# Unit 5.1: Motion, Speed, and Velocity

**Notes for/from class**

**Further Reference: 11.1 Observing Motion**

**MOTION**

1. Motion is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_relative \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Frame of Reference is a system used \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Distance is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Displacement is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Displacement must always include \_\_\_\_\_\_\_\_\_\_\_\_\_
4. If you run around a 400m track, what is your traveling distance?
5. If you run around a 400m track, what is your traveling displacement?
6. Scalar is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Vector is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. EX: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Distance is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Displacement is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**VECTOR TERMS**

1. Part \_\_\_\_\_\_\_\_\_\_\_\_\_\_ arrow is the \_\_\_\_\_\_\_\_\_\_ of a vector
2. Part \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ arrow is the \_\_\_\_\_\_\_\_\_\_\_ of a vector
3. When adding vectors, we always put them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for as many vectors as we have
4. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the result of the vector \_\_\_\_\_\_\_\_\_\_\_\_, and is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ drawn from the head of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the tail of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Vector Addition: Because velocities include magnitude and direction combining 2 different velocities depends on their \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_
   1. Can occur in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Can occur \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to each other
   3. (HONORS) For vectors at right angles to each other, we use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to find the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      1. \_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_

**Notes for/from class**

**PRACTICE:**

Find the resultant vector when adding 5m north and 22m south.

(HONORS) Find the resultant vector when adding 35km south and 50km west.

**SCALAR VS VECTOR**

1. Scalar (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Vector (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_AND \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**SPEED VS VELOCITY**

1. Speed is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ includes a direction
2. Velocity is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Includes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Speed = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ / \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Simply \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of velocity
4. Velocity = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ / \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Speed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**VELOCITY Equation**

**SPEED VELOCITY**

Equation in Equation in Equation in Equation in

Words Symbols Words Symbols

1. What are the SI units for:

**Notes for/from class**

* 1. Velocity (and speed) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_)
  2. Displacement (and distance) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(\_\_)
  3. Time \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_)

**MORE VELOCITY**

1. Speed has no \_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_
2. A vector is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. By convention, Positive velocity is \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_
4. By convention, Negative velocity is \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_

**TWO KINDS OF VELOCITY**

1. Average velocity is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. What is a real world example?

WE WILL ALMOST ALWAYS CALCULATE AVERAGE SPEED.

1. Instantaneous Speed is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. What is a real world example?

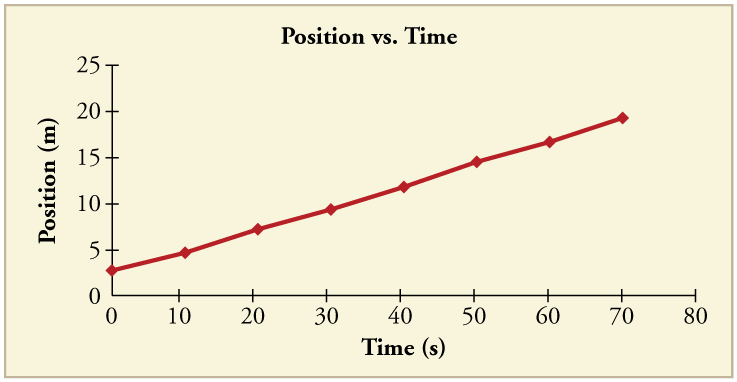
**Practice Problems** Write the equation, Show your work, Include units!

1. What is the velocity of a commercial jet which travels from New York City to Los Angeles (4800km) in 6 hours?
2. What is the velocity of a bike that travels 355 meters in 103.7 seconds?
3. A train travels 100km/hr for 2 hours. What distance has it traveled?

# Unit 5.2: Position vs Time Graphs: Guided Fill in Notes

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be studied using a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vs\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ graph
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is on the vertical axis (it can also be labeled \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is on the horizontal axis
2. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the line indicates the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the object.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be calculated by finding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**So let’s work one out.**

1. Choose 2 points: one to start and one to end with

Y2 = X2 =

Y1 = X1 =

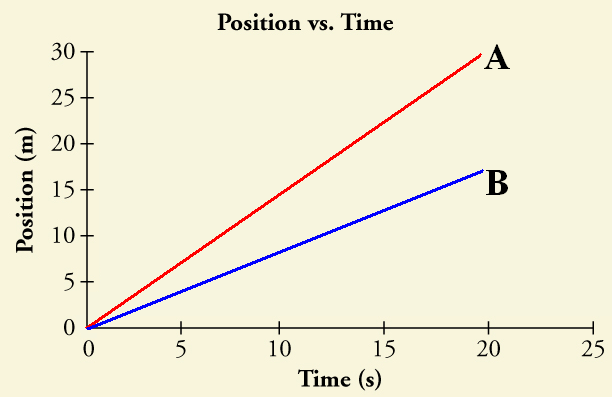
1. Calculate the change between the points.

Difference in Position (Y) =

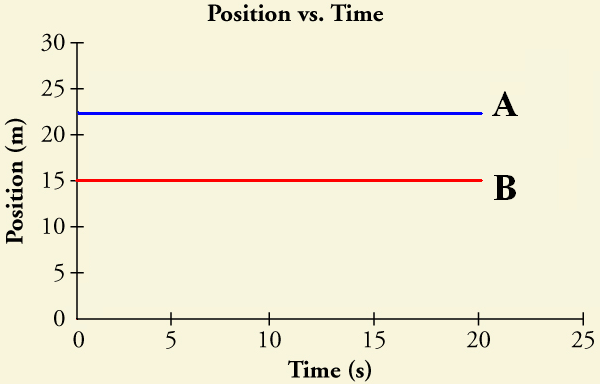
Difference in Time (X) =

1. Calculate for Slope = Position / Time
2. And remember, SLOPE = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

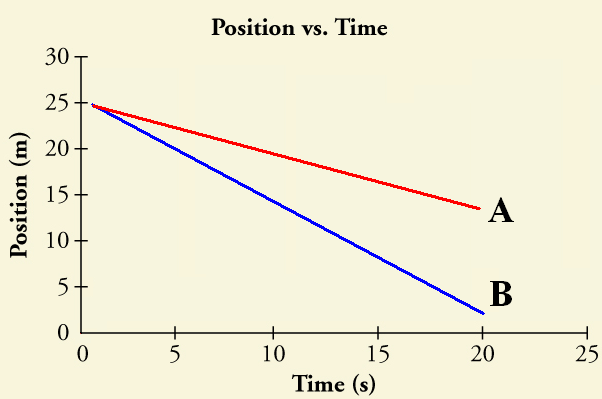
**DIFFE RENT SLOPES MEAN DIFFERENT THINGS**

***POSITIVE SLOPE:***

1. A POSITIVE slope indicates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Positive velocity means it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The greater the slope, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The less the slope, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. On the graph to the right, which has a greater velocity?

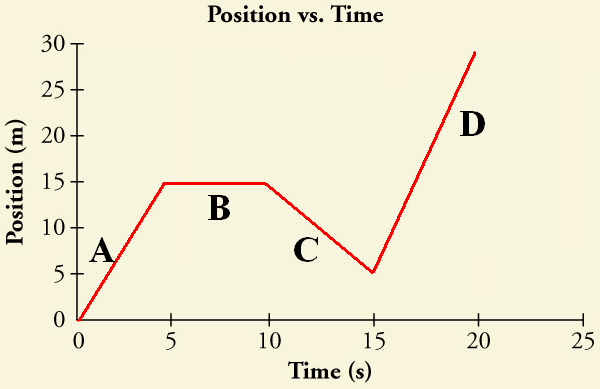
***HORIZONTAL (ZERO) SLOPE:***

1. ZERO slope indicates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. ZERO slope means that the line is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. On the graph to the right, which has a greater velocity?

***NEGATIVE SLOPE:***

1. A NEGATIVE slope indicates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Negative velocity means the object is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. On the graph to the right, which has a greater negative velocity?

***PUTTING IT ALL TOGETHER:***

1. **** So what is happening at each of these positions on the graph to the right?

What is happening? Numbers/Units

* 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Unit 5.3: Momentum (HONORS ONLY)

**Notes for/from class**

**Momentum**

1. Momentum is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. If an object is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. An object with \_\_\_\_\_\_\_ of momentum will be \_\_\_\_\_\_\_\_\_ to stop
   3. An object with \_\_\_\_\_\_\_ of momentum will be \_\_\_\_\_\_\_\_\_ to stop
2. Momentum equation:

In words In symbols

Words symbols

1. The SI unit for momentum is \_\_\_\_\_\_\_\_\_\_\_\_\_
2. Because momentum is based on \_\_\_\_\_\_\_\_\_\_\_\_\_, the momentum of an object \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice Problems:** Include a formula. Show your work. Include units.

1. Calculate the momentum of a 3kg ball that is moving east at 12m/s.

**conservation of Momentum**

1. Law of Conservation of Momentum is :
   1. The total momentum of a system cannot \_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_
   2. The law of conservation of momentum applies anytime \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. We will always assume perfect physics classroom scenarios for this to work. The 3 assumptions are:

**Notes for/from class**

* 1. 1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. 2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. 3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Conservation of Momentum Equation:**

M1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ M2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

V1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ V2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice Problems:** Include a formula. Show your work. Include units.

1. A 3kg ball is traveling at 8m/s. If it hits an empty bottle, with a mass of 12kg, what will be the velocity that the bottle travels assuming the ball stops on impact and all momentum is transferred?

# Unit 5.4: Acceleration and Gravity

**Notes for/from class**

**Further Reference: 11.2 Acceleration and 12.2 Gravity**

**SCALAR VS VECTOR**

1. Scalar (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Vector (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_AND \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Acceleration and Motion**

1. Acceleration is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be caused by:
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      1. Example: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      1. Example: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      1. Example: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. For acceleration to be zero, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ cannot be changing

Q1 – If I were to drive around a circular race track at a constant 60km/hr, am I accelerating or not? Explain why.

**ACCELERATION EQUATION**

In words In symbols

1. What are the SI units for:
   1. Acceleration\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_)
   2. Time \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_)
   3. Vf (final velocity) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_)
   4. Vi (initial velocity) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_)
2. If the acceleration is small, the velocity is increasing \_\_\_\_\_\_\_\_\_\_\_

**Notes for/from class**

1. If the acceleration is large, the velocity is increasing \_\_\_\_\_\_\_\_\_\_\_
2. Positive acceleration means an object is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Negative acceleration means an object is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Negative acceleration is also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice Problems**

(write the equation, show your work, include your units)

1. You are driving from school home and your velocity goes from 10m/s to 40m/s in 5 seconds. What is your acceleration?
2. If a football is thrown from rest with an acceleration of 8.5m/s2 and had a final velocity of 25m/s. How long was the football accelerating?

**GRAVITY AND ACCELERATION**

1. Gravity is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Acceleration due to gravity is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. A vacuum is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. When not in a vacuum, air resistance will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a falling object

**Universal Gravitation**

1. All objects in the universe exert a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on every other object in the universe.
2. The gravitational force of gravity between two objects depends on:

1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: As the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

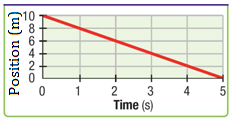
increases, the gravitational force \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: As the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

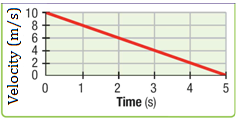
increases, the gravitational force \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Unit 5.5: Velocity vs Time Graphs

1. Acceleration is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The vertical axis (\_\_\_\_) will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. The horizontal axis (\_\_\_) will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Slope of a Velocity vs Time is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



1. Does the graph to the right represent velocity or acceleration?
   1. How can you tell?



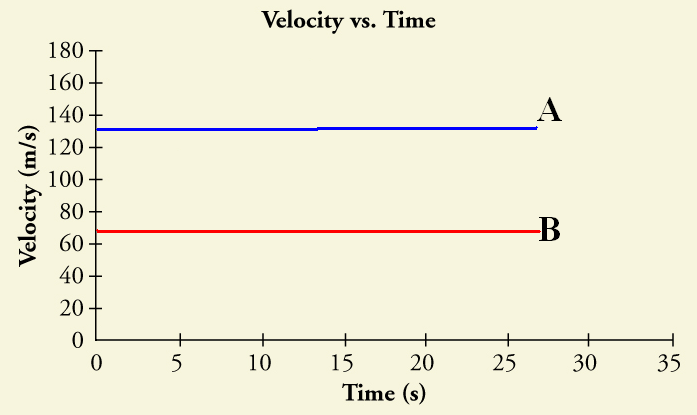
1. Does the graph to the right represent velocity or acceleration?
   1. How can you tell?
2. A velocity vs time graph shows \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Any slope shows us \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DIFFE RENT SLOPES MEAN DIFFERENT THINGS**

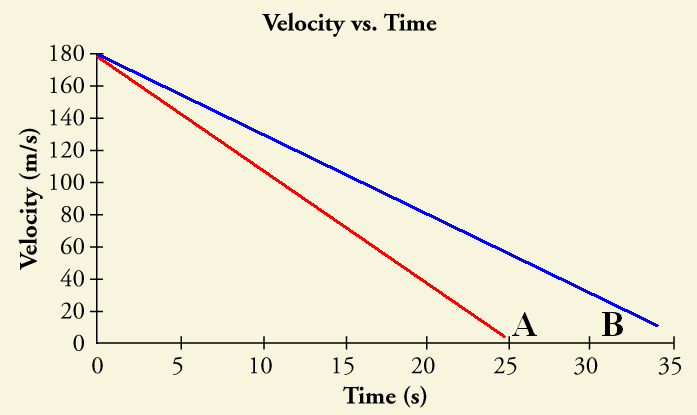
***POSITIVE SLOPE:***

1. A POSITIVE slope indicates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Positive acceleration means it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. On the graph to the right, which has a greater acceleration?

***NO SLOPE:***

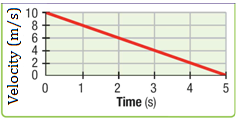
1. A slope of ZERO indicates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. This just means that there is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Slope of zero = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. On the graph to the right, which has a greater acceleration?
3. On the graph to the right, which of the two lines have the greater velocity?

***NEGATIVE SLOPE:***

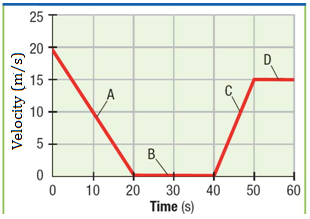
1. A NEGATIVE slope indicates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. NEGATIVE acceleration means it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Deceleration = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. On the graph to the right, which has a greater deceleration?

**RECAP**

1. What does a positive slope indicate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What does a negative slope indicate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What does a perfectly horizontal line indicate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***CALCULATING SLOPE:***

1. What is the formula for acceleration?
2. What is the velocity of the object at 1 second?
3. What is the velocity of the object at 4 seconds?
4. What is the acceleration of the object between 1 second and 4 seconds?
5. What do you notice about the slope and your acceleration?

**PUTTING IT ALL TOGETHER:**

1. This is a Velocity vs. Time graph, what does the slope represent?
2. What is happening at each of the following line segments?
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Calculate the acceleration for each of the following line segments:

Line A) Line B)

Line C) Line D)