Activity 4

Analyze Like a Scientist

Basics of Speed

Think of a time when you were moving very quickly. Maybe you were riding in a car on the highway. Have you ever been stuck in a traffic jam? If you have, you remember that your car was moving very slowly. Objects move at different speeds around us all the time. **Read** the text and **look** at the image to learn more about speed. Then, **write** and **draw** your definition of speed.

Basics of Speed

Speed is a measurement of how fast something is moving. Speed measures the distance that an object travels over time. The speed of an object is the same no matter which direction it moves. If you move 5 meters backward every second or 5 meters forward, your speed is still 5 meters per second. Speed is displayed in units of distance over time. Therefore, to calculate an object's speed, divide the distance it travels by the time it takes to travel there. Some common units of speed are meters per second (m/sec) and kilometers per hour (km/hr or kph).

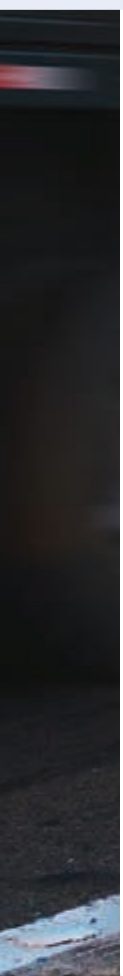
Traffic Sign

Basics of Speed, *continued*

To compare the speed of one object to the speed of a second object, measure the distance both objects travel in a given period of time. The object that travels the greater distance in the same amount of time is moving at a greater speed. If one runner travels 6 kilometers in 1 hour and a second runner travels 9 kilometers in 1 hour, the second runner is moving at a greater speed.

Another way to compare speed is to see which object moves a given distance in the smaller amount of time. Imagine two cars racing 1,000 meters. The car that finishes in less time is faster. It has the greater speed.

Speed is defined as distance per unit of time. We often see speed in units of kilometers per hour. Consider a car that travels 90 kilometers per hour. This car is faster than a car that travels 60 kilometers per hour.



Speed is . . .

What Is the Relationship between Speed and Kinetic Energy?

Activity 5

Investigate Like a Scientist

Hands-On Investigation: Racing Downhill

Consider what you have learned about speed and energy so far. In your last investigation, you changed the size of the ball that you rolled down a ramp. In this investigation, you will use model trucks to measure the speed and kinetic energy of objects moving down a cardboard tube at various angles, or inclines. You will measure the distance a paper cup moves when your truck rolls down the tube at each angle and into the cup.

Make a Prediction

How do you think kinetic energy will change with the angle of the tube?

How will the cup measure kinetic energy?

What materials do you need? (per group)

- Toy trucks
- Cardboard paper towel tube
- Paper cup, 360 mL
- Scissors
- Several books
- Metric ruler
- Removable sticky note flags
- Stopwatch

HANDS-ON INVESTIGATION

Life Skills **I can work to meet expectations.**

What Will You Do?

1. With your partner, record the number of books used to set up your tube in the column Number of Books.
2. Roll your truck down the tube, use the stopwatch to keep time, and record how long the truck takes to travel to the end of the tube in the column Time to Travel.
3. Add a book to change the incline angle and repeat the steps. Add a second book and repeat the steps again.
4. Now, repeat each incline, but place a cup at the bottom of the tube.
5. Measure the distance the cup moves after each time the truck rolls into it.

Number of Books	Time to Travel	Distance the Cup Traveled

Think About the Activity

What happened to the speed of the truck when the incline increased?

How did the results of the speed test compare to the results of the kinetic energy test?

What conclusion can you draw about the relationship between speed and kinetic energy, based on this experiment?