# *Entertainment Technology*          Junior *Agent of Change* badge

There's an old saying that all work and no play makes life pretty dull.  But, if you learn the ins and outs of entertainment technology, you can end up with work that's all about play!  Discover the sound waves in a ringtone, the light magic that makes movies, and the topsy-turvy physics of roller coasters.

*Steps*
1. Animate your own artwork
2. Dig into video game development
3. Try the science of amusement park rides
4. Create your own special effects
5. Surf a sound wave

*Purpose*
When I've earned this badge, I'll know the science behind the world of entertainment.

"Nurture your desire to learn constantly.  Be creative, be practical, be patient, be crazy."
                                      -Melody Malberg, author of *Walt Disney Imagineering*

# Step 1  Animate your own artwork

Whether you do it digitally or the old-fashioned, hand-drawn way, the secret of animating art is getting g32 frames into one second. Try it yourself!

CHOICES – DO ONE:
Make a flip book.   Take a pad of paper (stickies work well) or find an old paperback book in whose margins you can draw.  Then, draw something in the exact same spot on each page, moving it slightly each time.  So, a ball might move up a tiny bit on each page and, then, move down the same way.  Flip through your pages quickly and the ball bounces up and down.

<div align="center">OR</div>

Play around with stop-action. Stop-action animation is like a digital flip book – it's the process used to make clay or block figures move in films like *Wallace and Gromit*.  Take a building block figure, small doll, or a figure made of clay or wire, set up a simple background (like a sheet of paper), and shine a lamp or flashlight on your scene.  Then, shoot a series of pictures of your object doing a small action – like waving, bowing, or lifting a leg – moving its position a VERY little bit each time.  Load the pictures onto your computer and put them in sequence.  Click through quickly – or use slide presentation software, and set the time between each slide as "00:00" seconds - and you've got a movie!

FOR MORE FUN: Use a video-editing program to make your movie even smoother (iMovie and Windows Movie Maker come with many computers).

OR

Make your own thaumatrope. A thaumatrope is a disk or card with a picture on each side. The disk is attached to two pieces of string or a pencil. When the pencil or string is twirled, the images appear to combine into one. See below.

- ➢ Cut an index card in half (cut the halves into two equal circles if you like) and draw a picture on each half. A common thaumatrope uses a bird for one image and a cage for the other. Be sure to draw in the middle of each card so the pictures line up.
- ➢ Tape the cards to opposite sides of a pencil. The image should face out on both sides.
- ➢ Tape around the edges of the cards
- ➢ Spin the pencil between your hands. If you drew a bird and a cage, the bird should appear to be inside the cage.

## How to Find Animated Secrets

Frame by frame, play back one minute of your favorite animated movie and search within for secrets.

- Several of Pizar's animators studied in the same classroom at the California Institute of Technology. The classroom number - A113 – can be seen in many Pixar movies. In *Toy Story 3*, it is the license plate of Andy's mom's car.
- A restaurant called Pizza Planet can be seen in almost every Pixar film.
- Nemo from *Finding Nemo* was first seen in *Monsters, Inc.* as one of Boo's toys.
- Buzz Lightyear's batteries come from Buy n Large, the company that nearly destroys Earth in *WALL-E*.
- One of the characters from *Cars*, Luigi, can be seen driving across the street in *finding Nemo.*

# Step 2 Dig into video game development

Some software developers get to play games all day! Think you might like that kind of career? In this step, team up with an adult to find out.

CHOICES – DO ONE:
Use a free downloadable program. With these programs, you can create an interactive story or game using characters they provide. The Massachusetts Institute of Technology has a great one called Scratch, or try the Carnegie Mellon University version, called Alice. Share your creation with friends.

OR

Go onto an interactive site. There are a lot of how-to-be-a-programmer sites out there that walk you through the steps of game programming ("Interactive Logo" and "Challenge You" are two to try).  Check out one and do your best to build a game!

OR

Talk to a developer! Ask someone in the video game field to share their portfolio and creative process with you.  You could invite a student, professor, or professional to chat with your group, or see if you can visit a studio.

FOR MORE FUN: Share your own drawings or game concept ideas for feedback.

## More to EXPLORE

Make a maquette or a miniature.  Despite all the digital advances in moviemaking, many animated projects still begin with a model.  Research special-effects models of buildings, called miniatures, and character models, called maquettes.  Then, create a miniature using recyclables or a maquette using clay.

## Fun FACT Walt Disney coined the term Imagineer – a combination of "imagination" and "engineer" – to describe employees who used science and creativity in their everyday work. Today, about 1,000 Imagineers work for the Walt Disney Company.

## Words  Worth Knowing

A  is a rigid object, like a metal bar.  A FULCRUM is a pivot for lever.

# Step 3  Try the science of amusement park rides

The science of physics makes most theme park action possible, from the flume to the roller coaster to the merry-go-round.

CHOICES – DO ONE:
 Create a roller coaster with marbles and foam tubing.  Cut 6-foot pieces of ¾ inch or 1 inch foam insulations tubing in half lengthwise (ask an adult to help you) and tape together a track, starting at t heed of the table or another high place.  Use books, boxes, or rolling pins to make hills.  Make toilet-paper tube tunnels.  Fashion a loop.  Check out the Fetch! "Thrill ride" activity sheet at pbskids.org for details on this project.

FOR MORE FUN: Design a roller coaster online at learner.org/interactive/parkphysics/coaster
 or ultimaterollercoaster.com

<div align="center">OR</div>

Catapult some stuff. Make a catapult out of household items, like a ruler or yardstick for a lever and a thread spool or banana for a fulcrum.  Then, have a marshmallow or Ping-Pong-ball launching contest with your friends.  Whose object flies the farthest?  Trade ideas about why.

FOR MORE FUN:  Check out the Fetch! Catapult activity sheet called "Target Practice" at pbskids.org.

<div align="center">OR</div>

Figure out centrifugal force. This force is what squashes you against your seat in spinning amusement park rides.  Try this spinning-water-bucket experiment.  Go outside and fill a bucket halfway full of water.  Spin it around and around, Ferris-wheel style.  Why does the water stay in the bucket?

## Movie Makeup Artists

They may not get as much attention as actors, but movie makeup artists are very important to the moviemaking process.  Movie series like *Harry Potter* or *The Chronicles of Narnia* would not be possible without the artists who transform ordinary actors into magical creatures.

Most makeup artists begin by taking courses in cosmetology, which is the study of beautification techniques.  But, makeup looks much different on film than it does in real life.  Film color is usually different than color in real life, and actors often work under bright lights.  The makeup artist must, also, make sure that an actor's makeup looks exactly the same in every single scene, no matter how many times it will be shot.

# Step 4  Create your own special effects

Chances are that special effects (FX) play a big role in many of your favorite movies.  Sometimes the effects are quite obvious, but lots of times they're hidden.  See for yourself!

CHOICES – DO ONE:
Try the blue screen.   Find out how the chroma-key technology called "blue screen" (or "green screen") works.  Then, try it yourself!  Fashion your own blue screen however you like:  anything from cutting out a picture of yourself and sticking it on various backgrounds to using a computer design program to asking a video expert for help filming in front of a real blue screen.

FOR MORE FUN:  See if a local TV station will let you watch the weather forecast to see blue-screen technology in action.

OR

Play makeup artist.  Invite a makeup artist (maybe from a local theater company or television station) to speak to your group about using makeup to emphasize features so they look great on stage or screen.  What products do they use, and why?  How do they make a person look "natural," older, younger, or like a nonhuman character such as an animal or alien?  Team up with an adult to try some of the techniques on a friend, using any makeup you have on hand.

FOR MORE FUN:  Ask a graphic designer to show you how they adjust people's features for print media, such as erasing wrinkles or adding color to cheeks.

OR

Make your own 3–D glasses.   Follow the instructions below to make your own 3-D fun!

FOR MORE FUN: Make a 3-D picture, too.  Ask an adult to help you find instructions and free easy-to-use software online.


To Make Your Own Glasses
Ask an adult to help you with these steps.
1. Start with an old pair of sunglasses that you don't use anymore.  Or, find an inexpensive new pair at a dollar store.  Carefully pop out the plastic lens.

2. Cut out two holes the same size as the lenses in a clear sheet of transparency, cellophane, or acetate.  You can use the original lenses as templates.

3. Use markers to color one lens red and one blue.  Do a little research to see why red and blue are used.

4. Place the new lenses into the frame.  Red goes on the left side, blue goes on the right.  Try them out with a 3D photo.



## More to EXPORE
Create a ghost. The "Pepper's Ghost" illusion was created by John Henry Pepper in the 1860s.  It is still used today in many haunted houses and theme parks.  Find instructions for creating the illusion, and make your own "ghost" with the help of an adult.

# Most Human Beings See the World in 3-D.

Our vision relies on the fact that our eyes are about 3 inches apart. The space between our eyes means that we can see depth, because each eye sees things slightly differently. 3-D works by copying the way our eyes see things.

## Live Action 3-D Movies are made with special cameras that film the same scenes from slightly different angles (computer programs create the same effect in animated movies). In most cases, special glasses are required to filter the images and make them appear in 3-D. Without the glasses, the film appears blurry. This is changing quickly, though, as more companies work with 3-D technology. In the future, people may not need any extra equipment to see movies or TV shows in 3-D!

# Step 5  Surf a sound wave

Sound technology has changed enormously in the past few decades, and the changes, especially the invention of compressed MP3 files, have made playing, recording, and sharing music easier and more accessible. But, no matter how music is played, it all comes from the science of sound waves.

CHOICES – DO ONE:
Experiment with acoustics. Acoustics are the qualities that affect how a sound is heard in a particular area. Find a portable music player and choose five spaces, such as an empty gym, a backyard, or a kitchen. In each space, listen to a song for at least 30 seconds from three to five feet away. (In enclosed rooms, listen from the same distance and at the same volume.) Write down what you notice about the sound in each place. How loud is it? How well can you hear the different parts of the music? After your experiment, research the science to learn why sound changes in different spaces.

FOR MORE FUN: Put something over your ears in one of the spaces, like your hands, a scarf, or some foam. What happens to sound when you add insulation? Why?

OR

Go on an elephant hike. Elephants can hear better than humans – experiment to learn why! Taking an elephant hike    Get two 16-oz. paper or plastic cups. Cut a pair of two-inch slits down the side of each, about one inch apart. This will make a flap. Fold the flap back and cut it off so you have a space to fit your ear.

With an adult, hike for five minutes, paying careful attention to sounds. After five minutes, put on your "elephant ears" (the bottom of the cup should be at the back of your ear) and hike another five minutes. How did your hearing change? What made that happen?

OR

Make a ringtone for yourself, a friend, or family member. Play around with GarageBand or any similar computer program that lets you layer various instrument riffs together to create your own musical compositions.

FOR MORE FUN: Make up an entire song and dedicate it to someone you know.

## Add the badge to your Journey
In step 2, try making a flip book or stop action video that tells a story about the Power of Team.

## Now that I've earned this badge, I can give service by:
- Helping Daisies or Brownies make simple flip books
- Doing makeup for a school play or a dance recital
- Making a special ringtone for a friend or family member

*I'm inspired to:*