

Competency Goal 2: The learner will build an understanding of linear motion.

Objectives

2.01 Analyze velocity as a rate of change of position:

- Average velocity.
 - Instantaneous velocity.
- >Discuss the difference!!

2.02 Compare and contrast as scalar and vector quantities:

- Speed and velocity.
- Distance and displacement.

2.03 Analyze acceleration as rate of change in velocity.

2.04 Using graphical and mathematical tools, design and conduct investigations of linear motion and the relationships among:

- Position.
- Average velocity.
- Instantaneous velocity
- Acceleration.
- Time.

$$\bar{v} = \frac{\Delta x}{\Delta t}$$

v = velocity

t = time

$$x_f = x_i + vt$$

x = position

$$x_f = x_i + v_i t + \frac{1}{2} a t^2$$

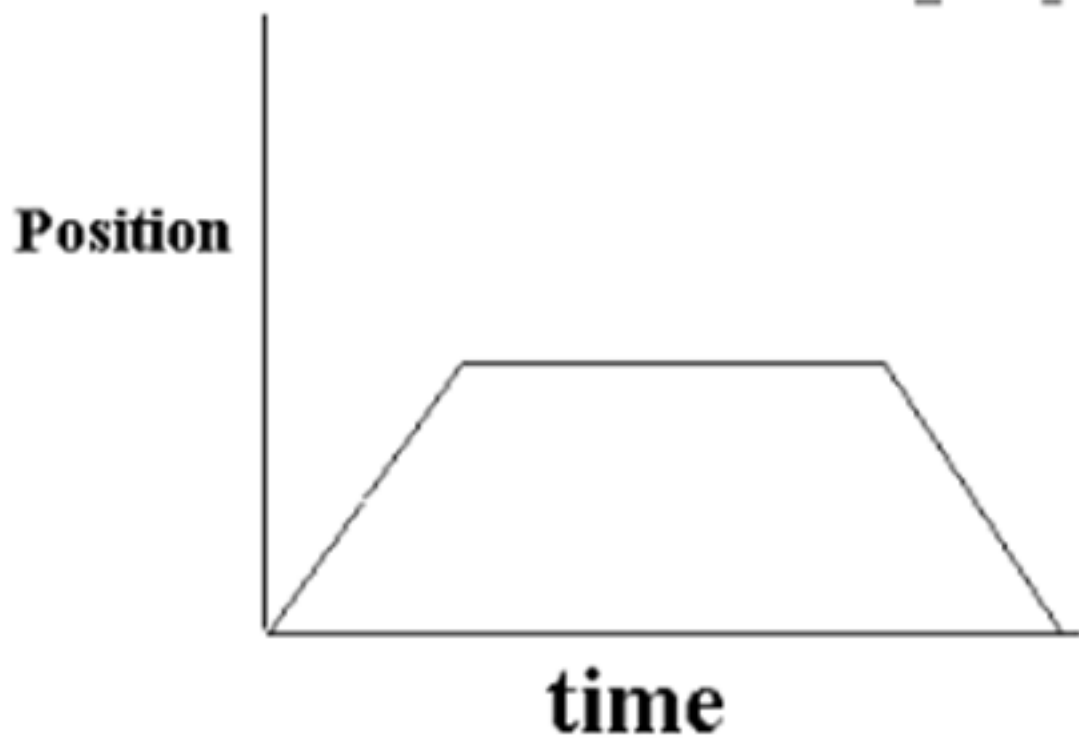
a = uniform
acceleration

$$a = \frac{\Delta v}{\Delta t}$$

$$v_f^2 = v_i^2 + 2a\Delta x$$

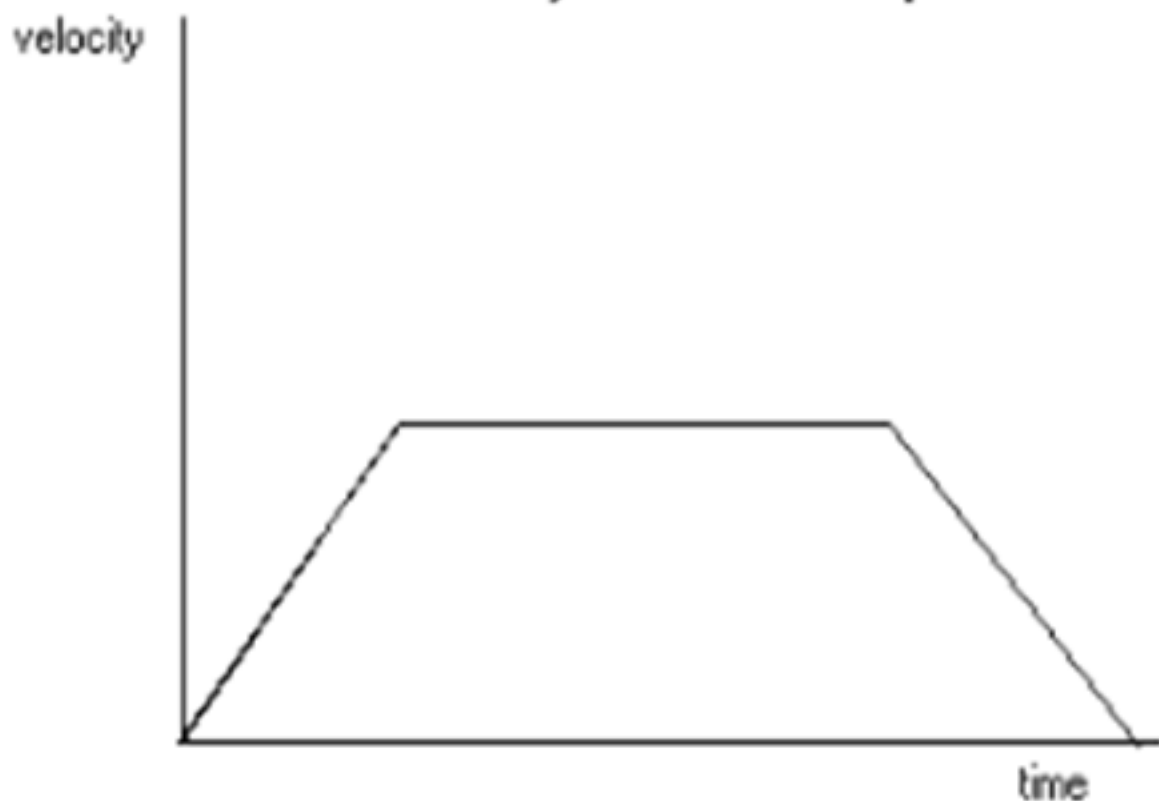
What can you determine from various graphs?

Position-time graph

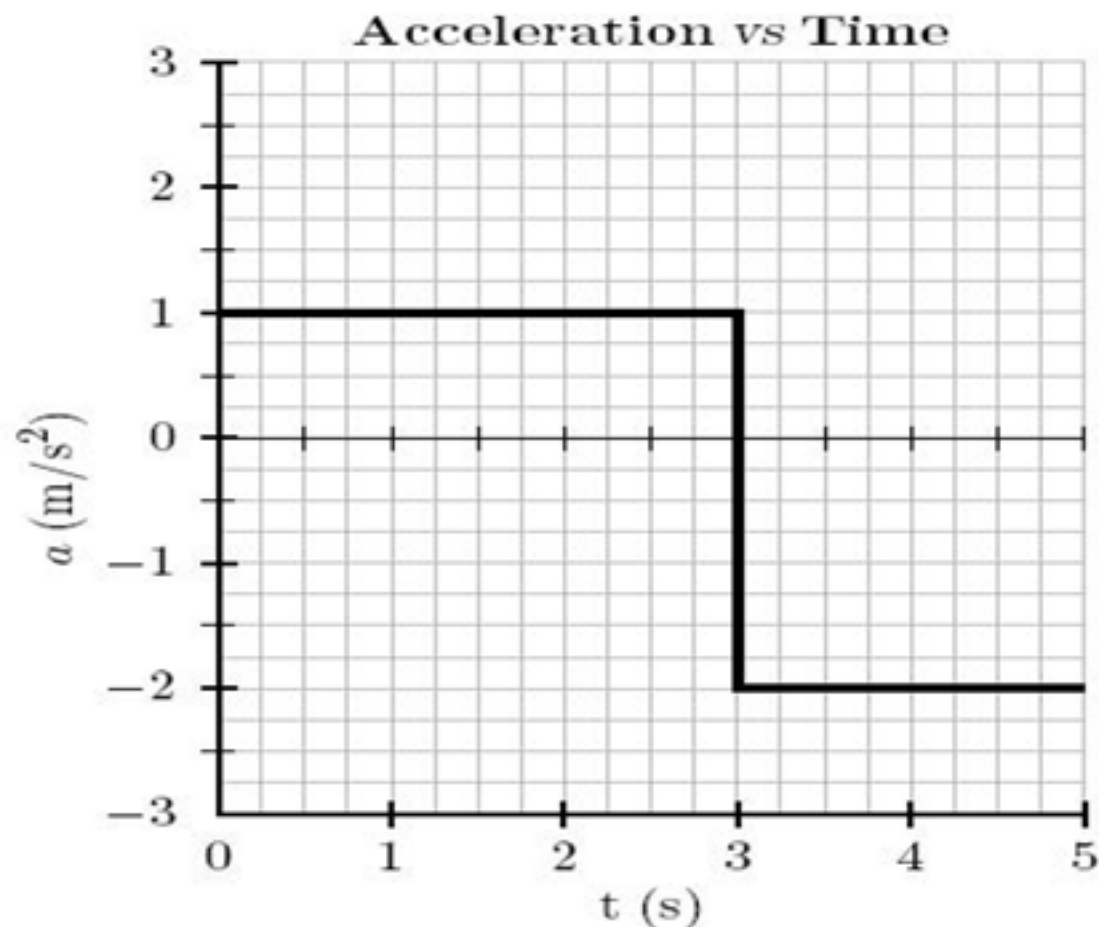


What can you determine from various graphs?

A Velocity - Time Graph

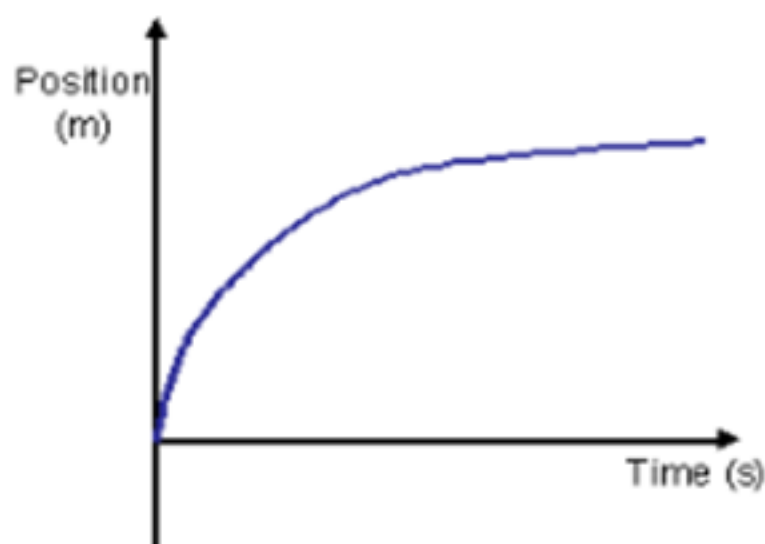


What can you determine from various graphs?

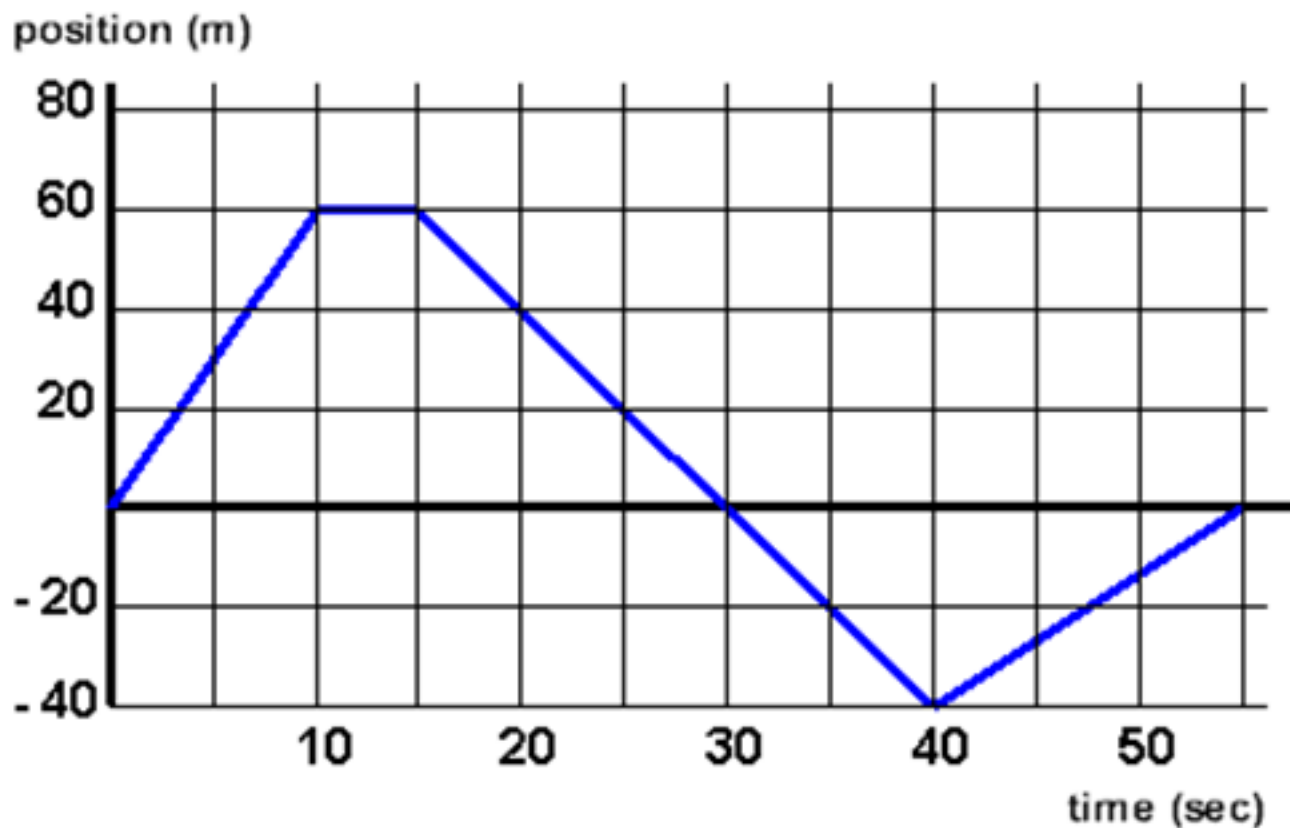


Graphs of Average vs. Instantaneous velocity!!!

Position - Time Graph



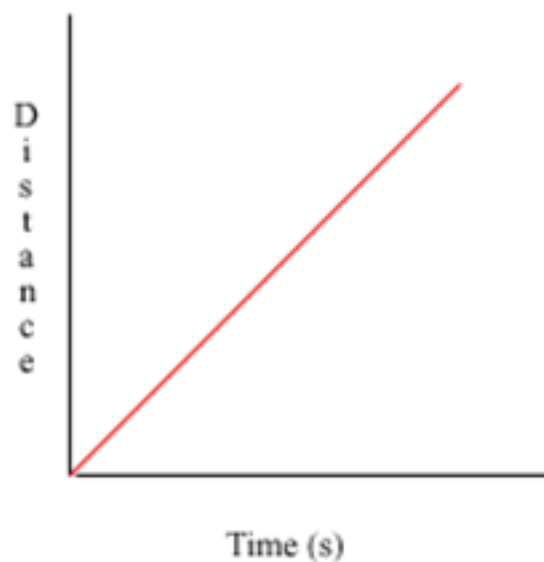
Graphs of Average vs. Instantaneous velocity!!!



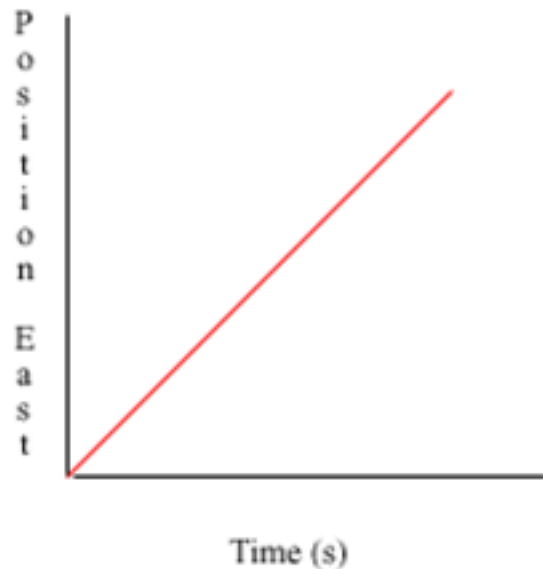
Describe in words what is happening!!

Distance-Time vs. Position-Time Graphs!!!

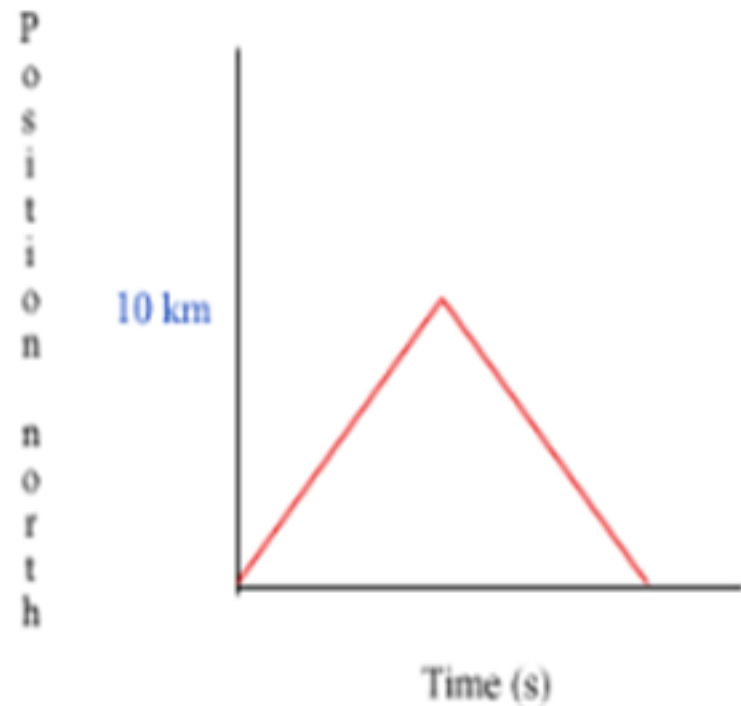
Distance -Time graph of a plane



Position-Time Graph of the same plane



Distance-Time vs. Position-Time Graphs!!!



Competency Goal 3: The learner will build an understanding of two dimensional motion including circular motion.

Objectives

3.01 Analyze and evaluate projectile motion in a defined frame of reference.

3.02 Design and conduct investigations of two-dimensional motion of objects.

3.03 Analyze and evaluate independence of the vector components of projectile motion.

3.04 Evaluate, measure, and analyze circular motion.

3.05 Analyze and evaluate the nature of centripetal forces.

3.06 Investigate, evaluate and analyze the relationship among:

- Centripetal force.
- Centripetal acceleration.
- Mass.
- Velocity.
- Radius.

2 dimensional Motion thoughts:

1. Once an object is released, the only force acting on it is gravity!!
--Whether it is dropped or thrown horizontally doesn't matter!!
2. If object is thrown horizontally, the horizontal velocity will not change until it hits the ground, but it will continue accelerating downward because of gravity!!
3. If the object is launched at an angle, first resolve the velocity into a vertical and horizontal component, then use those components in your equations!!!
4. If you are asked a thought provoking question about 2 dimensional motion, use some thought!!!!

A rock is thrown horizontally from the top of a 75 m tall building with a velocity of 14 m/s. How far from the base of the cliff will the ball land?

A basketball is shot with a velocity of 10 m/s at an angle of 35 degrees. a) How long will it remain in the air? b) How high will it rise? c) How far will it move horizontally before hitting the ground?

Circular motion stuff:

1. Objects in circular motion may travel at a constant speed, but their velocity is changing (therefore they are accelerating)!!
2. The instantaneous velocity is the tangent at a particular point!!
3. Centripetal acceleration and Centripetal force are always directed toward the center of the circle.
4. If released, the object moving in the circular path will always move in a straight line!!
5. If you are asked a thought provoking question then THINK!!!