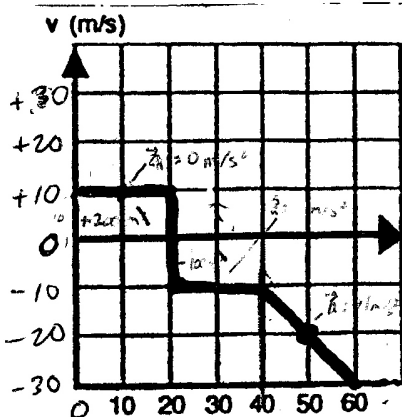


Exemplary	Accomplished	Developing	Beginning
Complete & in depth understanding of concepts. Answers are correct, with elegant solution strategies.	Solid understanding of concepts. Most answers are correct. Solution strategy has few errors	Basic understanding of concepts. Errors and inconsistency reveal some missing elements.	Does not demonstrate basic understanding of concept. Substantial errors and/or omissions.

Concept #1:

Use a velocity-time graph to find any of: velocity, average velocity, displacement, acceleration, average acceleration, distance, speed, average speed



(1) What is $\vec{v}$ at $t = 50s$?

The velocity of the object is moving $-20m/s$ at the instant of $50s$.

(2) What is the displacement during the first 30 s?

The displacement during the first 30s was $+100m$. During the first 20s the object move $+200$ from the reference. In the next 10s the object moves towards the reference point by $-100m$. So the displacement is $100m$ for the first 30s.

(3) What is $\vec{v}_{avg}$ for the first 30 seconds?

$$\vec{v}_{avg} = \frac{\Delta x}{\Delta t} = \frac{100m}{30s} =$$

$$= 3.3 m/s$$

The average velocity for the first 30s.

(4) What is $\vec{a}$ at $t = 45s$?

The slope of line from 40s-60s is same as line through 45s.

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t} = \frac{v_2 - v_1}{t_2 - t_1} = \frac{-30m/s - (-10m/s)}{60s - 40s} =$$

$$= -1.0 m/s^2$$

The acceleration at 45s is $-1.0m/s^2$.

(5) What was $\vec{a}_{avg}$ for the first 60s?

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t} = \frac{v_2 - v_1}{t_2 - t_1} = \frac{-30m/s - (+10m/s)}{60s - 0s} = \frac{-40m/s}{60s} = -0.66 m/s^2$$

The average acceleration is $-0.66m/s^2$.

(6) One part of the graph is unrealistic. Where? Why?

At 20s the velocity changes dramatically, from $+10m/s$ to $-10m/s$ in one instant.

E	A	D	B
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Map for improvement: