Unit Project

small groups 1 class period

Make a Windbreak

There are many ways to complete this Unit Project. The steps and Suggested Materials indicate one way to complete the investigation. Encourage children to come up with their own ideas of how to make a windbreak. If children decide to follow another process to complete their investigation, be sure to review each group's plans before the children begin. Provide guidance for groups that may have strayed off topic. This Unit Project supports content in Lessons 1 and 3.

3D Learning Objective

SEP Constructing Explanations and Designing Solutions
Design and test a windbreak. Make observations to use as evidence to answer a question. Construct an argument using evidence to support a claim.

Skills and Standards Focus

This project supports building children's mastery of **Performance Expectations 2-ESS1-1 and 2-ESS2-1.**

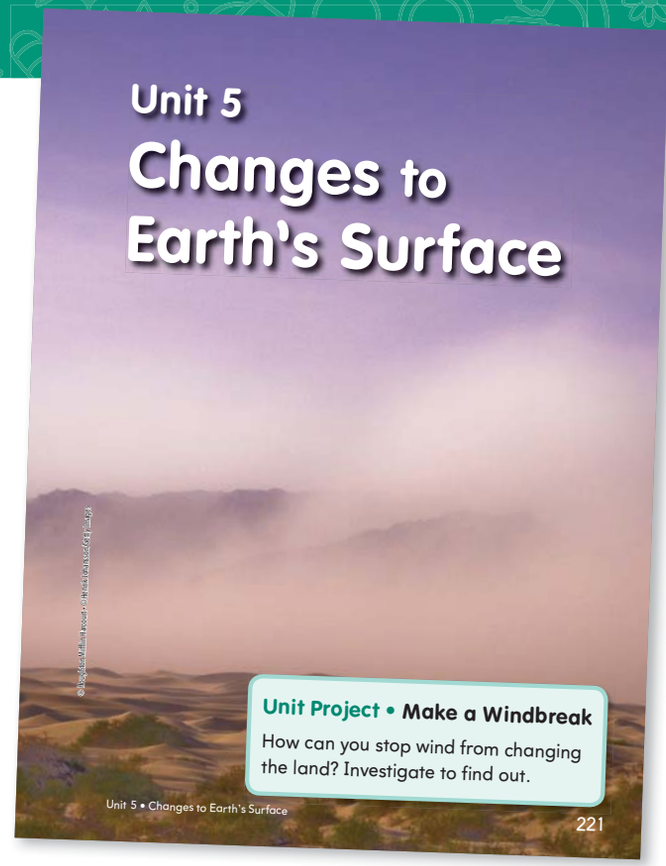
- SEP Constructing Explanations and Designing Solutions
- DCI **ESS2.A** Earth Materials and Systems
- DCI **ETS1.C** Optimizing the Design Solution
- CCC Influence of Engineering, Technology, and Science on Society and the Natural World

Suggested Materials

- 2 same-size flat boxes
- sand or loose soil
- fan or hair dryer
- cardboard, wood, clay
- safety goggles

Preparation

Have enough boxes and safety goggles available for each pair or group of children. Remind children to arrange the sand the same way in both boxes. Monitor children as they pour the sand. Children should wear safety goggles when they turn on the fan or hair dryer. Remind children to use the lowest setting possible and to hold the fan or hair dryer at least one arm's length away from the sand.



Differentiate Instruction

RTI/Extra Support Children can be provided with 2–4 ideas for making a windbreak. They can then choose their method to investigate.

Extension Challenge children to model a terrain other than a sandy beach, such as sand or soil on a hillside.

Name _____

Unit 5 Project

Make a Windbreak

What is a windbreak? How can a windbreak stop wind from changing the land? Write your ideas on the lines below. Then choose two ideas to test. Plan and conduct an investigation to find out.

Children should write ideas they have for what a windbreak is and how it can stop wind from changing the land.

Materials

Draw and label the materials you will need.

Children should draw and label materials. The following are possible materials children can use for this investigation: two boxes, sand or loose soil, fan or hair dryer, cardboard, wood, clay, and safety goggles

Unit 5 Project

Make a Windbreak

SEP Constructing Explanations and Designing Solutions

Pose the Unit Project question to children. Discuss what a windbreak is. **Ask: What do you think a windbreak does?** It stops the wind. Encourage children to think of different ways a windbreak can stop wind from changing the land. Discuss all of the ideas as a class. Have children use print and online resources to find out more about windbreaks.

In the sample investigation shown, children compare how the sand in two boxes changes when exposed to wind from a fan. They compare how the sand moves when cardboard is placed in front of one box and how sand moves in a box without cardboard. Then have children redesign their solution and test again.

Children will cover the bottom two shallow boxes with sand. They will place a piece of cardboard in front of one box and then point a fan at both boxes. **Ask: Which box of sand will change more? Why?** I think the box without the cardboard in front of it will change more because there is nothing blocking the wind from moving the sand.

ESSENTIAL QUESTIONS Prepare children for their project by asking the following questions.

- What are some ways that wind can change Earth's surface?
- When might wind cause Earth's surface to change quickly?
- When might wind cause Earth's surface to change slowly?

Ask: What do you think will happen when the fan blows air on the sand? I think the fan will act like wind and move the sand.

Steps

Discuss with children why it is important to list the steps in their investigation. If children need support, brainstorm the steps together as a class.

CCC Influence of Engineering, Technology, and Science on Society and the Natural World. . . .

Discuss with children the process by which windbreaks block wind. **Ask: How will you use your materials to model the way a windbreak works?** Sample answer: I will use cardboard to model the structure of the windbreak. I will use the fan to model the wind. **Ask: Do you think people use only one kind of windbreak? Explain.** No. There are many different kinds of land and different uses for land, so there are probably different kinds of windbreaks.

DCI Earth Materials and Systems . . . . . .

Before beginning the investigation, have children observe sand in both boxes. **Ask: How would you describe the sand?** The sand is flat and smooth and spread across the bottom of the box. Challenge children to identify the type of change they are modeling with the fan blowing on the sand. **Ask: How is the wind blowing on the sand changing the surface of the sand in the box?** The wind is blowing the sand like erosion. Refer children to Lesson 1 What Changes on Earth Happen Slowly? Have them record their observations using words and pictures.

Data

Remind children to make observations as they investigate. Observations can be used as data to determine the outcome of the investigation.

DCI Optimizing the Design Solution . . . . . .

Have children redesign their windbreaks in order to compare their solutions. **Ask: Which solution worked better?** Answers may vary.

Steps Write the steps you will do.

Answers may vary but should reflect a logical order of steps in the investigation. Sample steps listed:

1. Cover the bottom of two boxes with sand.
2. Place a piece of cardboard in front of the sand in one box.
3. Point the fan at the boxes and turn it on.
4. Observe and record how the sand in each box changes.
5. Redesign your idea and then compare the two solutions.

Data

Record your data.

Answers and drawings may vary but should reflect how the two design solutions stopped the sand from changing.

Analyze Your Results

Look for patterns in your data.

Restate Your Question

Write the question you investigated.

Answers should identify the question children initially chose at the beginning of the investigation.

Claims, Evidence, and Reasoning

Make a claim that answers your question.

Answers should identify how the windbreak stopped the sand from moving and which solution worked best.

Review the data. What evidence from the investigation supports your claim?

Answers should cite evidence from the investigation to support their claim about how the windbreak protects the sand.

Discuss your reasoning with a partner.

Analyze Your Results

DCI Optimizing the Design Solution

Have children analyze their data. Elicit from them any patterns they noticed. Encourage them to share their data with the other groups in order to compare test results. **Ask: What types of windbreaks were most effective at preventing the fan from blowing the sand?** Answers may vary.

Claims, Evidence, and Reasoning

Children should understand that the sand in the box with the windbreak moved less than the sand in the box without the windbreak. They should compare their solutions to see which worked best.

Review with children what it means to make a claim. Guide them to understand that the data they collected will be used as evidence to support their claim. **Ask: What can you use as evidence from your investigation?** I can use the data collected, such as the drawings and writings.

Ask: What claim can you make? Windbreaks protect sand from the wind. **How does your evidence support your claim?** My evidence supports this because the sand in the box with the windbreak moved less than the sand in the box without the windbreak. Encourage children to discuss their reasoning.

Scoring Rubric for Unit Project	
3	States a claim supported with evidence that the windbreak protects the sand from the wind
2	States a claim somewhat supported with evidence that the windbreak protects the sand from the wind
1	States a claim that is not supported by evidence
0	Does not state a claim and does not provide evidence