

These pages are taken from the
G4 "Relating Speed and Energy" journal.



Speed is how fast something moves

Speed is a measure of how fast something moves. If an object goes a long distance in a short time, it has a fast speed. A ball, a surfer, or a cheetah all have more energy when they are moving fast than when they are moving slow or standing still.



To calculate speed, you divide the distance something travels by the time it took to do the traveling. If this surfer moves ten meters in one second, he is moving 10 meters per second.

$$\text{speed} = \frac{\text{distance traveled}}{\text{time}}$$

$$\text{speed of surfer} = \frac{10 \text{ meters}}{1 \text{ second}} = 10 \text{ meters per second}$$

How fast can a cheetah run?

The cheetah can run faster than any other animal. It can run at speeds of up to 75 miles per hour! This is as fast as a car drives on the freeway. When the cheetah is running at these high speeds, it has a lot of energy! Because it takes so much effort to run fast, a cheetah can only run at its top speed for a little while.



We can measure speed in any units of time and distance. In the table below, all the different units are describing the same speed.

The Top Running Speed of a Cheetah (all these speeds are the same)

75 miles per hour

110 feet per second

33.5 meters per second

120 kilometers per hour



An object's speed is related to its energy

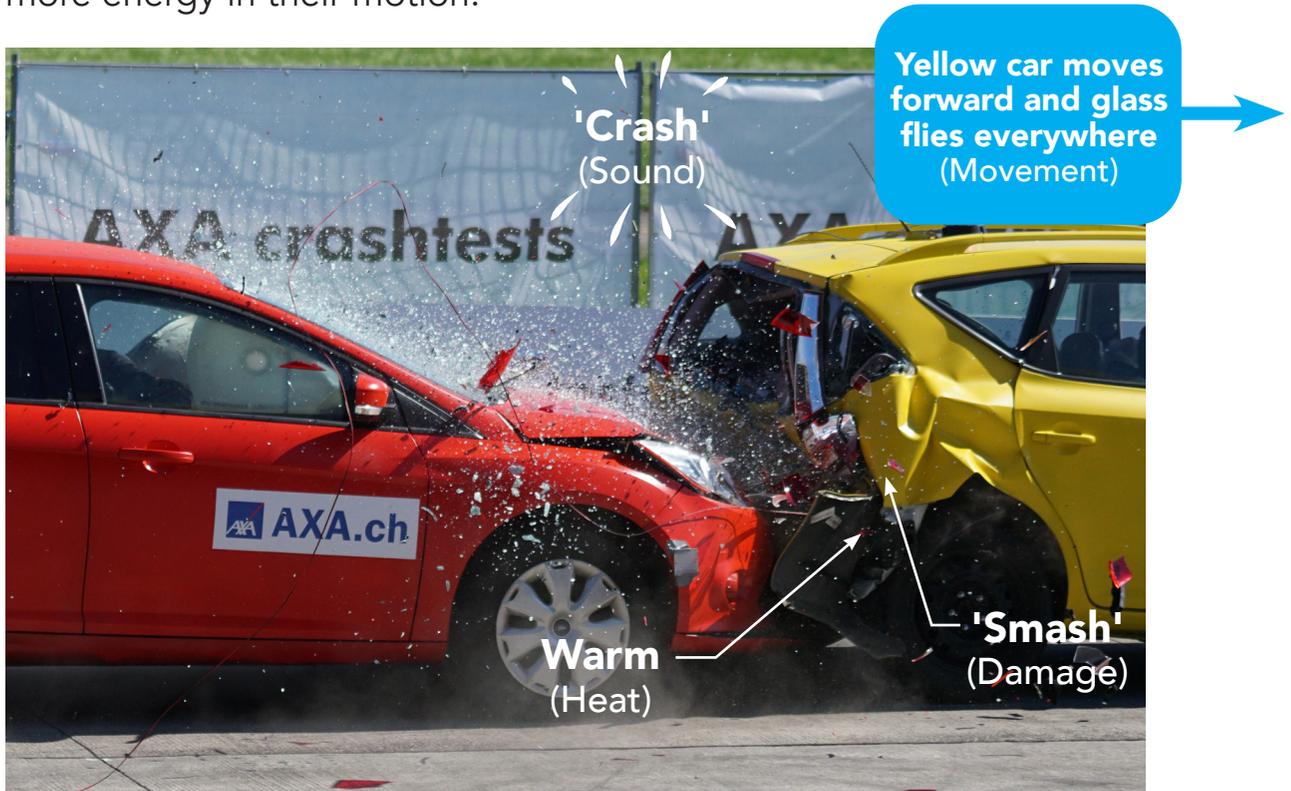
At a glance, you can tell if a car is moving fast or slow. When you ride your bicycle, you can tell how fast you are moving by how fast you are whizzing by objects around you. You can feel the strength of the wind in your face. You feel tired from pedaling so fast!

Which bicyclist has more energy in their motion?



Speed is related to energy

The faster an object moves, the more energy that object has in its motion. Sometimes we cannot see evidence of the energy in motion until something happens, like a collision. To **collide** means to crash together. A collision can cause **damage**, make a crashing **sound**, create **heat** and make other objects **move**. Heavier objects have more energy in their motion.



Energy is transferred from one car to the other in the collision. The crash bends metal, creates heat, breaks glass and pushes the parked car forward.



We can see, hear and feel energy

Whenever something is moving, that object carries energy in its motion. We call this **motion energy**. Motion energy can be useful to get work done such as driving a car from one place to another. Motion energy can also be harmful or cause damage such as in the case of a car crash.

Observe the effects of motion energy

Read the passages and underline things that can be seen, heard or felt that show us evidence of the energy in motion.



A baseball is lying still on the ground. The pitcher picks it up and throws the baseball. It flies through the air quickly.

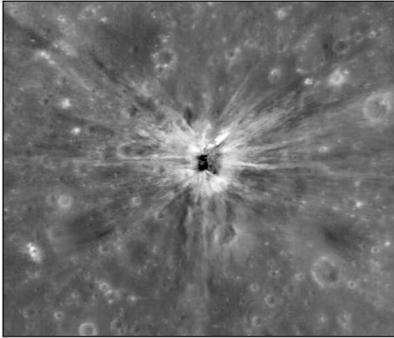


The fast moving ball lands in the catcher's glove with a loud thud. The impact kicks up a small cloud of dust. The catcher's hand moves backward from the impact when the ball is caught.





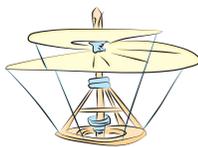
You see a quickly moving car crash into a stopped car. You hear a loud crashing sound. The car is seriously damaged where the impact occurred.



This crater on the surface of the moon was caused by an impact from a quickly moving piece of the Apollo 13 rocket during a NASA mission. The crater is 30 meters wide. Ejected rock was scattered out in a ray-like pattern.



A heavy hammer lands on the head of a nail with a loud clank. The nail goes deep into the wood. The nail is warm after impact.



Think,
Pair,
Share

How can you tell that a moving object has energy in its motion?

