Superhero Science: Quarantine Material

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Abstract

Hello all, hope everyone is staying safe and healthy. In this document you will find some activities you can do at home related to the course. You will find a selection of experiments and instructions for a project. please do the best you can with the materials available to you. You don't have to do all of the experiments but try as many as you can.

1 Superhero Science Project

I would like you to use what you learned over the duration of the course to study a new superhero. Pick your favourite superhero, hopefully someone we haven't looked at in class, but it's okay to choose one we have studied. I would like you to make a poster and document the following things:

1. Your superhero's backstory:

   - Where did they come from?
   - How did they get their powers?
   - Who is their arch nemesis?
   - Are they part of a team?

   Feel free to include any other details about your superhero.

2. A scientific explanation for their super powers and their origin:

   - How can we explain where their powers come from? Were they caused by radiation like the hulk? Did they come from mutations like the X-men? Are they alien? If so how did they get here on the Earth?
   - Then also try to explain their superpowers with science. What scientific laws would they need for their powers to work? For example ask yourself questions such as: Do they need to control electromagnetism? Do they need to gravity resistant?

3. Then the final question I would like you to answer is would their powers work in the real world?

Also I would encourage you to include images they can be drawn or from the internet. Finally, for when you are trying to research your superhero there are loads of great videos and articles online[1] and I'm sure many of you have books on superheros as well.

2 Experiments & Activities

2.1 Aquaman: Ocean in a Bottle

2.1.1 Materials

1. Empty resealable plastic/glass bottle with branding removed.
2. Glitter
3. Shells (or anything water resistant you want to put in)
4. Blue/Green food coloring
5. Clear oil
6. Glue/Tape

[1] I recommend parent supervision at this point as some youtube videos, in particular, may be inappropriate.

2.1.2 Instructions

1. Put glitter and shells in plastic bottle. (If you don't live near a beach you can use some stones from your garden or maybe make shells out of plastic waste, you could even make a figurine of Aquaman or any other aquatic superhero to put in)

2. Use funnel and fill bottle half-full with water.

3. Add a few drops of blue and/or green coloring.

4. Pour oil in bottle an inch or so. clear oil is best, otherwise your ocean will be a bit yellow.

5. Screw cap on tight (secure with glue or tape, if desired) Swish bottle back and forth to watch the waves!

Figure 1: When you're done it should look something like this

2.2 Batman: Boomerang

2.2.1 Materials

1. Heavy paper. This could be card stock, thin cardboard, cardboard, even watercolor paper. experiment with different types of paper to see which is the best.

2. Scissors.

3. Tape. If using heavy cardboard, you may want to use glue (allow for drying time), or rubber bands.

4. 360 degree protractor. This is not essential, but VERY helpful as you will see. Also, it is great for math art projects!

5. Pencil

2.2.2 Instructions

1. Decide on the shape of your boomerang's arm. We found that the design is not nearly important as having each arm exactly the same shape. Since most of the examples we saw had arms with a slightly larger tip. But experiment with different designs.

2. Tape 3-4 arms together. Use the 360 degree protractor to determine the distance between arms! If you don't have just try to ensure they are as evenly spaced as possible.

3. Then decorate the boomerang as you see fit.

4. Experiments to try:

   - Try different launching angles.
   - Hold the paper boomerang vertically, then try horizontally.
   - Try different launching speeds and see what happens.
   - Try different types of paper.

Figure 2: Here are some examples.

2.3 Flash: Zoom Bottle

2.3.1 Materials

1. 2 plastic 1 L bottles.

2. Scissors.

3. String.

4. Craft supplies.

2.3.2 Instructions

1. Cut the bottoms off your plastic bottles.
2. Either tape the bottles together, end to end, or slip one end inside the other.
3. Then Thread string through the bottle.
4. Decorate the zoom bottle as your favourite superhero.
5. It should work like this.

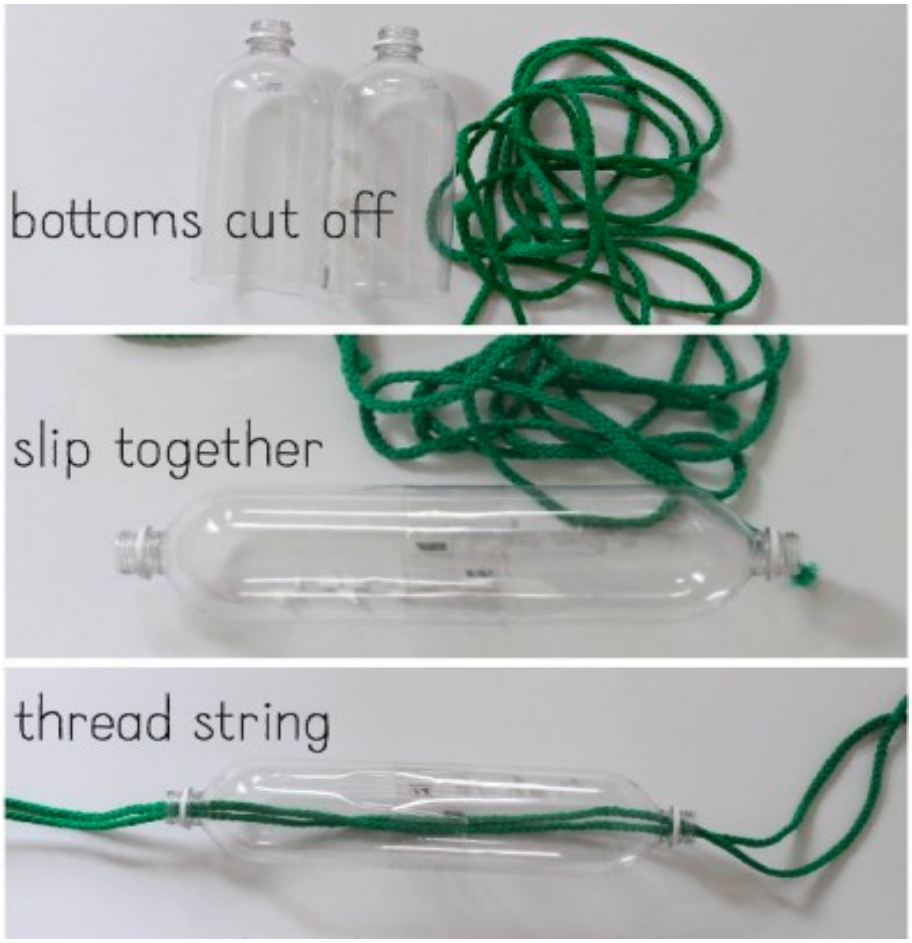

Figure 3: In this picture you can see how to put together the zoom bottle.