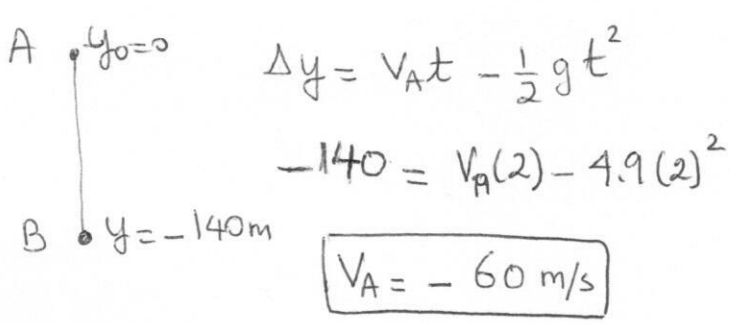
QUIZ#2- CHAPTER 2
DATE: 16/09/19

Name: Key Id#: Sect.#:

1. A particle is released from rest at a height H. It takes 2.00 s for the particle to fall from point A to point B (see Figure).

(a) What is the velocity of the particle at point A? Write your answer in 2 SF.

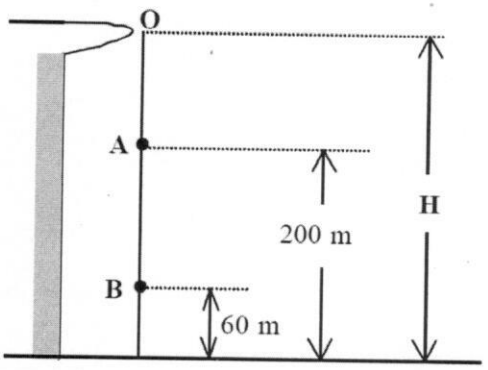
Between points A & B:



$\Delta y = V_A t - \frac{1}{2} g t^2$

$-140 = V_A(2) - 4.9(2)^2$

$V_A = -60$ m/s



(b) Calculate the height H. Write your answer in 3 SF.

Between points O and A:

$V_A = \cancel{V_0}^{0} - gt \Rightarrow -60 = -9.8t \Rightarrow t = 6.1$ sec

$\Delta y = \cancel{V_0 t}^{0} - \frac{1}{2} g t^2 = -4.9(6.1)^2 = -185$ m

$H = +185 + 200 =$ **385 m**

(c) How long does it take the particle to reach the ground? Write your answer in 3 SF.

$\Delta y = \cancel{V_0 t}^{0} - \frac{1}{2} g t^2 \quad -385 = -4.9t^2 \Rightarrow$ **$t = 8.86$ s**

(d) What is the velocity of the particle just before impact with the ground? Write your answer in 3 SF.

$V^2 = \cancel{V_0^2}^{0} - 2g\Delta y$

$V = \pm\sqrt{-2g\Delta y}$

$V = -\sqrt{-2\times 9.8 \times (-385)} =$ **-86.9 m/s**

OR

$V = \cancel{V_0}^{0} - gt$

$= -9.8 \times 8.86$

$=$ **-86.8 m/s**

QUIZ#2- CHAPTER 2
DATE: 16/09/19

Name: Key Id#: Sect.#:

1. A car starts a trip from Dammam, goes 400 km in a straight line to Riyadh in 3.5 hours. Immediately, the car is turned around, and returns to Dammam in 4.0 hours.
   (a) Calculate the average velocity of the car for the whole trip.
   Give your answer in m/s.

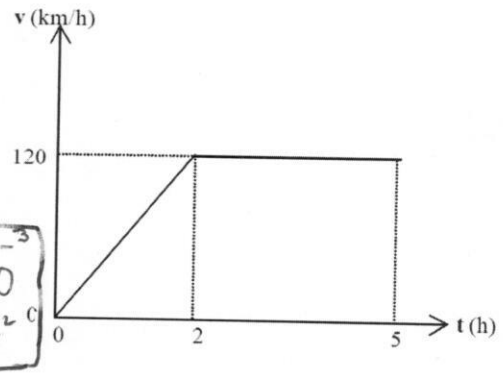
$$V_{avg} = \frac{X_f - X_i}{\Delta t} = \frac{0 - 0}{7.5\,h} = 0$$

   (b) Calculate the average speed of the car for the whole trip.
   Give your answer in m/s.

$$S_{avg} = \frac{\text{total distance}}{\text{total time}} = \frac{400\,Km + 400\,Km}{7.5\,h} = \frac{800\,Km}{7.5\,h}\left(\frac{1000\,m}{1\,Km}\right)\left(\frac{1\,h}{3600\,s}\right)$$

$$= \boxed{29.6\ m/s}$$

2. The figure represents the straight line motion of a car.



   (a) What is the acceleration of the car between t = 0 and t = 2 hours?
   Give your answer in m/s^2.

$$a_{avg} = \frac{\Delta V}{\Delta t} = \frac{120\,Km/h - 0}{2h - 0} = 60\,Km/h^2$$

$$= 60\,\frac{Km}{h^2}\left(\frac{1000\,m}{1\,Km}\right)\left(\frac{1\,h}{3600\,s}\right)^2 = \boxed{4.6\times10^{-3}\ m/s^2}$$

   (b) What is the distance traveled by the car from t = 0 to t = 5 h?
   Give your answer in ~~meters~~ Kilometers.

distance travelled = area under the curve

$$= \frac{1}{2}\left(120\,\frac{km}{h} * 2h\right) + 120\,\frac{Km}{h} \times 3h$$

$$= 120\,Km + (120\,Km \times 3) = \boxed{480\ Km}$$

QUIZ#2- CHAPTER 2
DATE: 16/09/19

Name: Key Id#: Sect.#:

1. An object starts from rest at the origin and moves along the x-axis with a **constant acceleration** of 4.0 m/s^2. Find its average velocity as it goes from x = 0 m to x = 10 m.

$V_{avg} = \dfrac{x_f - x_i}{t_f - t_i}$ $\quad t_i = 0;\ x_i = 0;\ x_f = 10\,m$

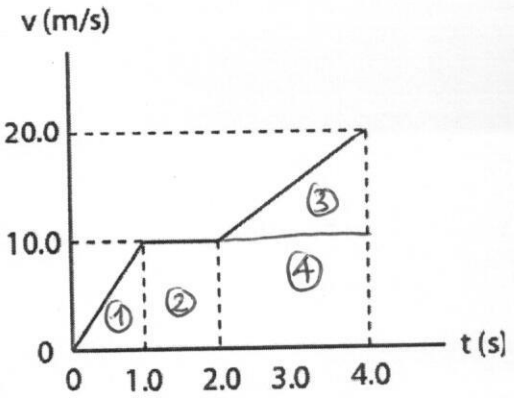
$x_f - x_o = v_o t + \frac{1}{2} a t^2 \quad 10 - 0 = \frac{1}{2}(4)t^2$

$t = 2.23\ sec$

$V_{avg} = \dfrac{10-0}{2.23-0} = \boxed{4.47\ m/s}$

2. The figure shows a velocity-time graph of a runner. If the runner starts from the position x = –2.0 m, find his position at t = 4.0 s.

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



area $= \frac{1}{2}(10\times1) + 10 + \frac{1}{2}(10\times2) + 10\times2$

$= 45\,m$

$x_f - x_i = 45m \Rightarrow x_f = 45 + x_i = 45 + (-2)$

$\boxed{x_f = 43\,m}$