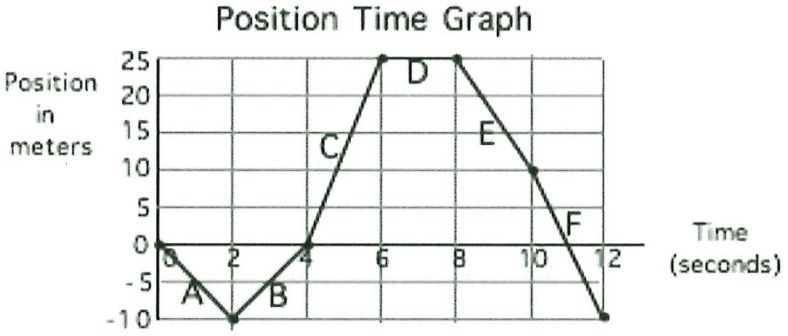
Position Time Graph Practice Name:_____

1. Consider the position time graph shown at the right to answer the questions that follow.



a. During which interval (A,B etc) is the object stationary? D

When is slope zero?

b. During which intervals is the object moving in the negative direction?

When is slope negative? A, E, F

c. In which interval is the object moving the fastest in the positive direction?

When is slope greatest and positive, C

d. At what times is the object located at the origin?

When is position 0? 0 sec, 4 sec, aprox 11 sec

e. Calculate the object's velocity during interval B.

$$\text{Velocity} = \frac{\Delta \text{position}}{\Delta \text{time}} = \frac{+10\text{m}}{2\text{sec}} = 5\text{m/sec}$$

f. Calculate the object 's velocity during interval F.

$$\text{Velocity} = \frac{\Delta \text{position}}{\Delta \text{time}} = \frac{-20\text{m}}{2\text{sec}} = -10\text{m/sec}$$

g. What is the total distance travelled? ← Distance is total without regard to direction

$$10 + 10 + 25 + 0 + 15 + 20 = 80\text{m}$$
$$A \quad B \quad C \quad D \quad E \quad F$$

h. What is the total displacement? ← Displacemet is Δpositin = Find - initial

$$-10 - 0 = -10\text{m}$$

Final position ↑ starting position

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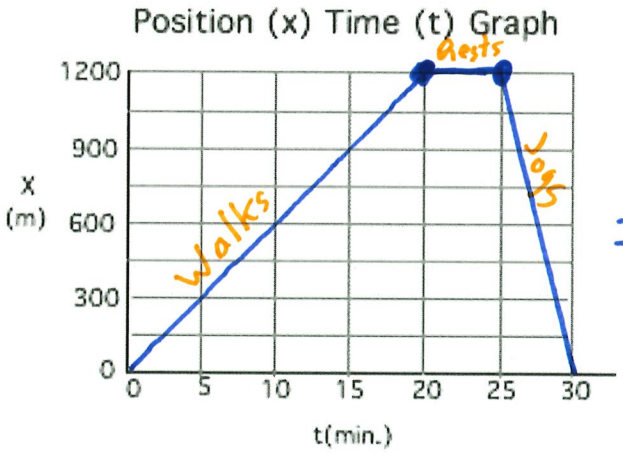
2. A person goes for a walk from his house. He walks at a constant velocity of 60 m/min for 20 minutes. He stops for 5 minutes, then jogs back home in 5 minutes at a constant rate.

   a. Draw a graph which relates the information given above.

   b. With what speed did the person jog back home?



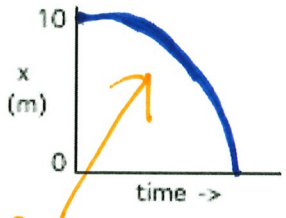
$\frac{60m}{min} \times 20 min = 1200m$

Speed = $\frac{\text{distance}}{\text{time}} = \frac{1200m}{5min} = 240 m/min$

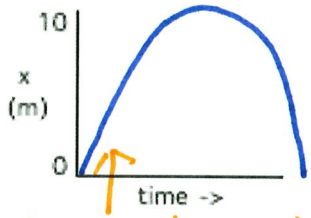
$\approx 200 m/min$

3. Sketch a graph which represents each of the following motions.

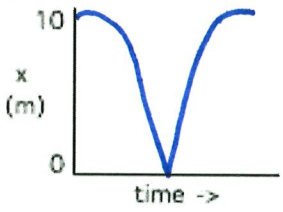
a) A stone is dropped from a height of 10 m. As is falls, it steadily picks up speed until it suddenly comes to halt on the ground.



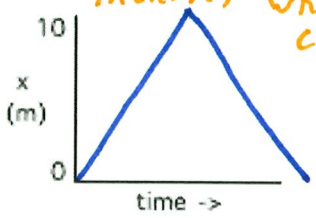
b) A stone is tossed straight upwards to a maximum height of 10 m. It steadily loses speed on its way up, then steadily gains speed on its way down.



c) A ball is dropped from a height of 10 m, hits the floor and bounces up to the same height.



d) a ball rolls along a floor at constant speed, hits a wall 10 m away, then rolls back again at the **same speed**.



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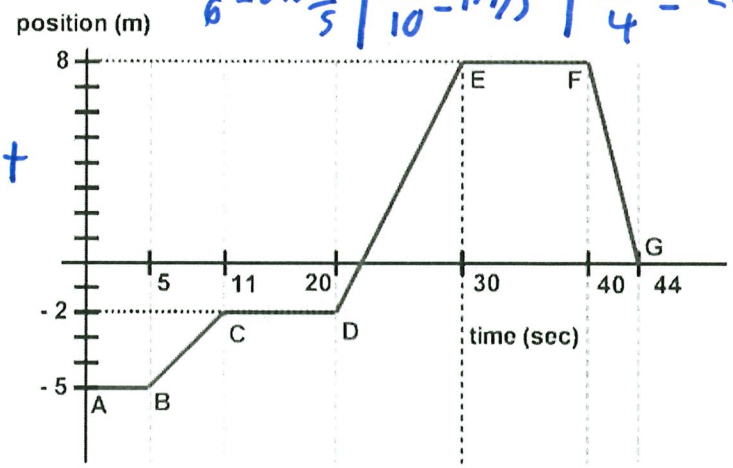
4. Consider the position time graph shown on the right

BC $\frac{3}{6} = 0.5\frac{m}{s}$ | DE $\frac{10}{10} = 1 m/s$ | FG $\frac{-8}{4} = -2 m/s$



a. During which time interval (AB, BC, CD, DE, EF, FG) was the object traveling at its greatest speed?

FG is steepest

b. During which time interval (AB, BC, CD, DE, EF, FG) was the object traveling at its least (nonzero) speed?

BC

c. During which time interval(s) (AB, BC, CD, DE, EF, FG) was the object at rest?

AB, CD, EF

d. During which time interval(s) (AB, BC, CD, DE, EF, FG) did the object travel in a negative direction?

FG, slope is negative there

e. What was the object's speed at 42 seconds?

All through FG speed is same = $\frac{8m}{4sec} = 2m/s$

speed is scalar so direction doesn't matter

f. What was the object's velocity at 42 seconds?

Velocity is vector so has direction, $v = -2 m/s$

g. What was the cart's displacement over the entire graph?

Displacement = Δposition = final position − initial position

= $0m - (-5)m$

= $5m$

h. What was the cart's average velocity during these 44 seconds?

$v = \frac{d}{t} = \frac{5m}{44sec} = 0.11 m/s$

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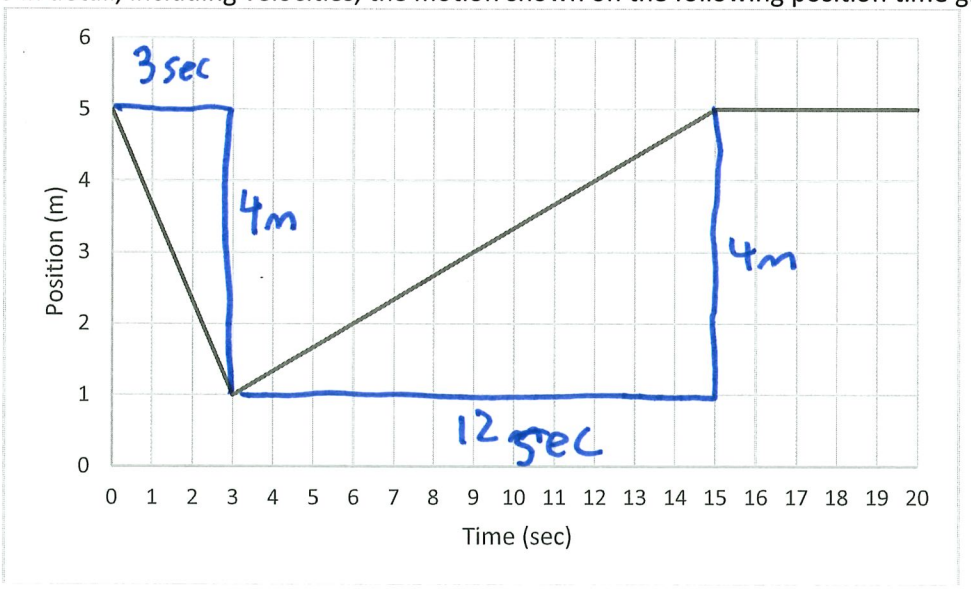
5. Describe in detail, including velocities, the motion shown on the following position time graphs.

a.



For first 3 seconds moves in negative direction at $\frac{-4m}{3sec} = -1.3 m/s$

Then from t=3 to t=15 moves in the positive direction back to where it started at $\frac{4m}{12sec} = 0.3 m/s$

For the last **5** seconds it is stationary.

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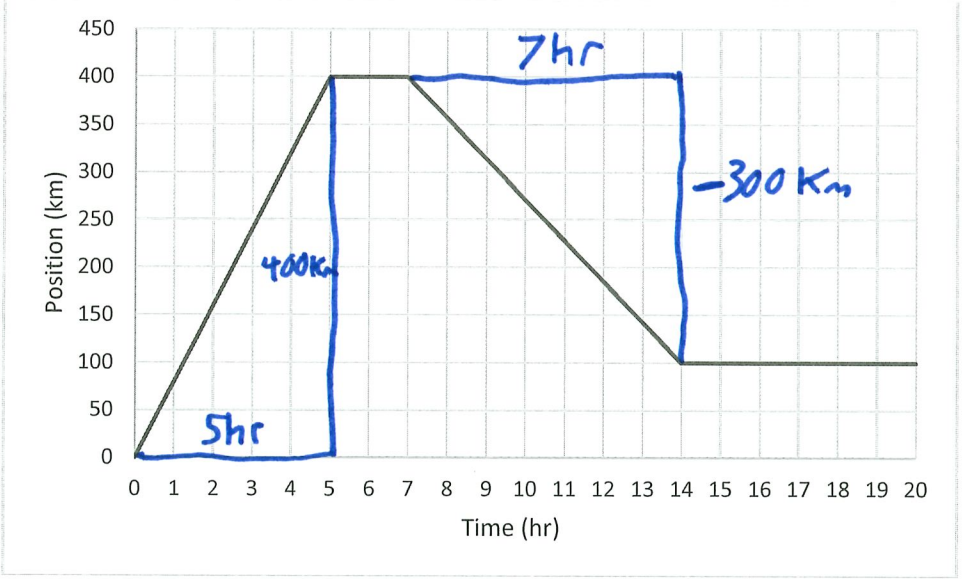
b.



First 5 hours it moves in positive direction at $\frac{400\text{ Km}}{5\text{ hr}} = 80\text{ Km/hr}$

From t= 5-7 it is stationary

From t= 7 to t= 14 it moves in negative direction at $\frac{-300}{7} = -43\text{ Km/hr}$

From t=14 to t=28 it is stationary

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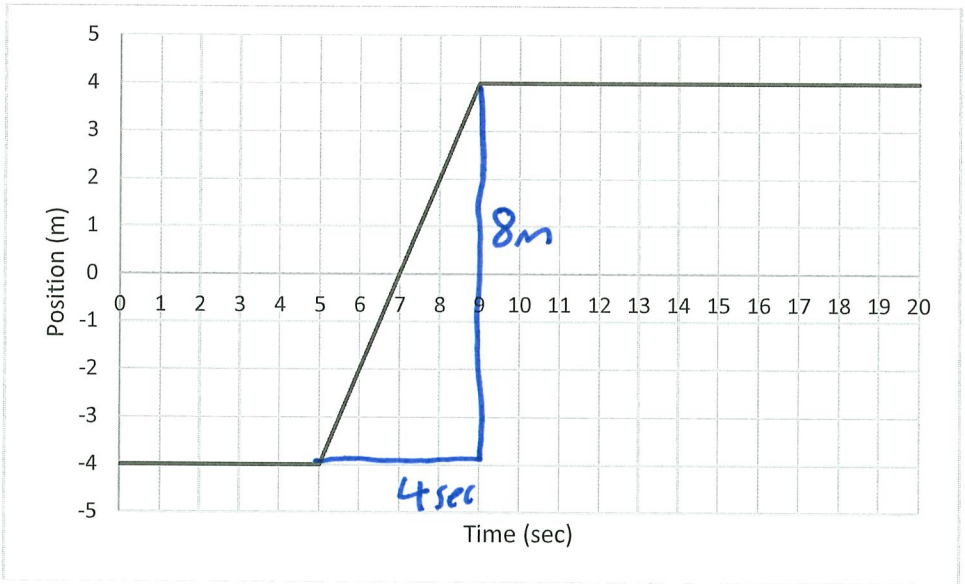
c.



Starts not moving 4m in the negative direction from the origin

At t=5 it starts moving in the positive direction at $\frac{8m}{4sec} = 2m/s$

From 9 seconds on it doesn't move