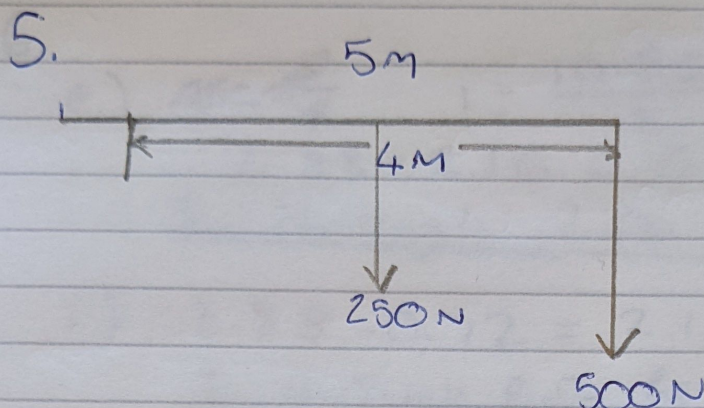


14/1/2022

2106370

Science
Exam

a) weight $\times$ Distance
 $250\text{ N} \times 5\text{ m}$
 Force = 3750 N (3 kN)

b) weight $\times$ Distance
 $250\text{ N} \times 4\text{ m}$
 Force = 3000 N (3 kN)

6.

a) Positive to Negative

b)
$$\frac{1}{\left[\frac{1}{2} + \frac{1}{6}\right]} = \frac{1}{0.5 + 0.17} = 0.67 \Omega$$

$$R_T = 0.5 + 0.67 + 3$$

$$R_T = 4.17 \Omega$$

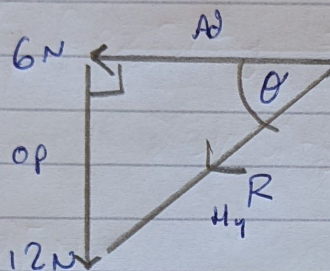
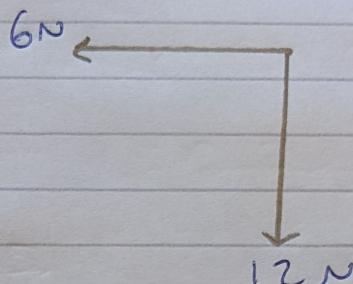
c) $I = \frac{V}{R}$ $I = \frac{12}{4.17}$ $I = 2.88 \text{ A}$

d) $2.88 \times 3 = 8.64 \text{ V}$

Science
Exam

15N ← → 9N $-15 + 9 = -6$

12N



$$R^2 = 6^2 + 12^2$$

$$R^2 = 180$$

$$R = \sqrt{180}$$

$$R = 13.42 \text{ N}$$

$$\tan \theta = \frac{12}{6}$$

$$\theta = \tan^{-1} \left(\frac{12}{6} \right)$$

$$\theta = 63.43^\circ$$

$$\text{Bearing} = 270 - 63.43$$

$$= 206.57^\circ$$

∴ Resultant is 13.42 N to the left +
and 63.43° below the horizontal

$$\text{Bearing} = 206.57^\circ$$

Page
5

Jay Dobbing

14/1/2022

2106370

science
Exam

6.

e) ~~$\frac{V}{R}$~~ $I = \frac{10.56}{2}$ $I = 5.28$
 $2.88 - 2.16 = 0.72$

I through 2-Ω Resistor = 0.72A

f) $2.88 - 0.72 = 2.16A$

I through 6-Ω Resistor = 2.16A

g) R3

Page

3

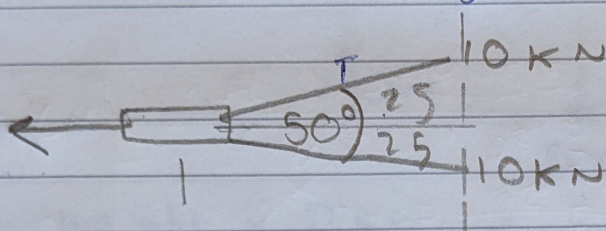
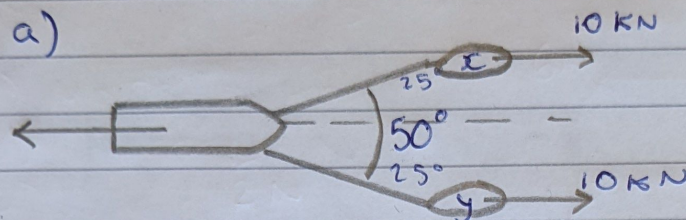
Jay Dobbing

14/1/2022

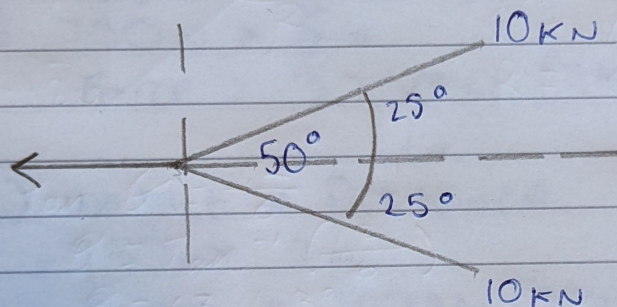
2106370

Science
Exam

4. a)



Component Vector
 $10\text{ kN} + 10\text{ kN}$
 $= 20\text{ kN}$



$$90 - 25 = 65$$

$$\sin 65 = 0.91$$

$$10\text{ kN} \times 0.91 = \cancel{9.1\text{ kN}} \quad 9.1\text{ kN}$$

$$9.1 \times 2 = 18.2 \times 10^3$$

$$18.2\text{ kN}$$

$$b) 20\text{ kN} - 18.2\text{ kN} = 1.8\text{ kN}$$

14/1/2022

Science Exam

2106370

1. a) Area = m^2

b) volume = m^3

c) mass = kg

d) force = N

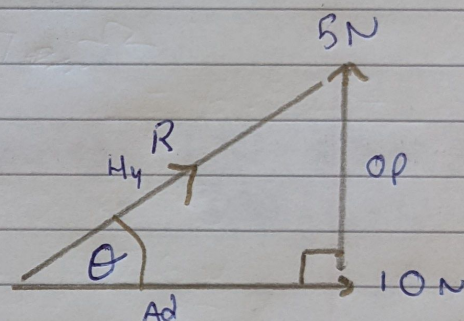
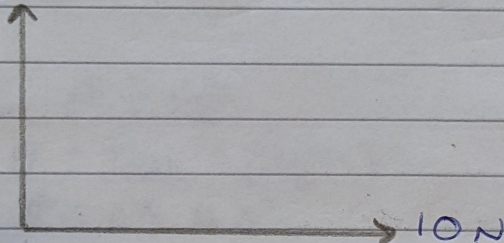
e) weight = N

2. Density = $\frac{\text{Mass}}{\text{Volume}}$

Density = $\frac{kg}{m^3}$

Density = kgm^{-3}

3. a) 5N



$$R^2 = 5^2 + 10^2$$

$$R^2 = 125 N$$

$$R = \sqrt{125}$$

$$R = 11.18 N$$

$$\tan \theta = \frac{5}{10}$$

$$\theta = \tan^{-1}\left(\frac{5}{10}\right)$$

$$\theta = 26.57^\circ$$

$$\text{Bearing} = 90 - 26.57 = 63.43^\circ$$

$\therefore$ Resultant is 11.18N to the right
and 26.57° above the horizontal.
Bearing = 63.43°