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Bruce Museum at Home
STEAM Activities for Children

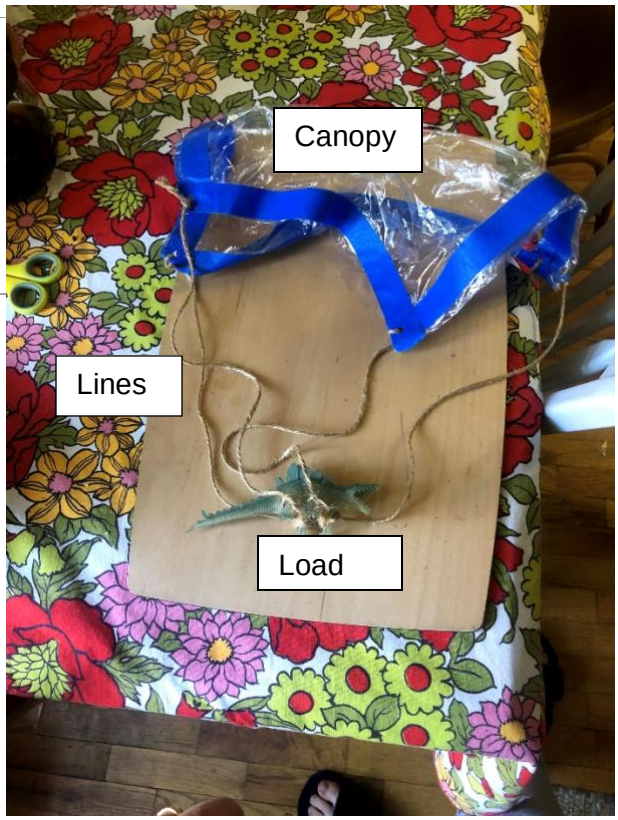
Lesson # 8: ***Drop In, Drop Out: Parachutes***
Week of May 11, 2020

This week's STEAM lesson will have your learners shouting "Look out, below!" as they experiment with homemade parachutes. Some of the concepts explored will be familiar from previous lessons but, as with all STEAM lessons, new concepts will be introduced.

Your learner will need to use their science journal once again this week. If they haven't made one yet, or if their pages are full, go back to Week 1 for instructions on how to make one.

In order of appearance, this lesson contains: a materials list for *Drop In* and a simple art activity, parachute vocabulary words, general instructions for the lesson, ways to add on to the activity, open-ended question ideas, a brief art activity, and NGSS Performance Expectations.

A tip for adults: *Your learners will need space to test their parachutes. We tested our parachutes outdoors, but if you have a space in your house with at least 6 feet of vertical space (this could mean safely standing on a chair) to drop a parachute, that will work.*



Materials for *Drop In*: science journal, tape (masking, clear, or painter's), scissors, thin plastic (plastic bags, plastic from packaging, the plastic from dry cleaning), coffee filters, paper napkins, string/ twine/yarn, scrap fabric, pipe cleaners, tissue paper, a small figurine or weight, hole punch (not necessary but useful. Feel free to supplement this list with other items from around the house.

Materials for art project: empty egg carton (paper or Styrofoam), empty single-serving yogurt cup, scissors, markers or crayons, string (twine or yarn), paper (white, colorful, scrap, etc.), tape (masking, clear, or painter's tape), stick glue.

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Parachute Vocabulary Words

Atmosphere: the envelope of gases surrounding the earth. (Your learner may think of this as air.) The atmosphere has its own density. To explore this concept further, check out the paper drop test from STEAM Week 6.

Gravity: the force that draws an object toward the center of the earth.

Wind: the perceptible motion of the air.

Surface Area: the outside part, or uppermost layer, of an object.

Load: a weight or source of pressure born by another object.

Drop In Parachute Activity

Before you start making parachutes, have a short conversation with your learner about what a parachute is and how one works. For more information on parachutes, check out this website.

- What is a parachute?
  - A parachute is made of a canopy that is shaped like a dome or umbrella, and rope or string that connects the load or object the parachute is carrying.
- What does a parachute do?
  - A parachute is attached to an airplane that is landing or a person/object falling from an airplane. The parachute opens up to slow the deceleration of the plane as it lands or the sky diver as they fall.
- How do parachutes work?
  - Parachutes create **drag** on an object as it descends through the **atmosphere.**
  - A parachute cannot stop the descent of its load, but it will slow it down.
- What are parachutes made of?
  - Parachutes are made of thin, flexible, and lightweight material, typically nylon.
- How do parachutes create drag?
  - An open parachute has a large **surface area**, but weighs very little. A large surface area with a small mass creates drag that will slow the descent of an object.
- How big does a parachute have to be?

Creative parachute design using pipe cleaners, a bandana, a yogurt cup and a pipe cleaner.

    - The size of a parachute depends on the **load** that it bears. The larger the load, the larger the parachute needs to be to slow its descent.

Show your learner the materials that you've gathered for the project and ask them to create a design in their science journal for their proposed parachute. Below are some guiding questions for their design.

- What will the load of their parachute be?
- What shape should their parachute be?
- How will they connect the load to the parachute?
- What material(s) will be the best for their parachute?

Ideas for Parachute Designs

Octagonal Plastic Bag Parachute

Simple Parachutes with Pipe Cleaner Cords

Coffee Filter Parachute

Simple Plastic Bag Parachute

Once your learner has created a parachute and connected their load, they should test whether it works to slow the descent of its load.

Questions

- Did the parachute work?
    - If it didn't work, why do they think it didn't work?
        - Material choices?
        - Too large a load?
        - Issues with the shape or structure of the chute itself?
    - If it did work, what worked the best and why?
        - Would they change anything about their design?
- If they were going to change their design, how would they change it?
- What other materials would they be interested in using?

Challenges

- Can they change the design of their parachute so that it falls in a specific way?
    - Makes small circles
    - Drifts in a specific direction
    - Falls faster
    - Falls slower
- Can they create a parachute to support a heavier load?

Decorated egg carton basket with a pipe cleaner & tissue parachute.

- Can they make a very small parachute that can still support the same weight?
- Can they make a huge parachute?

Art Project: Comfy Container

One of the things that your parachute may be missing is a nice holder for the load. This simple art project will give your learner a chance to make a comfy place for the parachute's load to rest.

- Choose a small container to use: a cup from an egg carton or an empty single serving yogurt cup are good options.
- You or your learner should punch or cut holes into the sides of the container so that it can be suspended under the parachute.
- Decorate the outside of the container with a colorful collage of paper or use crayons and markers if using a paper egg carton.
- Hang your container underneath your parachute and put the load into it. Then, try a parachute drop.
- Your learner may need to modify their parachute design to support the basket, and that's great!

NGSS Performance Expectations

2-PS-2 Matter and It Interactions Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

K-2-ETS1-2 Engineering Design
Develop a simple sketch, drawing or physical model to illustrate how the shape of an object helps its function as needed to solve a given problem.

K-2-ETS1-3 Engineering Design
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

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