

Day 1 Motion

Work on your part 1 vocabulary for now.

After the bell rings we will go over the test.

Essential Question:

- How would you describe how fast an object is moving?

Supporting Questions:

- How is it possible to be accelerating and traveling at a constant speed?
- Why is it more important to know a tornado's velocity than its speed?
- [Video](#)

Speed, Velocity, and Acceleration





To describe motion accurately and completely, a frame of reference is needed.

An object is in motion if it changes position relative to a reference point.

- Objects that we call stationary—such as a tree, a sign, or a building—make good reference points.



The passenger can use a tree as a reference point to decide if the train is moving. A tree makes a good reference point because it is stationary from the passenger's point of view.

Describing Motion

Whether or not an object is in **motion** depends on the **reference point** you choose.



Relative Motion From the Plane

- The plane does not appear to be moving.
- The skydivers appear to be moving away.
- A point on the ground appears to be moving away.



Relative Motion From the Skydivers

- The plane appears to be moving away.
- The skydivers do not appear to be moving.
- The ground appears to be moving closer.

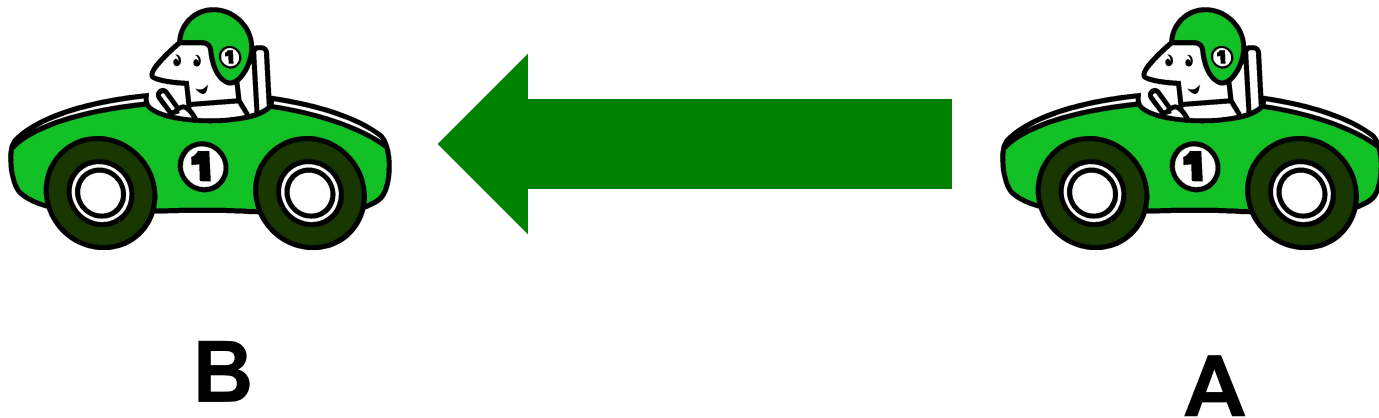
Relative Motion From the Ground

- The plane appears to be moving across the sky.
- The skydivers appear to be moving closer.
- The ground does not appear to be moving.

Distance

When an object moves, it goes from point A to point B - that is the **DISTANCE** it traveled. (SI unit is the meter)

Distance is how much ground an object has covered during its motion.



Displacement

Knowing how far something moves is not sufficient. You must also know in what direction the object moved.



Displacement is how far out of place the object is; it is the object's overall change in position.

Speed

Calculating Speed: If you know the distance an object travels in a certain amount of time, you can calculate the speed of the object.

What is instantaneous speed?

Instantaneous speed is the velocity of an object at a certain time.




Speed = Distance/time

Average speed = Total distance/Total time

2.1

Velocity

- Speed describes only how fast something is moving.
- To determine direction you need to know the velocity.
- **Velocity** includes the speed of an object and the direction of its motion. 

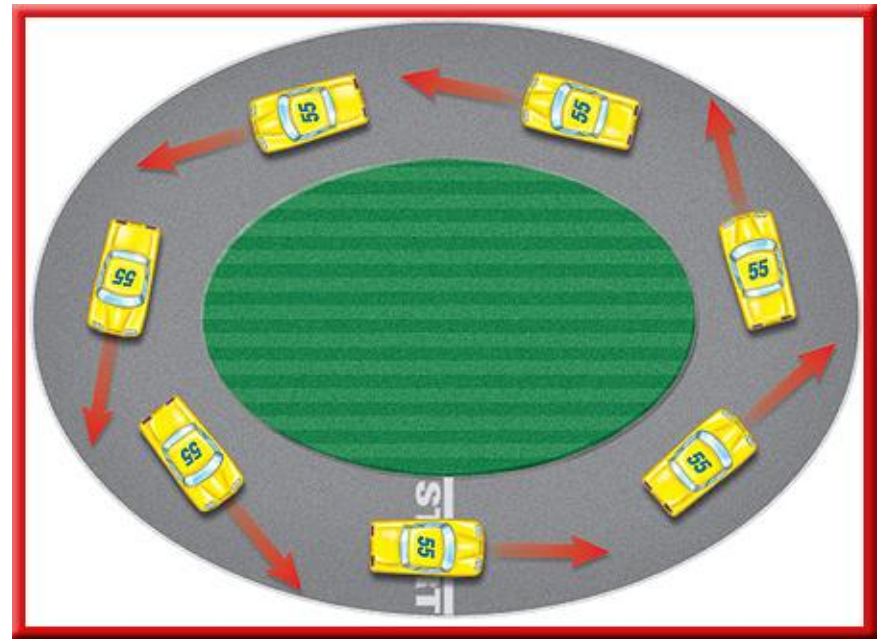


2.1

Velocity

Because velocity depends on direction as well as **speed**, the velocity of an object can change even if the speed of the object remains constant.

The speed of this car might be constant, but its velocity is not constant because the direction of motion is always changing.



Speed v. Velocity

1. How are speed and velocity similar?

They both measure how fast something is moving

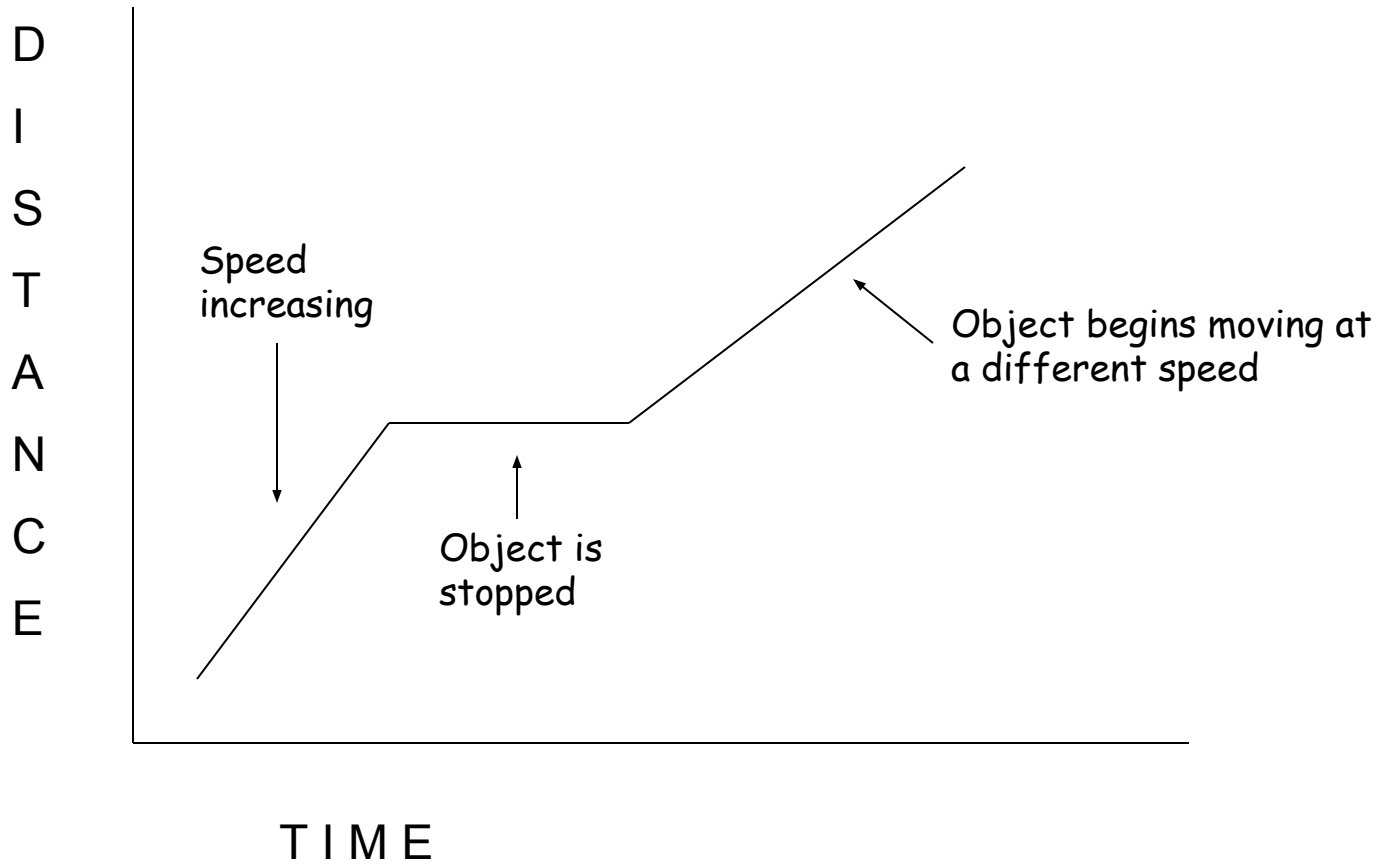
2. How are speed and velocity different?

Velocity includes the direction of motion and speed does not (the car is moving 5mph East)

3. Is velocity more like distance or displacement? Why?

Displacement, because it includes direction.

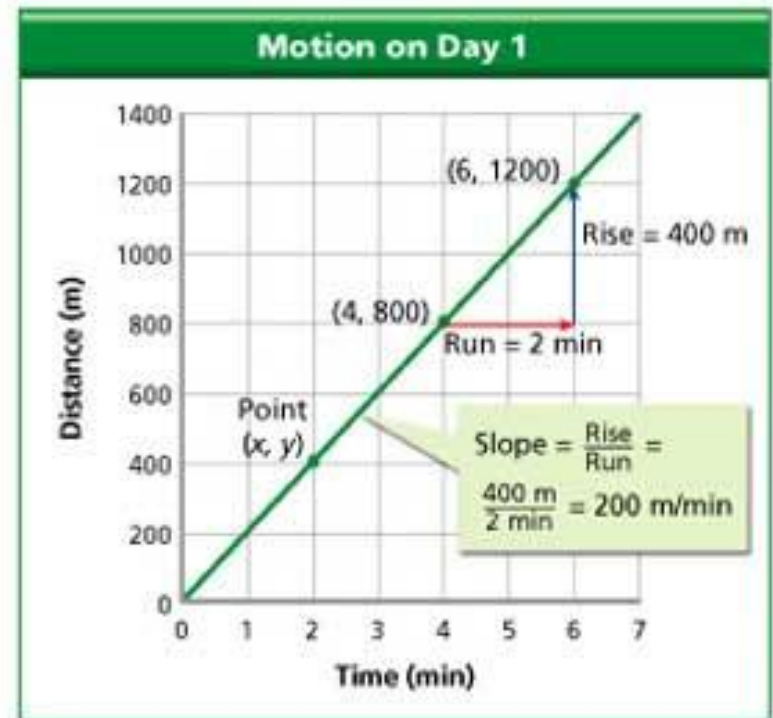
Graphing Speed



The steepness of a line on a graph is called slope.

- The steeper the slope is, the greater the speed.
- A constant slope represents motion at constant speed.

Using the points shown, the rise is 400 meters and the run is 2 minutes. To find the slope, you divide 400 meters by 2 minutes. The slope is 200 meters per minute.



Formula for Calculating Speed

$$\text{Speed} = \text{Distance} \div \text{time}$$

Introduction to speed

How to use this chart: Cover the unit (S, d or t) you are looking for with your hand. The remaining units will either be multiplied or divided as the chart shows.



For Example: If you are looking for time (t) cover the t with your hand. The remaining units are d over S. You will divide d into S as the chart shows.

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

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

distance = time \times speed

Quizlets

[Understanding Speed & Velocity](#)

[Calculating Speed & Velocity](#)

End of Day 1

Homework: Calculating Speed Practice Problems