EXPLORATION 3 Moving On Upstream, continued

HANDS-ON ACTIVITY ** Small groups *> 45 min How Can It Cross the Road?

3D Learning Objective



Constructing Explanations and Designing Solutions

Students design and model a solution to help caribou migrate after an environmental change caused by human activities alters the animals' old migration route.

Materials

Ask students to bring in cardboard boxes starting a week or two before beginning this activity. You can also check the school recycling program for cardboard. You might also wish to provide students with additional items, such as empty cardboard tubes from paper towels to serve as tunnels.

Preparation

Place all the materials in a central location. As a class, read aloud the objective and preview the procedure. Then have groups decide which materials they will use to build their designs.

LS2.C Ecosystem Dynamics, Functioning, and Resilience

Tell students that caribou migrate to find food and to give birth. They travel the same general path every year, heading north in the spring. They go to areas where they know the food will be plentiful and where they will have some protection when it's time for females to give birth. When the young caribou are strong enough to walk, the migration continues. The herd moves to find more food and escape mosquitoes and other pests in the summer. Then, as the cool temperatures of fall set in, they head south. In the winter, the caribou move to areas with thin layers of snow so they can dig for food.

Ask: What might happen to the caribou if they cannot migrate? They might run out of food. They might not be used to the weather in one place for all four seasons of the year, which could harm the animals.



Objective

Collaborate with a group to design and model a solution to help caribou migrate. A highway blocks the path they once used. Now they need help in finding a new route around the human-made change to their environment.

What question will you investigate to meet this objective?

Materials

- · craft sticks
- tape
- · cardboard
- glue
- · chenille sticks
- wood
- clay
- other materials you choose

Possible question: How can we help the caribou get across the highway?

Procedure

STEP 1 Migrating caribou have to cross a highway that blocks their migratory path. Think about the problems, and then write them down clearly.

Possible answer: The problem is that a human-made highway is blocking the

caribou's migratory path.

STEP 2 Work with a group. Together, brainstorm solutions to the problem of the migrating caribou. How might you design a solution to help the caribou cross the highway? Or will you redesign the highway?



Possible answer: I will design a solution on paper first.

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STEP 3 Work with your group to design a solution. Draw or build your design with materials of your choice.



STEP 4 Label the parts of your design or model. Write what those parts are and how the parts solve the problem below.

Students should list each part of their solution and describe what it does to help solve the problem.

Analyze Your Results

STEP 5 Compare your design solutions to two other groups in the class. How are the designs similar? How are they different?

Students should compare and contrast their designs to those of other groups

in the class, explaining the similarities and differences

STEP 6 Which group do you think has the design solution that will work the best? Explain why you think so.

Students should name which design they believe works best and provide evidence

for why they think this.

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Procedure

STEP 2 Suggest that students make a chart that lists the advantages and disadvantages of each solution. Tell them to think of factors such as materials and time as they evaluate their ideas.

STEP 3 Some groups will want to build prototypes of their designs. Explain that a prototype is a working model of the design. Tell students to make sketches of their designs before building the prototypes.

Ask: What is one advantage of sketching a prototype before building it? Possible answer: You can easily revise the sketch; it's harder to revise the prototype.

Analyze Your Results

STEP 5 Give students time to compare their designs. You can conduct a gallery walk, allowing all students the chance to view each other's work and then make comparisons when they get back to their tables.

STEP 6 Before students decide on the best solution, set aside time for groups to explain and, if applicable, demonstrate their solutions to the class.

Support the Unit Project

This activity supports student understanding of how human changes can affect animal habitats. Students can use the understanding derived from the activity to draw conclusions about animal habitats and adaptations.

EXPLORATION 3 HANDS-ON ACTIVITY, continued

Draw Conclusions

SEP) Engaging in Argument from Evidence

STEP 8 Explain that it is sometimes difficult to recognize problems with your own design. Have groups offer feedback to one another about potential problems or issues with designs.

STEP 9 If time permits, allow students to improve and retest their designs.

Claims, Evidence, and Reasoning

Have reference materials on hand for students to use to answer the question in Step 10. Have groups evaluate one another's response to the question. Tell them to assess the evidence used to answer the question. As a class, agree on criteria to assess the evidence, such as: Are sources reputable? Is evidence accurately cited?

| Scoring Rubric for Hands-On Activity | |
|--------------------------------------|---|
| | designs a viable solution to the caribou migration |
| 3 | problem; identifies problems with the solution; |
| | identifies ways to improve the design |
| | designs a viable solution to the caribou migration |
| 2 | problem; either does not identify problems or does not |
| | identify ways to improve the design |
| 1 | solution to caribou migration problem is not viable |
| 0 | does not design a solution to caribou migration problem |

| STEP 7 What problems does each model create? |
|--|
| Possible answer: Some designs might create problems by blocking other animal |
| migration patterns or changing the environment. |
| |
| Draw Conclusions |
| STEP 8 Make a claim about the problems or issues your design may have, if any. |
| Possible answer: Students' claims may involve issues of how to get the caribou to |
| cross over a bridge or go under a tunnel. |
| STEP 9 How might you improve your design? Explain. |
| Students' solutions should involve the issues they described in the previous question. |
| |
| |
| STEP 10 How can humans affect animal migration patterns? Cite evidence. |
| Possible answer: Human agriculture and construction can make it more difficult |
| for animals to migrate from one place to another. Clearing trees, plowing fields, or |
| building roads, bridges, or buildings changes the pathways or the food sources that |
| migrating animals use. |
| STEP 11 What other questions do you still have about animal migration: Possible answer: Where do animals migrate? What other animals migrate? |
| Possible answer: Where do animals migrate? What other animals migrate? |

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