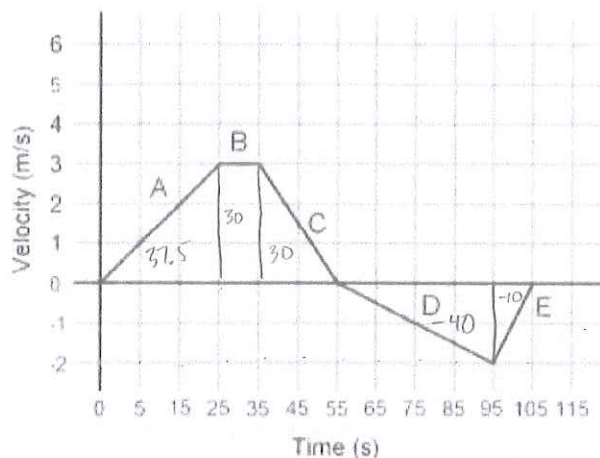


25 pts

AP Physics C: Basic Motion and Graphing Quiz

Using the graph below answer questions 1-3.



3 pts

- Determine the time at which the object passes its original position. Show any necessary work and explain your reasoning in forming your conclusion. If the object does not reach its original position give a justification indicating why it has not returned to the original position.

It has not. b/c area of graph show a  $+ \Delta x$  of 97.5m and a  $- \Delta x$  of -50m, so the object's closest point to the origin is +47.5m.

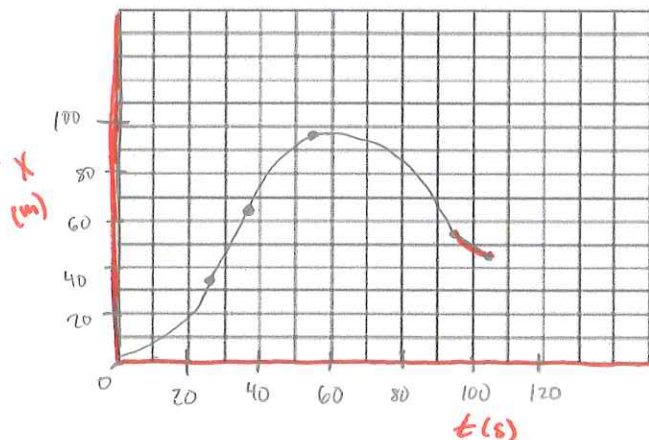
1 pt

- Determine any time(s) where the object changes directions.

55 seconds only

5 pt

- Sketch a position-time graph for the motion represented above. Include position and time intervals on the graph below.



2 pt

- The position of an object as a function of time is given by the equation  $x(t) = t^3 - 2t^2 + 5$ . Determine the velocity and acceleration of the object as a function of time.

$$v(t) = 3t^2 - 4t$$

$$a(t) = 6t - 4$$

- 3 pt 5. Using the same equation,  $x(t) = t^3 - 2t^2 + 5$ , for position as a function of time, give a brief description of the motion from  $t = 0.0$  s to  $t = 2.0$  seconds.

$$x(1) = 1 - 2 + 5 = 4 \text{ m}$$

$$x(0) = 0 - 0 + 5 \text{ so } x_0 = 5 \text{ m}$$

$$v(0) = 0$$

$$v(1) = 3 - 4 = -1 \text{ m/s}$$

$$x(2) = 8 - 8 + 5 \text{ so } x_2 = 5 \text{ m}$$

$$v(2) = 12 - 8 = 4 \text{ m/s}$$

object initially moved left, but turns around and reaches  $x_0$  @ 2s

- 3 pts 6. The velocity of an object is given as a function of time where  $v(t) = 6t^2 - 3$ . The original position of the object is given as  $-15$  m when  $t = 0$  s. Determine the object's position after 2.0 s have passed. Discuss the object's velocity from  $t = 2.0$  to  $t = 4.0$  s. You do not need a value, just a description of what is happening.

$$x(t) = \int_0^t (6t^2 - 3)$$

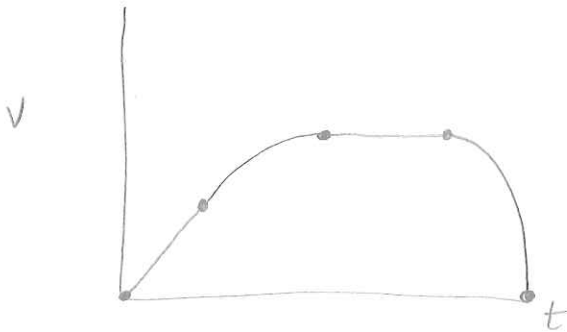
$$2t^3 - 3t + C$$

where  $C = x_0$

$$x(2) = 2(2)^3 - 3(2) - 15 = 16 - 6 - 15 = -5 \text{ m}$$

velocity increases in (+) direction; greater change w/ time.

- 4 pts 7. Sketch a velocity time graph representing the following motion: A) constant positive acceleration followed by B) a decreasing positive acceleration then C) an interval where acceleration is 0. The object then D) experiences an increasing negative acceleration until it comes to rest.



4 pts

8. Sketch the position time graph for the above motion.

