4th Grade Science

Week 9

Your Week at a Glance
• Motion and Speed • NGSSS: SC.4.P.12.1; SC.4.P.12.2

Student Name:_____

Teacher Name:_____

School: _____

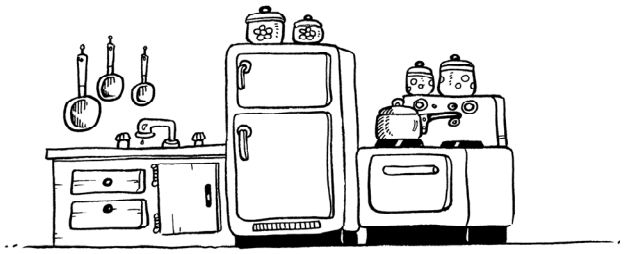
Name _____ Date _____

SC.4.P.12.1 Recognize that an object in motion always changes its position and may change its direction. **SC.4.P.12.2** Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.

Motion and Speed

Position

A friend asks you to explain your location at a baseball game. You might say, "I'll be on the field to the right of first base" or "I'll be on the bleachers next to the hot dog stand. "Words such as *on, to the right of*, and *next to* describe your location. **Position** is the location of an object in relation to a nearby object or place. The second object or place is called the reference point. All objects have a position. Can you use position words to describe where each item is in this kitchen?

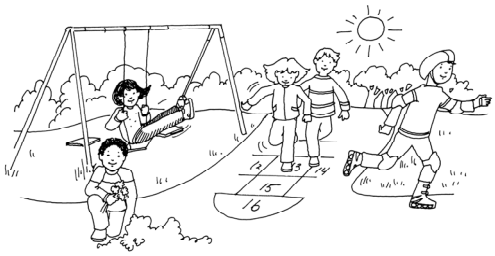


Motion

Suppose you want your pencil in a different place on your desk. You will need to move it. **Motion** happens whenever an object moves or is moved from one position to another. You can move a pencil from the desk to your school bag. You can move yourself from one part of a room to another. If you are changing position, you are in motion.

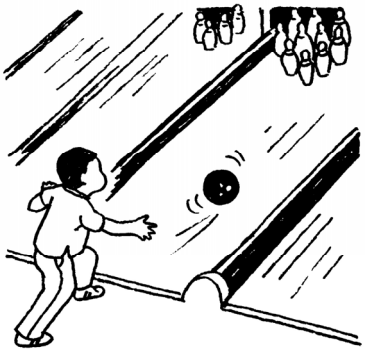
Forces

You are asked to put a book away. How would you move the book? Pick it up? Push it across the desk? Any change in motion needs a **force**, or a push or pull. When you pick up a book, you pull it. When you throw a ball, you push it. When you push a swing, a force called gravity pulls the swing back down toward Earth. Which objects are in motion at the playground?



Changing Motion

Forces can cause changes in motion. A bowling ball will not move until a force moves it. The ball will keep moving in the same direction until a force changes its motion. The boy gives the ball a push to put it in motion. Predict how the bowling pins will change motion.



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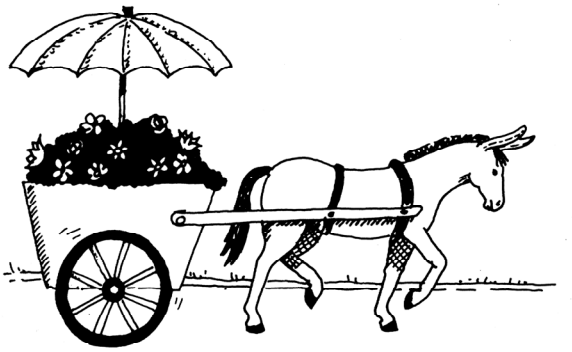
Name _____Date _____

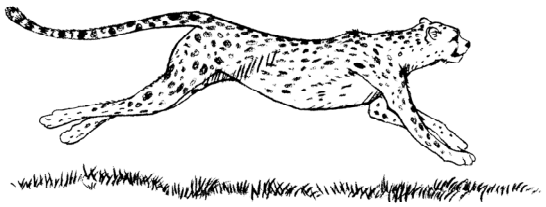
A mule pulls a cart. The position of the mule and the cart both change. How do forces change the cart's motion? First, the mule pushes off the ground to start motion. When the mule moves, it pulls the cart. The cart's wheels push against the ground to start motion.



Distance, Direction, and Speed

How far can you throw a ball? You can describe motion by its distance, or the length it travels. You throw a ball 3 meters. You ride a bicycle 3 kilometers. You can find **distance** by measuring the length between where you stand and where the ball lands after throwing it. Which way will the ball move? What about a flying disc?

Direction is the path an object follows while it is in motion. When you rode the bicycle, you went 2 kilometers in a northerly direction and 1 kilometer to the east. **Speed** tells you how the position of an object changes during a certain amount of time. A hummingbird's wings move so fast, it is hard to see them. You can't see a plant grow but you know it has grown because it looks taller or has changed position. To calculate speed, divide distance by time. The cheetah can run up to 27 meters (91 feet) in one second!



Sometime you need to describe the speed and direction of an object in motion. This is an object's **velocity**. For example, if the speed of the cheetah is 27 m/sec, and it is traveling north, then its velocity is 27 m/sec, north.

Student-Response Activity

❶ How is position related to an object's motion?

_____

_____

_____

_____

_____

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❷ Use the information in the chart to answer the questions.

Object	Time	Distance	Direction
A	10 seconds	10 meters	north
B	20 seconds	20 meters	west

What is the speed of object A?

_____

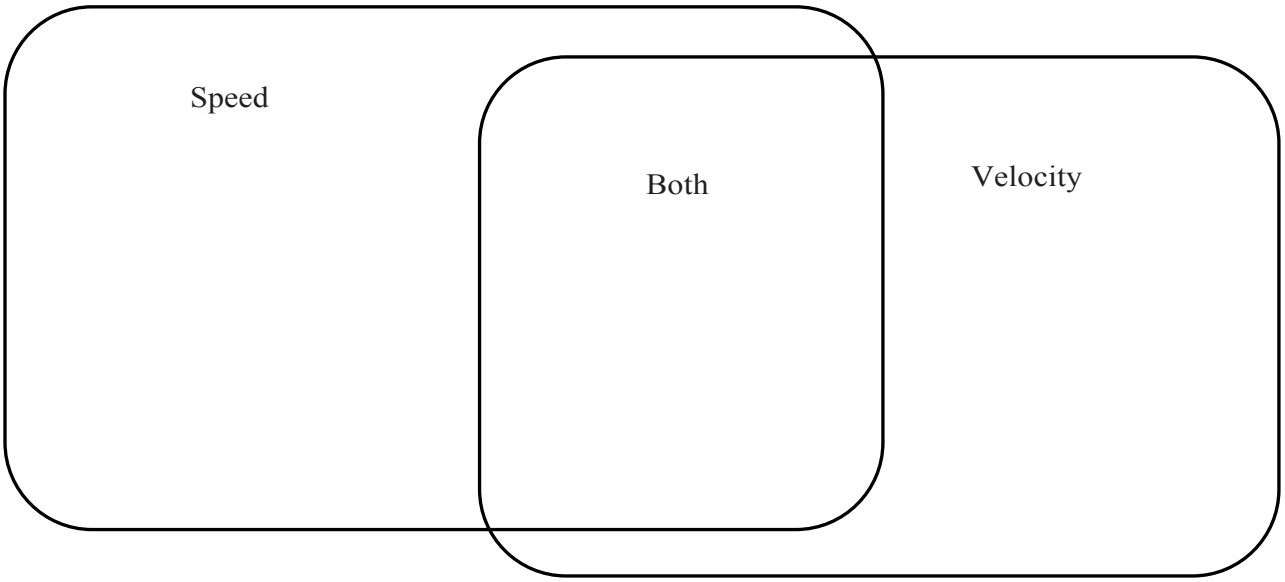
How do the speeds and velocities of objects A and B compare?

_____

What is the velocity of object B?

_____

❸ Complete the Venn diagram below to compare and contrast speed and velocity.



❹ A soccer ball is resting on the field. What must happen for the ball to change position? Explain your answer.

_____

_____

_____

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Benchmark Assessment SC.4.P.12.1, SC.4.P.12.2

Fill in the letter of the best choice.

❶ Abby marked the starting and ending positions of an object. Then she measured the distance between to find out the distance the object traveled. What else does she need to know to find the speed of the object?

Ⓐ its mass
Ⓑ its volume
Ⓒ the direction the object moved
Ⓓ the time it took to move the distance

❷ Abe and Kess biked from the library to the school. They left the library at the same time. Abe arrived 5 minutes after Kess. Which is **true**?

Ⓕ They biked at the same speed.
Ⓖ Kess biked at a slower speed than Abe.
Ⓗ Kess biked at a faster speed than Abe.
Ⓘ Abe biked at a slower speed than Kess.

❸ Which is **true** of an object in motion?

Ⓐ Its position changes.
Ⓑ Its direction changes.
Ⓒ Its velocity changes.
Ⓓ Its speed changes.

❹ What do you need to know about an object's motion to express its velocity?

Ⓕ speed of travel and direction
Ⓖ original position and new position
Ⓗ distance traveled and original position
Ⓘ distance traveled and time it took to travel the distance

❺ Jen pushed four toy cars for one meter, and recorded the time it took them to travel the entire meter.

Car	Time	Distance
A	19 seconds	1 meter
B	20 seconds	1 meter
C	15 seconds	1 meter
D	23 seconds	1 meter

Which car had the fastest speed?

Ⓐ A
Ⓑ B
Ⓒ C
Ⓓ D

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