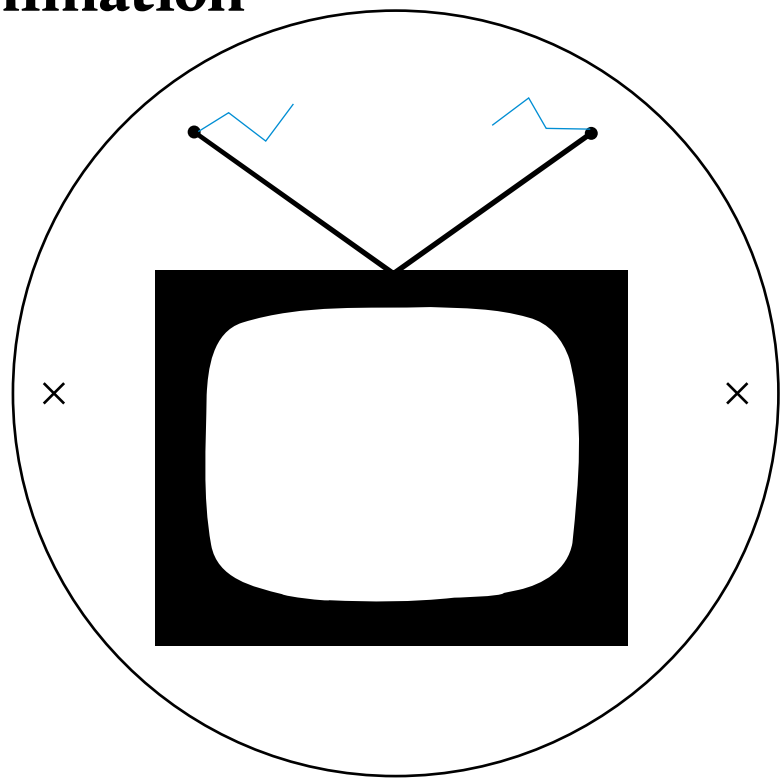
Make Your Own Thaumatrope

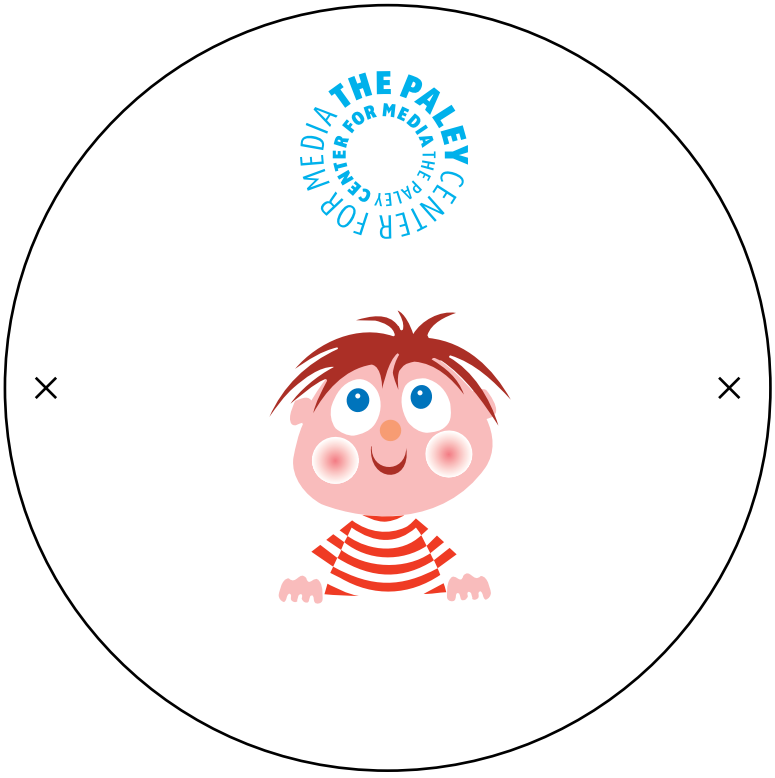
The thaumatrope (pronounced thaw-ma-trope) is a motion toy from the early 1800s. The thaumatrope uses a disc with pictures on both sides. When this disc is spun quickly, the two different pictures become one.

You will need:
Scissors
Hole Puncher
String
Glue
Cardstock

Directions:

1. Print out this sheet. Cut out both picture discs and glue them on a sheet of cardstock.
2. Punch holes on both discs at the x's.
3. Place the two discs back-to-back and tie string through the holes.
   The television should be right-side up, the Paley Center logo and boy should be upside-down.
4. Twist the string back and forth between your thumb and fore-finger to spin the disc quickly and see the two pictures as one.





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Post-Visit Activities:

Part 1: Make Your Own Flip Book

Animation is the process whereby still pictures are turned into moving pictures. This is done by flashing a series of images before the eye in rapid succession. Individual drawings are called cels; individual photographs are called frames. Animation is used in cartoons, television, and film. The more frames used per second, the "smoother" the animation is. Twenty-four frames equal one second of a motion picture.

A flip book contains a series of still images, one per page. When you thumb through a flip book quickly, a moving image appears, and you have created animation. The visual effect of a flip book is attributed to human "persistence of vision."

Materials:

- 3" x 5" blank index cards (Each flip book should consist of between twenty to thirty cards.)
- a thick rubber band (to hold cards together)
- a thick black magic marker or a pencil (also color markers or color pencils if you want to add color)

Directions:

1. Think of an idea for your moving picture. It may help you to study how the object moves and sketch it out in stages on paper before drawing it on your flip book cards. You can start with something as simple as a bouncing ball, which you draw in a slightly different place on each page, or try something more challenging like a flower sprouting or a cow jumping over the moon.
2. Draw each stage of the movement you've selected on a separate index card. Try to make the changes in movement gradual from picture to picture. The key is to alter the image and its location on the page ever so slightly, as you move from one page to the next.
3. To create your own movie, hold one side of the group of cards and flip through the other side with your thumb!
4. Share your flip books with each other. The possibilities are endless, so let the animating begin!

To explore more animation activities, please visit the Exploratorium at www.exploratorium.edu

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Part 2: Animation Calculations

Have students work individually or in small groups to solve the Animation Calculations on the attached worksheet. The answer key is provided below.

Answer Key

1. 60 seconds

2. 30 minutes; 30 minutes x 60 seconds/minute = 1,800 seconds

3. 60 minutes; 60 minutes x 60 seconds/minute = 3,600 seconds

4. a. 2 pages
   b. 22 pages

5. 8 seconds x 24 frames/second = 192 pages (frames)

6. a. 30 minutes – 8 minutes = 22 minutes
   b. 22 minutes x 60 seconds/minute x 24 frames/second = 31,680 frames
   c. 22 minutes x 60 seconds/minute x 12 visible frames/second = 15,840 visible frames, or 31,680 frames divided by 2 frames/visible frame = 15,840 visible frames

7. a. 2 hours x 3,600 seconds/hour x 24 frames/second = 172,800 frames
   b. 172,800 frames x 1/3 = 57,600 frames

8. a. 216,000 drawings divided by 12 drawings/second = 18,000 seconds
   b. 18,000 seconds divided by 60 seconds/minute = 300 minutes
   c. 18,000 seconds divided by 3,600 seconds/hour = 5 hours

9. a. 103,680 frames divided by 24 frames/second = 4,320 seconds
   b. 4,320 seconds divided by 60 seconds/minute = 72 minutes = 1 hour and 12 minutes
   c. 72 minutes – 60 minutes (1 hour) = 12 minutes

10. a. 40,320 frames x 1 second/24 frames x 1 minute/60 seconds = 28 minutes, so: No, it's too short.
    b. He needs to add at least 2 minutes, but not more than 7.
    c. He needs to add at least 2 minutes.
    d. 2 minutes x 24 frames/second x 60 seconds/minute = 2,880 frames

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Animation Calculations

Name:_____ Date:_____

Warm-up Problems

1. How many seconds are there in one minute? _____
2. How many minutes are there in a half-hour? _____
   How many seconds? _____
3. How many minutes are there in an hour? _____
   How many seconds? _____

**Important information to remember when doing these problems Cartoons are made up of individual drawings or pictures called frames. In an animated program, there are twenty-four frames per second.*

Use a calculator to help you solve the following problems. Show your work on a separate piece of paper. Check your answers. Do they make sense?

4. Matt's flip book has ten pages. Mary's flip book has twelve pages.
   a) How many more pages does Mary's flip book have?
   b) If Matt and Mary were to combine their flip books, how many pages would the new flip book have?

5. Jill wants to make a flip book that lasts eight seconds. Each page of a flip book is like one frame of a hand-drawn animation program. Remember that there are twenty-four frames per second. How many pages (or frames) must she have?

6. A *Dragonball Z* cartoon runs for a half-hour.
   a) If there are eight minutes of commercials during this program, how many minutes of cartoon arethere?
   b) How many frames of animation are there in this cartoon?
   c) When watching a cartoon, the human eye can see only twelve frames per second. There are twenty-four frames per second in a cartoon to make the picture run more smoothly. How many frames in this *Dragonball Z* cartoon will your eyes be able to see if you watch the entire cartoon?

7. A *Rugrats* cartoon is made of individual pictures or frames.
   a) How many frames of animation are there in a special two-hour *Rugrats* cartoon?
   b) One third of these frames use a black background to indicate nighttime. How many frames have to be black?

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8. For every two frames, there is only one drawing. Each drawing is repeated once in order to make the cartoon more fluid. There are twelve different drawings per second. Sam knows that 216,000 drawings were used in a special episode of *The Simpsons*. How long is this special episode? Give your answer in both minutes and hours.

Bonus Questions

9. Annie's claymation (stop-motion) has 103,680 frames.
   a) How long is her animated program?
   b) How many minutes does she need to edit out in order for her animation to be exactly one hour long?

10. The guidelines of a stop-motion animation contest state that animation submitted for the contest must be between thirty and thirty-five minutes. John's animated program has 40,320 frames.
   a) Is his animation ready for the contest?
   b) If not, what must he do in order to get it ready?
   c) How many minutes does he need to add?
   d) How many frames does he need to add?