

Hands-on STEM Learning Series

Traveling Through Air

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Unit 1 - Activity 2

A Problem Solving Challenge

Outcomes

- Learning how some shapes descend slowly
- Finding out how to slow the descent of an object
- Inventing shapes that carry a load gently to the ground

Materials: pens, pencils, and drawing paper

Resources: magnifying glass, seeds, and photographs of various types of seeds

Nature's Use of Gravity

Many trees and plants use gravity to disperse their seeds. When the seeds are ripe they are released to fall to a place they can settle and take root. Some seeds float to the ground slowly because they have wing shapes attached to them. These seeds spin gently to the ground and fall a long way from the parent tree. This is so that they will not compete for the same ground space when they take root.

Other plants have seeds that are attached to feathery fibers. They look like small umbrellas drifting along on the wind. These seeds are so light they can float for miles on a windy day. The floating seeds descend slowly because they are held up by air resistance - the upward pushing of air that slows their falling movement.

Not all seeds are dispersed in the same way. There are other types of trees that have heavy seeds; these fall out of the tree and bounce to a place where they can grow. Some, like the coconut, are very heavy and it could be dangerous to be near the coconut palm when they are ripe. The coconut is not slowed down too much by air resistance.

Observe

Talk to your partner about different types of seeds. Discuss the types of seeds that float on the wind. If it is the right time of the year, collect a variety of seeds

that have fallen from trees and plants, particularly air-borne seeds. Observe the seeds closely using a magnifying glass and make drawings to show their structure.

Research

Finding out about the natural world is one of the best ways to learn how things work. Natural flyers have had millions of years to evolve into efficient flyers. Humans are novices in comparison. Use your research skills to find more information about seeds.

+ Portfolio

Put a selection of your drawings of seed structures into your portfolio along with your notes.

Challenge

Can you design something that will carry a piece of modeling clay (100g) down to the ground from a height of 2 meters in the longest possible time?

Materials:

- a piece of modeling clay (100g)
- glue
- clear adhesive tape
- any materials your teacher thinks will be useful, including recycled materials

Resources and Tools:

- stop watch
- tape measure
- weighing scales
- scissors

The Design Process

1. Identify the problem.

Make sure you understand what the challenge is asking you to do.

2. Brainstorm solutions.

There are lots of ways to solve the problem. See if you can find a really good solution.

Discuss with your partner what you have learned about the types of seeds that float on air. Does your earlier research about seeds give you ideas for your own design? Some things to think about:

- How can you make your clay glide to the ground?
- Will you design a whirly shape that spins to the ground?
- Will your invention use lots of different types of materials?

Brainstorm different ideas with your partner, make drawings, and try to think of interesting ways that the problem can be solved. You could:

- Break your piece of clay into lots of smaller pieces and distribute the weight over a larger surface.
- Form your clay into a flying shape and join other materials to it.
- Glide it to the ground using a paper dart.

✚ Portfolio Work

Make drawings of your ideas in your portfolio. Construct some of your ideas and find out which ones work best - choose the best.

3. Create the solution you think is best.

4. Test your solution.

- Test your final design to see how well it works.
- Use a stopwatch and time how long your invention takes to reach the ground.
- Work out the average over four drops.
- Whose invention took the longest time to reach the ground?

5. Evaluate your solution.

- Was it the best solution?
- What would you have done differently?
- Can you add to it to make it better?

✚ Portfolio Work

Don't forget to record what you did in your portfolio.