

13:00, 18th May 2020

M3X01513, 1902731

1.

a) Velocity - m/s^{-1}

b) Acceleration - m/s^{-2}

c) Force - N

d) Mass - kg

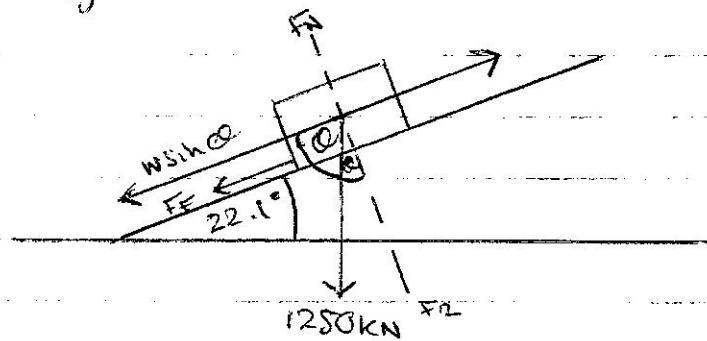
e) Weight

2. Momentum = Force $\times$ Velocity

Units = kgm s^{-1}

3

a)



b) ~~1250~~ $W \sin \alpha$

$$1250 \text{ kN} = 1.26 \times 10^6 \text{ N}$$

i) $1.26 \times 10^6 \sin 22.1$

$$= 474042.5 \text{ N}$$

ii) ~~ii)~~ AS The component is at rest.

Forces down = Forces up

Friction acting up the slope = ~~474042 N~~

c) $W \cos \alpha$

$$1.26 \times 10^6 \cos 22.1$$

$$= 1.16 \times 10^6 \text{ N}$$

13:15, 18th May 2020

MBXC1513, 1902731

4.

a) $\text{Moment} = F \times d$

$$\text{Distance from pivot} = \frac{4.6}{2} = 2.3 \text{ m}$$

$$\text{Moment} = 22.5 \times 2.3$$

$$\text{Moment} = 51.75 \text{ Nm Anticlockwise}$$

b) $\text{Anticlockwise} = \text{Clockwise}$

$$d_1 W_1 = d_2 W_2$$

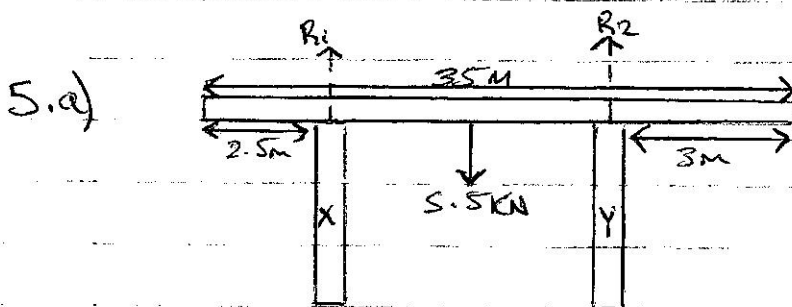
$$2.3 \times 22.5 = d_2 \times 45$$

$$2.3 \times 22.5 = 51.75$$

$$\frac{51.75}{45} = 1.15 \text{ m}$$

$$d_2 = 1.15 \text{ m}$$

$$2.3 \times 22.5 = 1.15 \times 45$$



b) $5.5 \text{ kN} \times 1000 = 5500 \text{ N}$

$$S_X + S_Y = 5.5 \text{ kN or } 5500 \text{ N}$$

Taking the moment of 'X'

$$(5500)(35 - 3) = 29.5 S_Y$$

$$(5500)(16)^2 = 29.5 S_Y$$

$$\frac{88000}{29.5} = 2983.1 \text{ N}$$

$$S_Y = 2983.1 \text{ N}$$

$$S_X = 5500 - 2983.1$$

$$S_X = 2516.9 \text{ N}$$

13:40, 18th May 2020

MSX01513, 1902731

6.

a) Potential ~~Energy~~ difference - is the difference of electrical potential between two points.

b) Resistance - involves collisions of current carrying charged particles.

7.

a) $V = IR$

$$1k\Omega \times 1000 = 1000\Omega$$

$$V = 0.12 \times 1000$$

$$V = 120V$$

b) $I = \frac{V}{R}$

$$I = \frac{12}{22}$$

$$I = 0.55A$$

8a) Series ~~+~~ - $1.5 + 2.5 = 4\Omega$

Parallel - $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$

$$\frac{1}{R_T} = \frac{1}{4} + \frac{1}{2} = \frac{3}{4}$$

$$\frac{4}{3} = 1.33\Omega$$

Series - $1.33 + 0.5 = 1.83\Omega$

$$R_{Total} = 1.83$$

13:50, 18th May 2020

MX01513, 1902731

b) $V = IR$

$$I = \frac{V}{R}$$

$$I = \frac{12}{1.83}$$

$$I = 6.56 \text{ A}$$

c) Voltage drop $= R_T \times I$

Voltage drop $= 1.83 \times 0.5$

Voltage drop $= 0.915 \text{ V}$

d) $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

$$\frac{1}{R} = 1.83 \text{ A}$$

$$1.83 \text{ A through } 2 \Omega$$

e) $1.83 \text{ A through } 1.5 \Omega \text{ and } 2.5 \Omega$

9) a) $R_{\text{Total}} = R_1 + R_2 + R_3$

$$R_{\text{Total}} = 10 + 20 + 30$$

$$R_{\text{Total}} = 60 \Omega$$

b) $I = \frac{V}{R}$ $I = \frac{12}{60}$ $I = 0.2 \text{ A}$

c) $R_{\text{Total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$$R_{\text{Total}} = \frac{1}{10} + \frac{1}{20} + \frac{1}{30}$$

$$R_{\text{Total}} = \frac{11}{60}$$

$$R_{\text{Total}} = \frac{60}{11} = 5.55$$