



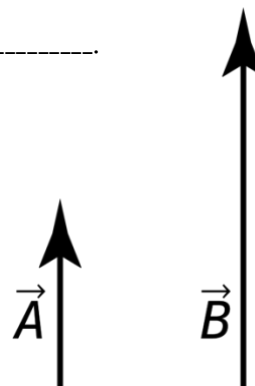
BIG PICTURE IDEAS

- #1) *Vectors*: Vectors have both _____ and _____. Scalars have _____ only.
- #2) *Uniformly Accelerated Motion (UAM)*: The Kinematics or UAM Equations can be used when the acceleration of an object is _____.
- #3) *Projectile Motion*: An object in Projectile Motion has a constant _____ in the x-direction and a constant _____ in the y-direction. On Earth, the acceleration in the y-direction is _____.
- #4) *Working with Vectors*: Often, in order to work with vectors, we need to break, or resolve, vectors into _____ by using the trigonometric functions like sine, cosine, and tangent.

Topic 1.1 – Scalars and Vectors in One Dimension

- 1) On the AP Physics 1 exam you can basically _____ significant figures. As long as you include roughly _____ in your answers.
- 2) In order to convert 1 m³ to cm³ you need to multiply 1 m³ by _____ (Include all units and numbers!).
- 3) Identify the variables in the table at right as vectors or scalars.
- 4) The vectors in the following equation $\vec{v}_f = \vec{v}_i + \vec{a}\Delta t$ are identified using _____.
- 5) The vectors in the following equation $v_{xf} = v_{xi} + a_x\Delta t$ are identified using _____.
 - a) Both are acceptable ways of identifying that variables are vectors.
 - b) The reason the variable t in the above equation does not have an x subscript is because _____.
- 6) Vectors **A** and **B** as shown to the right are different in that **B** is _____ than **A**.
You know this because the arrow illustrating **B** is longer than the arrow illustrating **A**.

<u>Variable</u>	<u>Vector or Scalar?</u>
Time	
Distance	
Displacement	
Speed	
Velocity	
Acceleration	



Topic 1.2 – Position, Velocity, and Acceleration

- 1) Displacement is the _____ distance from where the object started to where it ended.
- 2) Displacement is the _____ in position of an object.
- 3) The distance traveled by an object is always _____ the magnitude of its displacement.
- 4) The equation for displacement is:
- 5) The equation for average speed is:

Topic 1.2 – Position, Velocity, and Acceleration (continued) 

- 6) The equation for average velocity is:
 - a) If the time interval used for the above equation is very small, the resulting velocity will be _____ velocity.
- 7) The equation for average acceleration is:
 - a) If the time interval used for the above equation is very small, the resulting acceleration will be _____ acceleration.

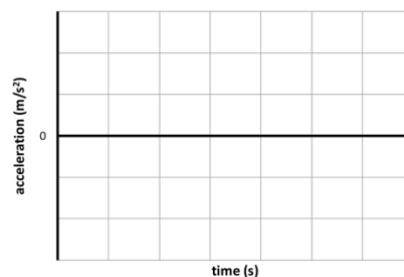
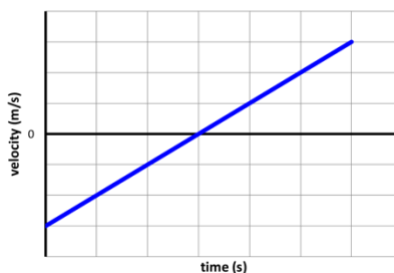
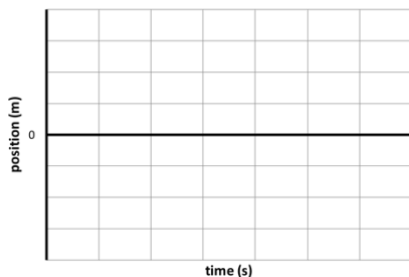
Topic 1.3 – Representing Motion 

- 1) The slope of a position vs. time graph is _____.
- 2) The slope of a velocity vs. times graph is _____.
- 3) On a velocity vs. time graph, the area between the curve and the time axis is _____.
- 4) On an acceleration vs. time graph, the area between the curve and the time axis is _____.
- 5) Area above the horizontal axis is _____.
- 6) Area below the horizontal axis is _____.
- 7) To the right are the 3 Kinematics or UAM Equations which are on the equation sheet.
- 8) The fourth UAM Equation is:
- 9) These UAM Equations assume the initial time is _____.
- 10) Assuming an initial position of zero, complete the position and acceleration as functions of time graphs for motion of an object shown by the velocity as a function of time graph below.

$$v_x = v_{x0} + a_x t$$

$$x = x_0 + v_{x0} t + \frac{1}{2} a_x t^2$$

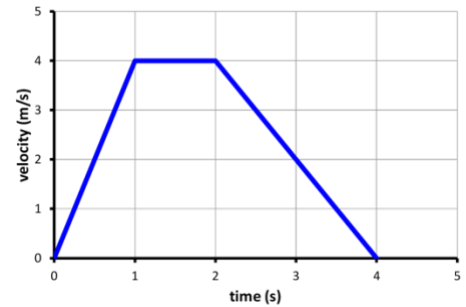
$$v_x^2 = v_{x0}^2 + 2a_x (x - x_0)$$



Topic 1.3 – Representing Motion (continued) 



11) You *cannot* use Uniformly Accelerated Motion Equations on the graph at right from 0 to 4 seconds because the acceleration is _____ from 0 to 4 seconds.

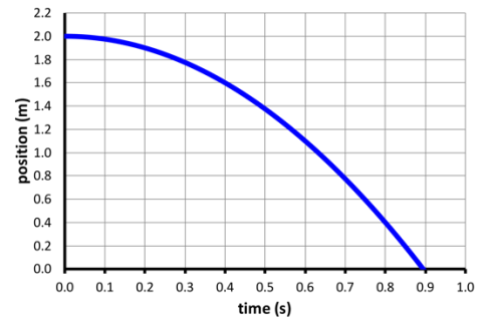


a) However, you *can* use the UAM Equations if you split the motion into three parts because the acceleration of the motion of the object is uniform from _____ to _____ seconds, _____ to _____ seconds, and _____ to _____ seconds.

b) From 1 to 2 seconds, the velocity of the object is _____ and the acceleration of the object is _____.

c) For the third part of the motion, which is from 2 to 4 seconds, the acceleration of the object is:

12) For the graph of the motion of the object shown at right



a) The velocity from 0 to 0.8 seconds is:

- i) This velocity is called an _____ velocity.
- ii) This velocity is the slope of a line drawn from (_____ s, _____ m) to (_____ s, _____ m).

b) The velocity of the object at 0.6 seconds is approximately:

- i) This velocity is called an _____ velocity.
- ii) This velocity is the _____ at 0.6 seconds.

13) When an object is near the surface of planet Earth and air resistance is _____, the acceleration of the object caused by the force of gravity is vertical, downward, and has a _____ of 9.81 m/s^2 . This is often called free fall motion and $g = 9.81 \text{ m/s}^2$.

a) 9.8 m/s^2 and 10 m/s^2 are also acceptable values to use on the AP Physics 1 exam.

i) It is recommended that you use _____ m/s^2 on the exam because that makes all the calculations easier.

b) This is a special case of _____ where the acceleration of the object is always known.

c) The velocity of the object at the top of its path in the y-direction is _____.

d) A heavy object and a light object are dropped at the same time from the same height above the ground. Which object reaches the ground first? _____.

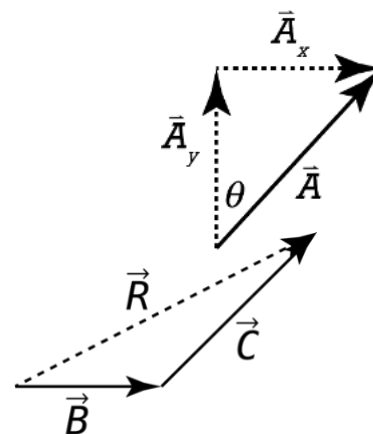


Topic 1.4 – Reference Frames and Relative Motion

- 1) The description of the motion of an object changes depending on the reference frame of the _____.
- 2) Combining the motion of an object and the motion of an observer in a reference frame involves _____ addition.
 - a) The AP Physics 1 exam restricts relative motion problems to _____ dimensional motion.
- 3) The acceleration of an object is independent of reference frame as long as they are all _____ reference frames.

Topic 1.5 – Vectors and Motion in Two Dimensions

- 1) The y-component of vector **A** at right is _____.
- 2) The reason we cannot use the Pythagorean theorem, sine, cosine, and tangent on the **B + C = R** vector addition diagram at right is because the triangle does not have a _____.



- a) In order to determine R, the _____ vector, we would need to break vector _____ into its components in the _____ and _____ directions.
- b) Draw the new vector diagram of **B + C, C, = R**.
- c) Now we are able to use the Pythagorean theorem, and the equations for sine, cosine, and tangent because the vector addition diagram triangle *does* have a _____.
- 3) When an object is in projectile motion:
 - a) Because the object is moving at a constant velocity in the x-direction, the equation we can use for the motion of the object in the x-direction is:
 - i) In the x-direction, we need to know _____ variables in order to determine the other _____ variable.
 - b) Because the object is in _____ in the y-direction, the equations we can use for the motion of the object in the y-direction are the _____ with an acceleration, on Earth, of _____.
 - i) In the y-direction, we need to know _____ variables in order to determine the other _____ variables.
 - c) The variable which is the same in both the x and y-directions is _____ because it is a _____.

Topic 1.5 – Vectors and Motion in Two Dimensions (continued) 

- d) The velocity of the object at the top of its path is _____ in the y-direction.
- e) On Earth, the acceleration of the object at the moment it is at the top of its path is _____.
- 4) All of the following examples have an initial velocity of _____ in the y-direction; a mobile phone launched horizontally, a ball rolling off a _____ table, a skydiver dropped from a plane flying with a _____ velocity.
- 5) When an object enters projectile motion at an angle which is not horizontal, often the first step is to break its _____ into components in the x and y-directions.
- 6) At the same time and from the same height above the ground, a ball is dropped and a rock is launched horizontally.
- a) Which object reaches the ground first? _____.
- b) Which object has the largest speed right before striking the ground? _____.
- 7) First a ball is dropped and then a rock is thrown vertically downward. For the first second, the change in velocity of the ball is _____ the change in velocity of the rock.
- 8) Sometimes when doing projectile motion problems, you will have to take the square root using your calculator; especially when using this equation:
- i) When taking the square root using my calculator, I need to remember to be _____.
- b) In projectile motion, assuming a constant launch speed, the launch angle which will give the largest horizontal displacement is _____.