When to Feed a Cheetah
Virtual Classroom Extension

Objective

This activity is designed to help your at-home student(s) recognize themselves as scientists and think critically about problem-solving. The goal is to help students understand cheetah biology and adaptations. As with all lessons provided, please feel free to adapt them according to your students' abilities. Take these ideas, make them your own and your at-home students will have a greater chance at success.

Materials

Paper or attached worksheet, writing utensils, measuring tape, stopwatch.

Procedures

1. Explain that cheetahs are the fastest land mammal, reaching speeds of nearly 70 miles per hour. That is the same speed that cars drive on the highway. Ask your at-home students why they think cheetahs need to be able to run so fast?
   a. Cheetahs are predators, which means they eat other animals, referred to as prey. A lot of the prey cheetahs eat can also run very fast. Because of this, cheetahs must be quick enough to catch their prey.
2. Explain that you will be looking at some characteristics of cheetahs that help them to run quickly. Cheetahs are in the cat family. While all cats are carnivores (meat eaters), not all cats can run like a cheetah. Show your students the picture of the cheetah next to the picture of the lion (at the bottom of the lesson plan). What are some differences between them that might explain why a cheetah is so much faster?
3. Cheetahs rely on their speed for hunting and have special adaptations that contribute to their ability to run at top speeds. Show your students each picture of a cheetah trait (at the bottom of the lesson plan). Ask them if they can guess what the cheetah uses it for. Can they think of human inventions that have a similar function? Explanations of each trait are below.
   a. Semi-retractable claws: While other cats can retract their claws, cheetah claws are more like those of dogs, which are always out. These claws allow the cheetah to grip the ground, so they don't slip when they run. This is similar to the way athletes wear cleats when running.
   b. Spotted fur: The spots help hide the cheetah in the grass so that they can get close to their prey. This is similar to the way hunters wear camouflage to blend in with the forest.

c. Flat, flexible tail: Cheetahs' tails are flatter than other cats. This allows them to make quick turns. This is similar to the rudder of a boat.

d. Tear marks: Cheetahs have distinctive tear mark patterns on their face. These are thought to help reduce glare from the sun so they can easily see their prey. This is similar to the way football players put black marks under their eyes.

Outdoor Extension

4. Ask students how they compare to a cheetah. Is their body designed for speed the way a cheetah's is?

5. Explain that first, you will measure your breathing rate at rest. This is the number of times you take a breath every minute when you have not exercised recently. To calculate this, set a timer for one minute. Breath normally, counting every time you breath in (inhale). When the timer goes off, record the number of breaths you took in the Measurement Table on the attached worksheet. If you did not print the worksheet, record all measurements on a separate sheet of paper.

6. Decide how far you will run and record this number on the attached worksheet. Mark on the ground where you will start running. If you have a measuring tape, measure 50 feet (or whatever distance you have the space for).

   a. If you do not have a measuring tape, you can estimate the distance by counting your steps. An average adult has a step length of about two and a half feet. This may be less for shorter individuals and greater for taller individuals. A child's average step length may be closer to one and a half feet.

      i. If you are an adult counting your steps, take smaller steps than normal to approximate a step length of two feet. Then count by twos until you reach the desired distance. If your students will measure the distance, tell them to take slightly larger steps than normal to have a step length of about two feet.

      ii. Measure stride instead of step. Stride is the length of two steps (one step with each leg). For adults, average stride would be five feet. For children, average stride would be three feet. An adult can count by five for each stride to measure the desired distance and a child can count by three for each stride to measure the distance. Your students may need assistance in counting by three. Alternatively, figure out how many strides the students will need to take ahead of time and then have them count their stride.

   b. Make a mark on the ground for where you will end the run.

7. Go to the starting line. Have one person ready with a stopwatch or timer to measure the seconds it took to run the distance.

8. Have your students run the distance three times, recording their time for each trial.

9. Once your students finish all three runs, have them measure their breaths per minute. Record the number in the Measurement Table for "breathing rate after exercise."

10. Have your students take two running steps (one stride). Measure how many feet they are able to cover with one running stride and record it in the Measurement Table.
11. Average your running time by adding all three times together and then dividing by three.
12. Divide the number of feet you ran by your average running time. This will give you the number of feet per second. Record this in the Measurement Table.
13. Convert feet per second into miles per hour. In order to make this conversion, you need to know how many seconds are in an hour (60 sec/min x 60 min/hour = 3,600 sec/hour) and how many feet are in a mile (5,280 feet/mile). For older students that can multiply and divide, the formula is provided with an example on the attached worksheet. For younger students, you can find conversion calculators online if you do not wish to do the math by hand.
14. Have the students compare their measurements to the cheetah measurements. Ask the student if they think they would be able to win a race with a cheetah. Why or why not?

Supplemental Information

https://www.clevelandmetroparks.com/zoo/lionandcheetah
Cheetah Conservation Fund: https://cheetah.org/kids/cheetah-facts/
Action for Cheetahs in Kenya: https://www.actionforcheetahs.org/
Ruaha Carnivore Project: https://www.ruahacarnivoreproject.com/

Ohio's Learning Standards

Science Content Standards
Grade 1 Life Science Topic: Basic Needs of Living Things
1.LS.2: Living things survive only in environments that meet their needs.
Grade 3 Life Science Topic: Behavior, Growth and Changes
3.LS.2: Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.
Grade 6 Life Science Topic: Cellular to Multicellular
6.LS.4: Living systems at all levels of organization demonstrate the complementary nature of structure and function.

Mathematics Content Standards
Grade 2 Measurement and Data
2.MD.3: Estimate lengths using units of inches, feet, centimeters, and meters.
Grade 5 Measurement and Data
5.MD.1: Know relative sizes of these U.S. customary measurement units: pounds, ounces, miles, yards, feet, inches, gallons, quarts, pints, cups, fluid ounces, hours, minutes, and seconds. Convert between pounds and ounces; miles and feet; yards, feet, and inches; gallons, quarts, pints, cups, and fluid ounces; hours, minutes, and seconds in solving multi-step, real-world problems.

Cheetah and Lion

Look at the pictures of the cheetah and the lion.

How are they different? How might those differences help a cheetah run faster than a lion?
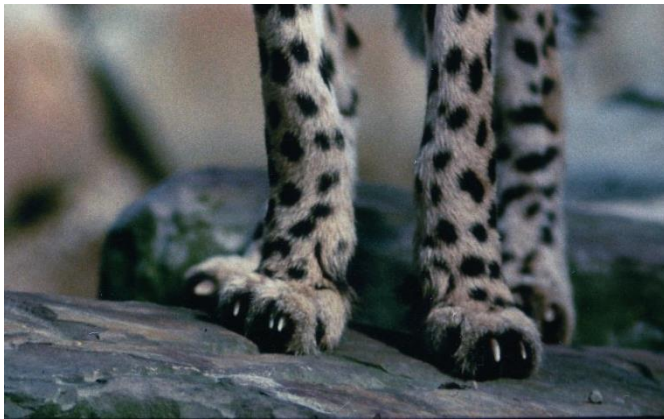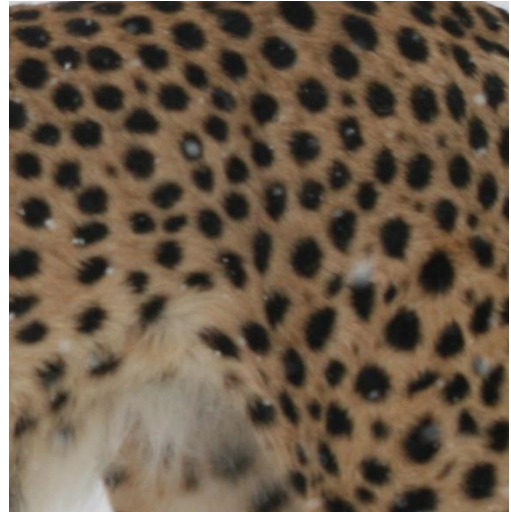
Cheetah Traits

Look at the pictures of cheetah traits. What do you think each one is used for? How do those traits help a cheetah to find food?

Semi-retractable claws

Spotted fur

Flexible, flat tail

Tear Marks

How do I compare to a cheetah?

Measurement Table		
	My Measurements	**Cheetah Measurement**
Breathing rate at rest		60 breaths per minute
Running stride		21 feet
Breathing rate after exercise		150 breaths per minute
Speed in feet per second		102 feet per second
Speed in miles per hour		70 miles per hour

Distance I am running (in feet): _____

My Running Time	
Running time 1	
Running time 2	
Running time 3	
Average running time	

How to calculate miles per hour from feet per second.

_____ feet	1 mile	60 sec	60 min
_____ sec	5280 feet	1 min	1 hour

1. Fill in the number of feet your ran in the top left box.
2. Fill in the number of seconds it took you to run that distance in the bottom left box.
3. If there is a word that is in both the top row and the bottom row, put a line through that word. You should be left with "mile" in the top row and "hour" in the bottom row.
4. Multiply all numbers in the top row and put the answer in the top box below.
5. Multiply all numbers in the bottom row and put the answer in the bottom box below.

miles
hours

6. Divide the top number by the bottom number.
7. Write the answer in the space below. This is your speed in miles per hour.

_____ miles per hour

Example: If I ran 200 feet in 12 seconds I would fill out the box like so.

__200__ feet	1 mile	60 sec	60 min
__12__ sec	5280 feet	1 min	1 hour

Next, I would cross out any words that are on both the top and the bottom.

__200__ ~~feet~~	1 mile	60 ~~sec~~	60 ~~min~~
__12__ ~~sec~~	5280 ~~feet~~	1 ~~min~~	1 hour

I multiply all the top numbers to get 720,000.

Then I multiply all the bottom numbers to get 63,360.

200 x 1 x 60 x 60 miles		720,000 miles
12 x 5280 x 1 x 1 hours	=	63,360 hours

Finally, I divide the top number by the bottom number.

720,000 ÷ 63,360 = 11.36 miles/hour

By running 200 feet in 12 seconds, I would be running at 11.36 miles per hour. This means that if I kept up the same pace for one hour, I would travel 11.36 miles.