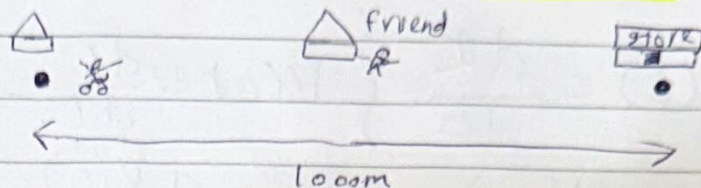


Exam 2 Revision questions

Page 1

1) First you went to the Store Then you Stopped at your friend's house



displacement = 500 m east 1000 east - 500 West

distance = $|1000| + |-500| = 1500 \text{ m}$

after you go back home displacement = 0 m West east
1000 - 1000

total distance = 2000 m

2) car travels 22 Kph for 15 min and 35 Kph for 30 min
how far does it travel overall Kph → kilometer per hour

22 Km $\xrightarrow{1 \text{ hour}}$
? Km $\xrightarrow{15 \text{ min } (\frac{1}{4})}$

For 15 min it will travel 5.5 Km

35 Km $\xrightarrow{1 \text{ hour}}$
? $\xrightarrow{30 (\frac{1}{2})}$

For 30 min it will travel 17.5 Km

overall distance = $17.5 + 5.5$ or 23 Km

3) car travels north 22 m/s for 30 min and Then Reverses direction and travels 28 m/s for 15 min

Find car total displacement $V = \frac{x}{t} \rightarrow x = Vt$

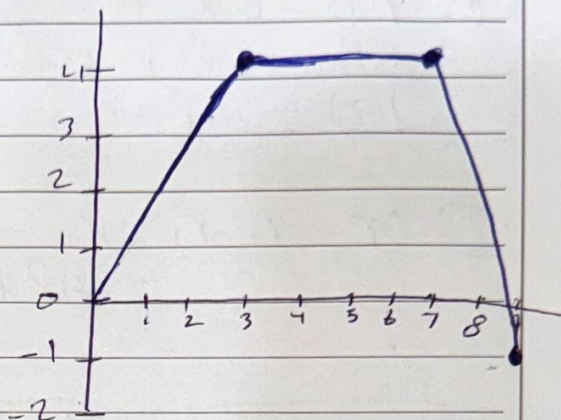
$$x_1 = v_1 t_1 = 22 \times 30 \times 60 = 39.6 \times 10^3$$

$$x_2 = v_2 t_2 = 28 \times 15 \times 60 = 25.2 \times 10^3$$

$$\text{total displacement} = \Delta x = 39.6 \times 10^3 - 25.2 \times 10^3 = 14.6 \times 10^3 \text{ north}$$

exam... 1... Revision... Part 2

- 6) a) find total distance
 b) find total displacement
 c) find average velocity
 between $t=3$ $t=9$
 d) average speed between
 $t=3$ $t=9$



a) $4 + |-5| = 9\text{m}$

b) $4 + -5 = -1\text{m}$

c) $V = \frac{x}{t} = \frac{-1-4}{9-3} = -\frac{5}{6} = -0.83$

d) $S = +V \rightarrow V = \frac{4+4}{6} = \frac{5}{6} \text{ m/s}$

Q1 p3

$$x(t) = 11 + 3t^3 - t$$

Page 3

- 1) find position at $t=2$
- 2) find displacement between $t=0$ $t=2$
- 3) find average velocity between $t=0$ $t=2$
- 4) find instantaneous velocity at $t=2$

1) $11 + 3(2)^3 - 2 = 33$

2) $11 + 3(0)^3 - 0 = 11$ $\Delta x = (33 - 11) = 22$

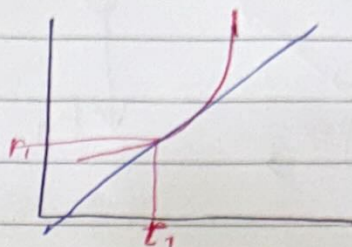
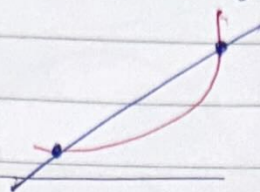
3) $V = \frac{\Delta x}{\Delta t} = \frac{22-11}{2-0} = 11$

4) $11 + 3t^3 - t \xrightarrow{\text{differentiation}} 9t^2 - 1 \rightarrow 9(2)^2 - 1 = 35 \text{ m/s}$

Page 3

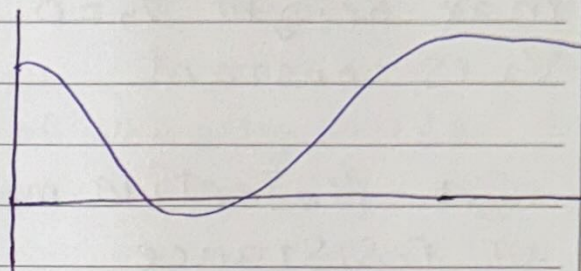
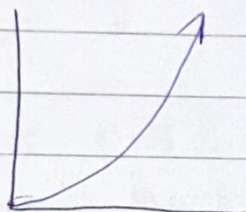
2) average velocity

instantaneous velocity



Velocity function

position function



Page 4

3) $t^3 - t + 1$

$x(t) \rightarrow$

find instantaneous velocity $t=2$

2) average acceleration $t=0$ $t=2$

3) instantaneous acceleration $t=0$ $t=1$ $t=2$

$$3t^2 - 1 = v(t)$$

$$1) 3(2)^2 - 1 = 11$$

$$2) a = \frac{v}{t} = \frac{11 - (-1)}{2 - 0} = 6 \text{ m/s}^2$$

$$3) a(t) = 6t = 6(0) = 0$$

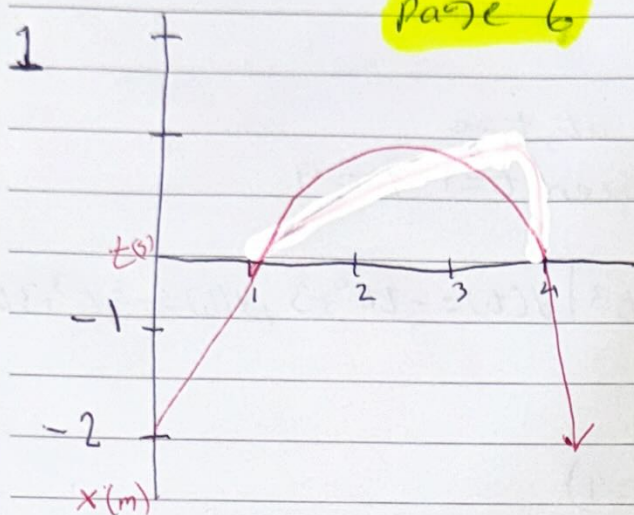
$$= 6t = 6(1) = 6$$

$$= 6t = 6(2) = 12$$

$x(t) = t^2 - t + 2$ has constant acceleration because $v(t) = 2t - 1$ and $a(t) = 2$ So nothing effect the acceleration except 2

الوقت جالس متغير *

Page 6



1) at $t=1s$ the x component of velocity will be positive $x_i = -2$ $x_f = 0$ $V = \frac{\Delta x}{\Delta t} = \frac{0 - (-2)}{1} = +2$

2) at $t=4s$ the x component of velocity is negative $x_i = 1$ $x_f = 0$ $V = \frac{\Delta x}{\Delta t} = \frac{0 - 1}{4} = -\frac{1}{4}$

3) at $t=2.5s$ Velocity will be zero (max height)

Page 7

6) Find average acceleration on I, II, III

I $\rightarrow V_i = 0$ $V_f = 30$ $t = 6s$ $a = \frac{\Delta v}{\Delta t} = \frac{30}{6} = 5 \text{ m/s}^2$

II $\rightarrow V_i = 30$ $V_f = 30$ $t = 6$ $a = \frac{0}{6} = 0 \text{ m/s}^2$

III $\rightarrow V_i = 30$ $V_f = 0$ $t = 12$ $a = \frac{0 - 30}{12} = -2.5 \text{ m/s}^2$

b) Find total displacement from $t=0$

$t = 24s$ $V = x/t \rightarrow x = Vt$

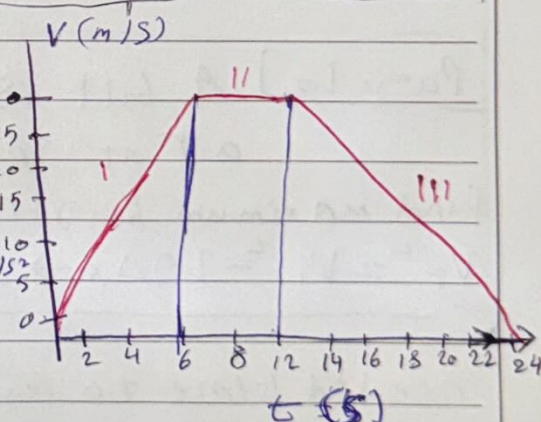
$$x_1 = \frac{1}{2} 30 \times 6 = 90$$

$$x_2 = 30 \times 6 = 180$$

$$x_3 = \frac{1}{2} (-30)(12) = -180$$

$$\Delta x = x_1 + x_2 + x_3$$

$$\Delta x = 90 \text{ m}$$



Page 9

$$a(t) = -4t \hat{x} + 1$$

a) Find position function $V=3$ at $t=0$

b) Find change in velocity between $t=1$ $t=4$

$$a) -\frac{4}{2} t^2 = V(t) \rightarrow x(t) = -\frac{2}{3} t^3 \quad [V(t) = -2t^2 + 3, x(t) = -\frac{2}{3} t^3 + 3t]$$

$$b) -\frac{2}{3} (1)^3 + 3(1) = 1 \quad (\text{at } t=1)$$

$$-\frac{2}{3} (4)^3 + 3(4) = -29 \quad (\text{at } t=4)$$

An object can have zero acceleration and be at rest

an object can have zero acceleration and be at motion

When Velocity is constant

$$3) V_i = 0 \quad V_f = 22.2 \quad x_f = 243 \quad t = ?$$

$$x_i = 0$$

$$1) V_f^2 = V_i^2 + 2a \Delta x \rightarrow 22.2^2 = 2a(243) \rightarrow a = \frac{22.2^2}{243 \times 2} \approx 1.0 \text{ m/s}^2$$

Page 10] A ball is thrown straight upward in the air at speed of 15 m/s

Find maximum height: $x_f = ?$ $V_i = 15$ $V_f = 0$ $g = 9.8$

$$V_f^2 = V_i^2 - 2g \Delta x \rightarrow \Delta x = \frac{0 - 225}{-19.6} = 11.5 \text{ m}$$

needed time to reach maximum height $t = ?$

$$V_f = V_i - gt \rightarrow 0 = 15 - 9.8t \rightarrow t = \frac{V_f - V_i}{-g} = \frac{0 - 15}{-9.8} = 1.5 \text{ s}$$

needed time to arrive the ground?

1.5 s

الوقت في الصعود والنزول متساوي

What is the velocity when it hits the ground = 15 m/s