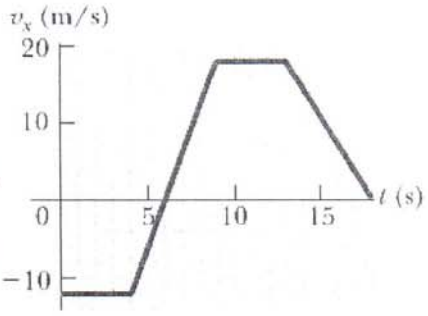
QUIZ#2- CHAPTER 2
DATE: 17/09/18

Name: Key Id#: Sect.#:

The velocity-time graph of a particle moving along in one dimension is shown in the figure.



(a) Calculate the acceleration of the particle in the time interval t = 9 and t = 13 s.

In the time interval $t_i = 9$ to $t_f = 13$ s

the velocity is constant $\Rightarrow$ $\boxed{a = 0}$

(b) How far has the particle moved in the time interval t = 6 and t = 13 s?

$$\Delta x = \int_{t_i}^{t_f} v\,dt = \text{area under the curve of } v \text{ vs. } t \text{ graph}$$

$$= \frac{1}{2}(18 \times 3) + 18 \times 4 = \boxed{99\text{m}}$$

(c) Calculate the acceleration of the particle in the time interval t = 13 and t = 18 s.

a = slope of the v vs. t graph

$$a = \frac{0 - 18}{18 - 13} = \boxed{-3.6\ \text{m/s}^2}$$

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A particle moves along the x-axis according to the equation $x = 50t^2 - 10t^3$ where x is in meters and t is in seconds.

(a) Calculate the average velocity of the particle in the time interval t = 0 and t = 3s.

$$V_{avg} = \frac{x_f - x_i}{t_f - t_i}$$

$x_f = 180\,m$

$x_i = 0$

$$V_{avg} = \frac{180 - 0}{3 - 0} = \boxed{60\,m/s}$$

(b) Calculate the acceleration of the particle at t = 2.0 s

$$V = 100t - 30t^2$$

$$a = 100 - 60t$$

$t = 2s$ $\quad a = 100 - 120 = \boxed{-20\,m/s^2}$

(c) Is the particle accelerating or decelerating at t = 2.0 s? why?

$t = 2s$ $\quad v = 100 \times 2 - 30 \times 2^2 = 80\,m/s$

$a < 0$

$v > 0$ $\Rightarrow$ deceleration

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A hot air balloon carrying a package is descending at the rate of 10 m/s. When it is 100 m above the ground a package is released.

(a) How long does it take the package to reach the ground?

$y_0 = 0$ — $V_0 = 10$ m/s

$$y - y_0 = v_0 t - \frac{1}{2} g t^2$$

$$-100 - 0 = -10t - 4.9t^2$$

$$4.9t^2 + 10t - 100 = 0$$

$$t = \frac{-10 \pm \sqrt{10^2 + 4 \times 4.9 \times 100}}{2 \times 4.9}$$

$y = -100$m → ground

take (+) sign $\boxed{t = 3.61\ s}$

(b) Calculate the velocity of the package just before it hits the ground.

$$V = V_0 - gt = -10 - 9.8(3.61)$$

$$= \boxed{-45.4\ m/s}$$

(c) Calculate the acceleration of the package just before it hits the ground?

free fall $\Rightarrow$ $a = -g$ always!!

$$= \boxed{-9.8\ m/s^2}$$