Motion and Speed Guided Notes

**Position**

* POSITION = \_\_\_\_\_\_\_\_\_\_\_\_(can be a place or object)
* When you describe position, you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the location with another object or place.
* The location you compare your object or place’s position to is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Ex: Santiago, Chile is about 3000 km SW of Brasilia, Brazil
* You can also describe position by using coordinates of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Ex: you can plot Santiago and Brasilia on a map using longitude and latitude coordinates.

**Motion and Relative Motion**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = change of position over time.
* Can be vertical or horizontal, or both
* How quickly or slowly the position changes depends on the object’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* How motion is observed depends upon the observer’s point of view.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= the motion of an object relative to an observer
	+ Ex: A bus driver would say the stop sign he is approaching is changing position; a person standing on the sidewalk waiting for the bus would say the bus is changing position.

**Lets Review**

1. What information do you need to describe an object’s location?
2. Describe how your position changes as you jump over an object.
3. Give an example of how the apparent motion of an object depends on the observer’s motion.

**Speed**

* Position can change at different rates.
* You can describe change in position in two ways: in terms of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Let’s say someone asks you how far it is from Bailey to Birkdale.
* If you describe using distance, you would say about 4 miles.
* When you describe with time, you have to take TWO things into account: the distance it takes to get there, and the person’s speed.
* SPEED = the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ something moves in a given amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The greater the speed an object has, the faster it changes position.

**Calculating Speed**

* To calculate speed, you need to know both distance and time measurements.
* Two bikes start at the same point at the same time.
* After 1 second, the first bike has traveled 4 meters, and the second bike has traveled only 2 meters.
* Because the first bike traveled 4 m in 1 sec, it has a speed of 4meters per second. The second bike has a speed of 2m/s.
* If each bike continues moving at the same speed as before, then after two seconds the first bike would have traveled 8 meters. The second bike would have traveled 4 meters.
* How far will each bike have traveled in 5 seconds? What formula did you use to figure that out??

**Calculating Speed**

* Speed = \_\_\_\_\_\_\_\_\_\_\_\_ S = d

 t

* The formula shows how distance, time, and speed are related.
* Remember, if two objects travel the same distance, the object that took a shorter amount of time will have the greater speed.
* So that means an object with a greater speed will travel a \_\_\_\_\_\_\_\_\_\_\_ distance in the same amount of time than an object with a lower speed will.
* The standard unit for speed is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ per second (m/s)
* It can also be given in kilometers per hour (km/h)
* In the US, we say miles per hour (mph)

**Speed Sample Problem**

* A wheelchair racer completes a 100-meter course in 20 seconds. What is his speed?
* Just like in math, we are going to use KQS (Know-Question-Solve)
1. What do we know?
2. What do you want to know?

Now, write the formula, then substitute the values you know into the formula. Calculate and simplify, and don’t forget your units of measure.

**Speed Practice Problem**

1. A man runs 200 m in 25 s. What is his speed?
2. If you travel 100 m in 50 s, what is your speed?

**Average Speed**

* Speed is NOT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!
* Speed from moment to moment (at any given time) is called instantaneous speed, and is hard to calculate, so we calculate average speed over a certain distance.
* Ex: a runner has different speeds on each lap he runs in a 1600m (4 lap) race: 83 s, 81 s, 79 s, 77 s.
* Calculate the total time (320 s) for the entire distance of 1600 m. The average speed would be 1600m/320s = 5.0 m/s

**Velocity**

* The direction of motion can be as important as speed.
* Velocity = speed in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Ex: Walking EAST at a speed of 3m/s
	+ A person walking NORTH at a speed of 3m/s would have the same speed but a different velocity

To determine velocity you need to know speed and direction. A change in either \_\_\_\_\_\_\_\_\_\_\_\_ OR \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (or both) changes the velocity!

**Distance Time Graphs**

* Using a graph that plots the distance against time is the best way to show motion of an object. This is called a distance-time graph.
* \_\_\_\_\_\_\_\_\_\_\_\_ is ALWAYS on the horizontal axis (x-axis) and \_\_\_\_\_\_\_\_\_\_\_\_ is ALWAYS on the vertical axis (y-axis)



* As an object moves, the distance it travels \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with time. This can be seen as a climbing or rising line on the graph.
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(or horizontal) line shows an interval of time where the speed is 0 m/s.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lines show intervals where speed is greater than intervals with less steep lines.
* Slope is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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