

Names: \_\_\_\_\_

Hot Wheels and Human MPH Activity

Question: Is a human faster than a Hot Wheels car?

Introduction:

Hot Wheels cars have low friction wheels. When traveling for short distances on level, smooth surfaces, a hot wheels car will maintain an approximately constant velocity. In this activity you and a friend will collect data to determine the speed of a person and a Hot Wheels car expressed in various units. A unit provides a common standard by which people can compare one object's speed to another object's speed.

Things you will need:

A Partner, Hot Wheels Orange Track, Masking tape, Hot Wheels Car, Measuring Tape, Stop Watch

Procedures:

Start by connecting two or more orange track pieces to create a ramp, also called an inclined plane, upon which a Hot Wheels car can gain speed. Another way of saying 'gain or lose speed' is accelerate. You can use masking tape to attach the track to the lower end of a wall and let the car roll onto the floor. Be sure that the floor at the bottom of the ramp is smooth and level. You will need a distance of 1 meter is at the bottom of the ramp without any obstructions to stop the car from rolling freely. You can measure 1 meter on the floor by using a measuring tape and pieces masking tape to mark the starting and ending points.

One member of your partnership will release the car from the top of the ramp while the other will clock the time required for the car to travel 1 meter upon reaching the bottom of the ramp. Start your stop watch when the car leaves the bottom of the ramp and stop your watch when the car has completed a distance of 1 meters. Repeat this process twice more. Each repetition of an experiment is called a 'trial'. Write down the resulting time from each trial below:

Trial 1: \_\_\_\_\_ sec.                  Trial 2: \_\_\_\_\_ sec.                  Trial 3: \_\_\_\_\_ sec.

Average the three trial times together:  $(\text{Trial 1} + \text{Trial 2} + \text{Trial 3})/3 =$  \_\_\_\_\_ sec.

Report speed in meters per second by dividing 1 meter by the average time in seconds.

$$(1 \text{ meter})/(\text{average trial time}) = \text{_____ meters/second}$$

Convert the Hot Wheels Car's average speed in meter/second to miles per hour which is most commonly abbreviated as mph. You will need to use fraction multiplication and the following conversion factors:                  1 mile = 1609 meters                  1 hour = 3600 seconds

Hot Wheels Car Speed: \_\_\_\_\_ mph

Hot Wheels cars typically are built on a 1:64 scale. If the car was scaled to life size, what would be the speed reached by the car in meters/second and mph? You can answer this question by multiplying the m/s and mph you already determined for the actual Hot Wheels car by the number 64.

Actual \_\_\_\_\_ m/s x 64 = Life Size \_\_\_\_\_ m/s

Actual \_\_\_\_\_ mph x 64 = Life Size \_\_\_\_\_ mph

Determine the average speed of a human being. Find a level surface more than 5 meters in length upon which it is safe to walk or run. Use the measuring tape and masking tape to mark the starting and ending points of the 5 meters. Make certain the surface is free of obstructions and that you are wearing running or walking shoes.

One member of your partnership will run or walk (your choice) 5 meters while the other will clock the time. Start your stop watch when the person crosses the first marker and stop your watch when the person moving crosses the final marker. In order to accurately measure average speed, it is a good idea to begin walking or running slightly before reaching the first marker tape and to continue slightly farther after reaching the ending marker tape. Repeat this process twice more. Write down the resulting time from each trial below:

Trial 1: \_\_\_\_\_ sec.                      Trial 2: \_\_\_\_\_ sec.                      Trial 3: \_\_\_\_\_ sec.

Average the three trial times together: (Trial 1 + Trail 2 + Trial 3)/3 = \_\_\_\_\_ sec.

Report speed in meters per second by dividing 1 meter by the average time in seconds.

(5 meters)/(average trial time) = \_\_\_\_\_ meters/second

Convert the human's average speed in meter/second to miles per hour which is most commonly abbreviated as mph. You will need to use fraction multiplication and the following conversion factors:

1 mile = 1609 meters

1 hour = 3600 seconds

Human Speed: \_\_\_\_\_ mph

Which was faster? (circle one)                      Human                      Actual Hot Wheels Car

The circumference of the earth is about 25,000 miles. How many days would it take for the person, at the average speed determined here, to travel this distance by foot? How many days would it take a Hot Wheels Car?

The earth is on average 93,000,000 miles from the sun. How many years would it take for the person, at the average speed determined here, to travel this distance by foot? How many years would it take the Hot Wheels car?