Wildlife Corridors Challenge

Home Connection

Dear Family,
During the last few days, the students designed wildlife corridors that would allow animals to cross a road safely. They acted just like engineers! They . . .

- identified and learned about a problem
- planned ways to solve the problem
- made and tested a model
- revised their design to make it even better

In this challenge, students developed an understanding of some of the problems caused when roads cut through animal habitats. Students learned about ways to help prevent collisions between animals and vehicles. They also learned about the engineering design process and practiced skills such as developing and using models, analyzing data, making claims based on evidence, and communicating technical information.

Let your child tell you what his or her team did in this engineering challenge. Prompt your child if he or she needs help.

- What was the problem you were solving?
- What were the criteria (goals) that your design plan had to meet?
- What constraints to cost and materials did you have to work within?
- How did you measure the success of your design?
- How did you improve your design? What information did you learn that lead you to make improvements?

On the back of this sheet, work with your child to extend his or her learning in the challenge.

This STEM project has been developed in partnership with Texas A&M University.

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About Wildlife Corridors

An animal's habitat provides it with the things it needs to survive, such as food, water, shelter, and a place to raise its young. When an animal's habitat is divided by roads, it is difficult for the animals to carry out normal activities. Wildlife corridors help solve this problem by connectiong the separate pieces of animal habitats. Wildlife corridors include pathways over and under highways. These pathways allow animals to cross highways without the risk of collisions with motor vehicles.

Have your child tell you about wildlife corridors. If needed, ask questions to prompt your child:

- What kinds of structures help animals cross roads safely?
- How do the size and length of a tunnel affect how much an animal can see?
- What kinds of animals like large tunnels? What kinds of animals like small tunnels?

Try It!

Many animals will not go into a tunnel unless they can see their habitat on the other end. The animal's ability to see out of a tunnel depends on the tunnel's the size and length. Collect various cardboard tubes in your home, such as the tubes from paper towels and toilet paper. Have you child predict which tube will allow him or her to see more. Ask questions, such as *Can you see more through a wide or narrow tube? Through a long or short tube? Can you see more if you are close to an object or far away from it?*

If possible, have your child accompany you on a tour of your neighborhood. Can you find places where roads or highways have divided wildlife habitats? Can you find culverts or tunnels that allow animals to pass through? Can you find other examples of ways that people are helping to protect local wildlife?

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Name _____

Where Are the Animals?

Follow these steps.

Animal	Number and color of chips
Kit fox	6 red
Mule deer	9 green
Bobcat	12 blue
Mountain lion	3 yellow

1. Separate the range maps.
2. Evenly spread out the kit fox chips within its range.
3. Do the same with the other range maps and chips.
4. Carefully, stack the range maps and chips on top of each other.
5. Observe the ranges and chips. What do you observe about the animal populations and their ranges? _____

_____

6. Separate the range maps keeping the chips on top.
7. Divide the chips into equal groups at each mile marker within that animal's range.
8. Record in the chart how many of each animal might cross the road at each mile.

Number of animals in each mile

Animal	Mile 1	Mile 2	Mile 3	Mile 4	Mile 5	Mile 6	Mile 7	Mile 8
Kit fox								
Mule deer								
Bobcat								
Mountain lion								

Name _____

Where Are the Animals?
(continued)

9. Use the numbers in your chart to make bar graphs that compare the number of animals that may cross at each mile.

Kit fox (KF)–red; Mule deer (MD)–green; Bobcat (BC)–blue; Mountain lion (ML)–yellow

KF	**MD**	**BC**	**ML**	**KF**	**MD**	**BC**	**ML**	**KF**	**MD**	**BC**	**ML**	**KF**	**MD**	**BC**	**ML**
Mile 1				**Mile 2**				**Mile 3**				**Mile 4**			

KF	**MD**	**BC**	**ML**	**KF**	**MD**	**BC**	**ML**	**KF**	**MD**	**BC**	**ML**	**KF**	**MD**	**BC**	**ML**
Mile 5				**Mile 6**				**Mile 7**				**Mile 8**			

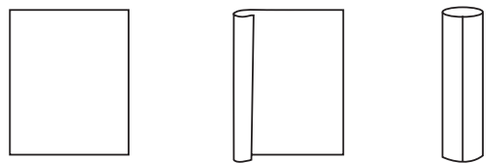
Tunnel Vision

Name _____

Follow these steps.

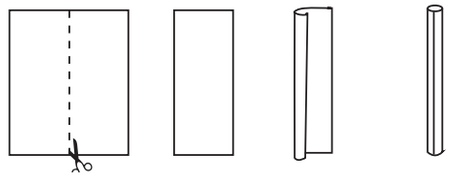
1. Make four paper tubes. Use paper clips to hold the ends together. Then tape the sides together.

   - Tube 1: Use a full sheet.



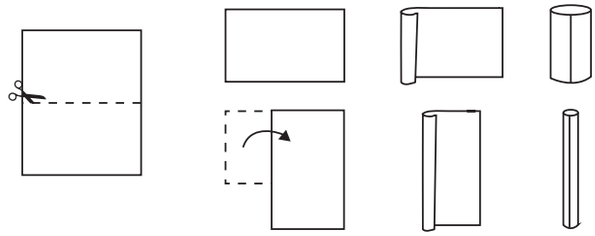
12 inches long and $2\frac{1}{2}$ inches wide

   - Tube 2: Use a sheet cut in half lengthwise. Share half the paper.



12 inches long and 1 inch wide

   - Tubes 3 & 4: Use a sheet cut in half crosswise. Use both halves.



6 inches long and $2\frac{1}{2}$ inches wide

9 inches long and 1 inch wide

2. **Measure** Stand 2 feet from the **Measuring Circles** page.

3. **Observe** Look through Tube 1 at the black dot. What is the biggest circle you can see? Write it in the chart.

4. Repeat Steps 2 and 3 for the three other tubes.

Description	Length in inches	Diameter in inches	Biggest circle I can see
Tube 1: Long–Wide	12	$2\frac{1}{2}$	
Tube 2: Long–Thin	12	1	
Tube 3: Short–Wide	6	$2\frac{1}{2}$	
Tube 4: Medium–Thin	9	1	

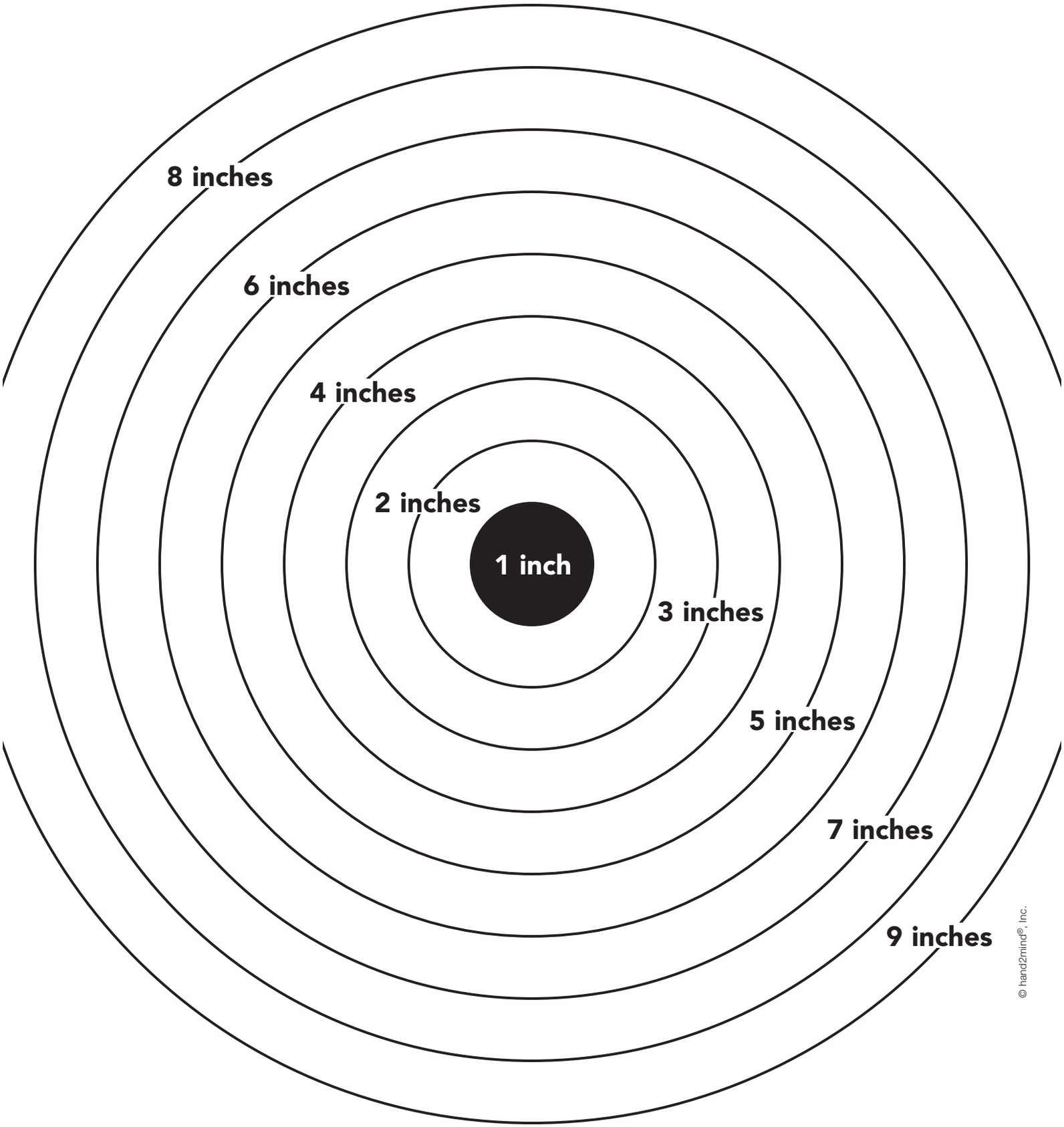
5. **Draw conclusions** Use *more* or *less* to complete these sentences.

   A wide tube lets you see _____ than a thin tube.

   A long tube lets you see _____ than a short tube.

Measuring Circles

Name _____

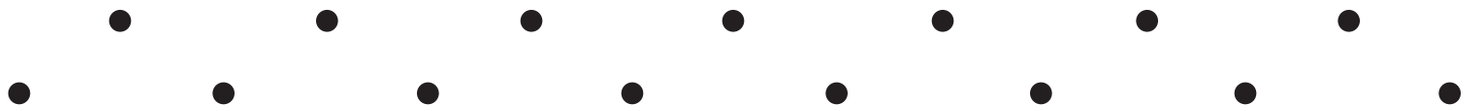


Name _____

Corridor Design Plan

Target animal (Circle one): Kit fox Mule deer Bobcat Mountain lion

1. Show where you will put culverts and fences. Label the culverts **M** for **medium** or **L** for **large**. Connect two dots to show a fence.



Mile 1	Mile 2	Mile 3	Mile 4	Mile 5	Mile 6	Mile 7	Mile 8

2. **Count** the culverts and fences in your plan. Write the numbers in the table below.

3. **Calculate** the cost for each size of culvert and any fences. Add the costs of culverts and fences to find the total cost of your plan.

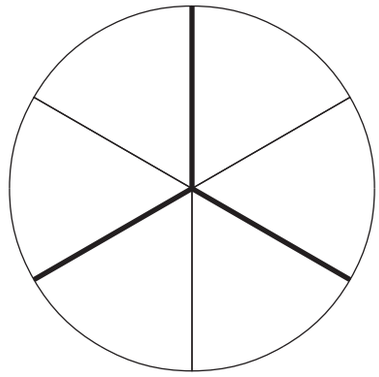
Materials	How many?	Price for one	Cost (Number x Price)
Medium culvert		$26,000	
Large culvert		$46,000	
Fence		$1,000	
		Total cost of materials (Must be no more than $196,000)	

Fractions of Populations

Name _____

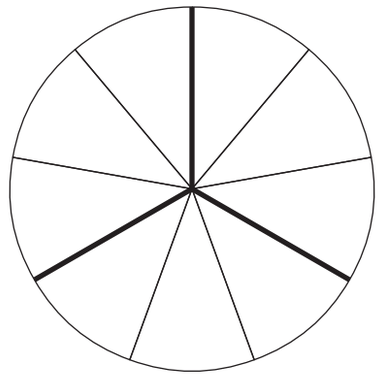
Follow these steps to find $\frac{2}{3}$ and $\frac{1}{3}$ of each animal population.

Kit fox population The circle is divided into 6 equal parts. Each part stands for one kit fox.



1. **Count** How many parts are in $\frac{2}{3}$ of the circle? _____
2. **Count** How many parts are in $\frac{1}{3}$ of the circle? _____

Mule deer population The circle is divided into 9 equal parts. Each part stands for one mule deer.



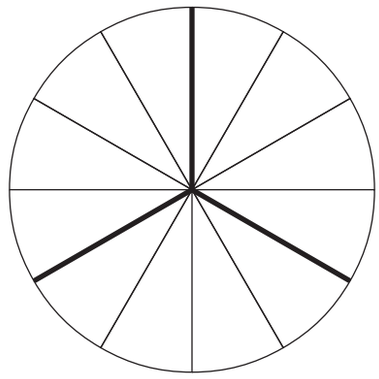
3. **Count** How many parts are in $\frac{2}{3}$ of the circle? _____
4. **Count** How many parts are in $\frac{1}{3}$ of the circle? _____

Fractions of Populations

(continued)

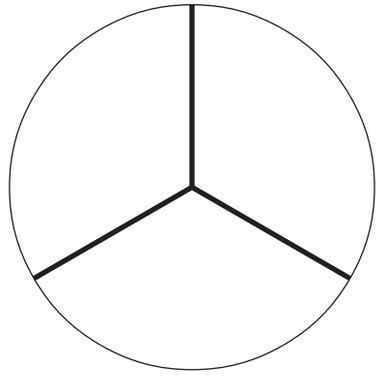
Name _____

Bobcat population The circle is divided into 12 equal parts. Each part stands for one bobcat.



5. **Count** How many parts are in $\frac{2}{3}$ of the circle? _____
6. **Count** How many parts are in $\frac{1}{3}$ of the circle? _____

Mountain lion population The circle is divided into 3 equal parts. Each part stands for one mountain lion.



7. **Count** How many parts are in $\frac{2}{3}$ of the circle? _____
8. **Count** How many parts are in $\frac{1}{3}$ of the circle? _____
9. Write the numbers for $\frac{2}{3}$ and $\frac{1}{3}$ of each population in the table on your **Test Results** page. Make sure each number is in the correct row and column.

Test Your Design

Name _____

Read the chart. Then follow the Test Procedure for each of the animal tokens.

The chart shows how many animal tokens to drop into each slot on the Animal Movement Simulator.

Animal and animal token color	Total animal tokens	Animal tokens dropped into each slot							
		A	B	C	D	E	F	G	H
Kit fox = red	6	**2**	**2**	**2**					
Mule deer = green	9						**3**	**3**	**3**
Bobcat = blue	12	**2**	**2**	**2**	**2**	**2**	**2**		
Mountain lion = yellow	3						**1**	**1**	**1**

Test Procedure

1. Drop an animal token into a slot.

2. Did the token fall through a culvert?
   - If yes, the animal has crossed safely. Make a check in the "Crossed the road safely" column on the **Test Results** page.
   - If no, make an X in the "Did not cross the road" column. Remove the animal token from the simulator and place it in a "Did not cross" container.

Name _____

Test Results

1. **Calculate** Use **Fractions of Populations** to calculate $\frac{2}{3}$ and $\frac{1}{3}$ of each animal population. Write those numbers in the chart. Are they in the correct row and column?
2. **Circle** your target animal.
3. **Record** For each animal, make a ✓ if the animal crossed safely. Make an **X** if the animal did not cross safely.
4. Count how many of each animal crossed the road safely. Was the criteria met?

Animal	Size of Population	$\frac{2}{3}$ of the population	$\frac{1}{3}$ of the population	Crossed the road safely	Did NOT cross the road	Criterion met?
Kit fox	6					Yes No
Mule deer	9					Yes No
Bobcat	12					Yes No
Mountain lion	3					Yes No

Reflect On It

Name _____

Use your plan, model, and test results to finish these sentences.

Target Animal

1. (circle one) Kit fox Mule deer Bobcat Mountain lion

   We choose this target animal because _____

   _____

2. Our model **did / did not** meet the criterion for our target animal.

Constraints

3. The culverts and fences for our model cost _____.

Criteria

4. Our model met the criteria for these animals:

   _____

5. One part of our model that worked well was _____

   because _____

   _____

6. One part of our model that did not work well was _____

   because _____

   _____

Compare Models

7. We compared our model to Group _____. I observed that _____

   _____

8. The most successful model was made by Group _____. It was successful because _____

   _____