

What is Motion?

Is anything really perfectly still, with no movement at all? If you have been paying attention in class you know that there is always motion happening, even if we cannot see it. Molecules and atoms are vibrating, sliding, and zooming every second of every day. Things around and in us are moving.

Reference Points

Most motion we can see with our eyes. How do we know that something is moving you ask, well it has to do with comparing it to other objects. Motion is hard to detect if you have your eyes closed, because you cannot tell if something is moving by seeing go past something else. Think about a car that has whizzed past you. You could tell that they were moving (not too fast I hope ☺) by comparing the car's movement your mailbox, driveway, your bike that is laying in the yard, or your friend's house across the street.

The object that appears to not be moving (mailboxes, bikes, driveways, ect) is what is known as a **reference point**. When we were in the hallways today, how did you know that you were moving? Well, you compared yourself to the walls, tiles, and even other classmates. Those were all reference points. They helped you to determine that you were in fact moving.

Motion is one of those things that scientists measure. They can measure on the atomic scale (like solid molecules vibrating in place) or on the larger scale (people and cars). In either situation **motion** is when an object changes position compared to a reference point.



Not all reference points have to be standing still. An example of a reference point that is moving is when you look out the window of a car and notice that you are moving faster than the car next to you. The car next to you is moving, it is just moving slower than your car. You use that other car as a reference point to determine that your car is moving.

Almost everything can be used as a reference point. The Earth, classrooms hallways, football fields, and dinner tables are full of things that you can use compare motion. Your milk cup is a reference point when determining that the bread that you threw at your little brother is in fact, MOVING. Your chair is a reference point as you run to your room because you know your mother is going to ground you for throwing the bread....tough break ☺



1. What is Motion?
2. What is reference point?
3. Give an example of something that has motion. What reference point was used to determine motion?

Speed

We know how much motion something has by measuring its speed. *Speed* is the distance an object travels divided by the time it took the object to travel that distance. I know its another formula and science is beginning to sound like math class, but remember math and science are BFFs. To calculate the speed of an object you use: **Average speed= total distance covered**

time



We use this formula to calculate the average speed of an object. One thing we know about speed is that it is always changing. Your speed moving down the hallway begins slowly, and then you find an area with no students so you increase your speed until you reach your locker, at which your speed stops. During your whole journey down the hallway your speed was constantly changing, but we can calculate your average speed by determining that your locker is 12.5 meters down the hallway and it took you 25 seconds.

$$\text{Average speed} = \frac{\text{total distance covered}}{\text{time}} = \frac{12.5 \text{ meters}}{25 \text{ seconds}} = 0.5 \text{ meters/ second}$$

So in our hallway example you were moving an average of 0.5 meters (50 centimeters) ever second. Speed can be measured in any distance and time measurements. For example when you run the track in P.E. you wouldn't want to measure your speed in centimeters per second (although the number would make you sound really fast). You would measure your average speed in meters per minute.

4. You ran 400 meters in 2 minutes. What is your speed? (SHOW WORK on all calculations!)

It is important to remember that during your run you were not going to same speed the entire time. At the beginning you were probably running really fast, but as the run went on you became tired, which caused you to slow down. The speed that you calculated in question #4 was your averages speed. Average speed takes all your movements (fast and slow) and gives you a number that you were moving overall. It will not tell you how much speed you had at the beginning of the race.



5. What is average speed?

6. How are speed and average speed different?

7. What is the average speed of a car that travels 150 km in 3 hours?

8. You went sledding over the weekend. You traveled down the 100 meter hill in 15 seconds. What is your average speed?