

2005231 JAY DELANEY

Module code: ACHA3000
Introduction Maths and science
(Science)

JA 19/07/22 (RESi\$)

1. Question 1.

Write down the units for the following:

a. Mass = Kg

b. Force = Newton (N)

c. Weight = $\text{Kg} \cdot \text{m} / \text{sec}^2$ (Kilogram per second squared)
(Kilogram per second Squared)

d. Velocity = m / s (Metre Second)

e. Acceleration = m / sec^2 (Metre per second Squared)
(4mks)

2. Question 2

Given that the equation for pressure can be written as pressure = $\frac{\text{Force}}{\text{Area}}$

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Question 2

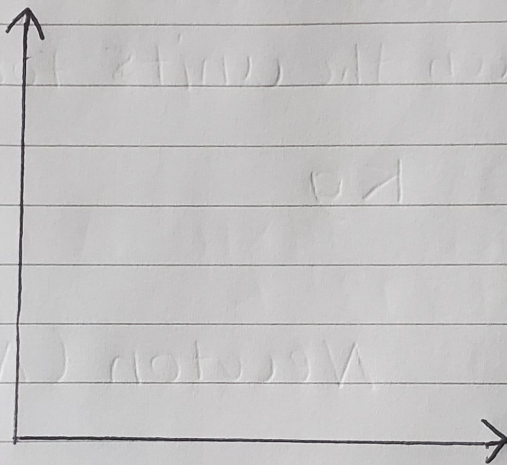
$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} = \text{N/m}^2$$

$$\text{Unit of Pressure} = \text{N/m}^2$$

Question 3

Res

a.



(10mKs)

$$\text{Resultant} = \sqrt{(10)^2 + (20)^2}$$

$$= \sqrt{100 + 400}$$

$$= \sqrt{500}$$

$$= 10\sqrt{5}$$

direction

$$\theta = \tan^{-1}\left(\frac{10}{20}\right)$$

$$\theta = \tan^{-1}(0.5)$$

$$\theta = 26.56^\circ$$

b. $18N \leftarrow$ $\rightarrow 4N$

$15N \downarrow$

$14N \leftarrow$

$\downarrow$

(12mks)

Resultant =

$$\sqrt{(14)^2 + (15)^2}$$

$$= \sqrt{196 + 225}$$

$$= \sqrt{421}$$

$$\text{Resultant} = 20.52$$

Direction

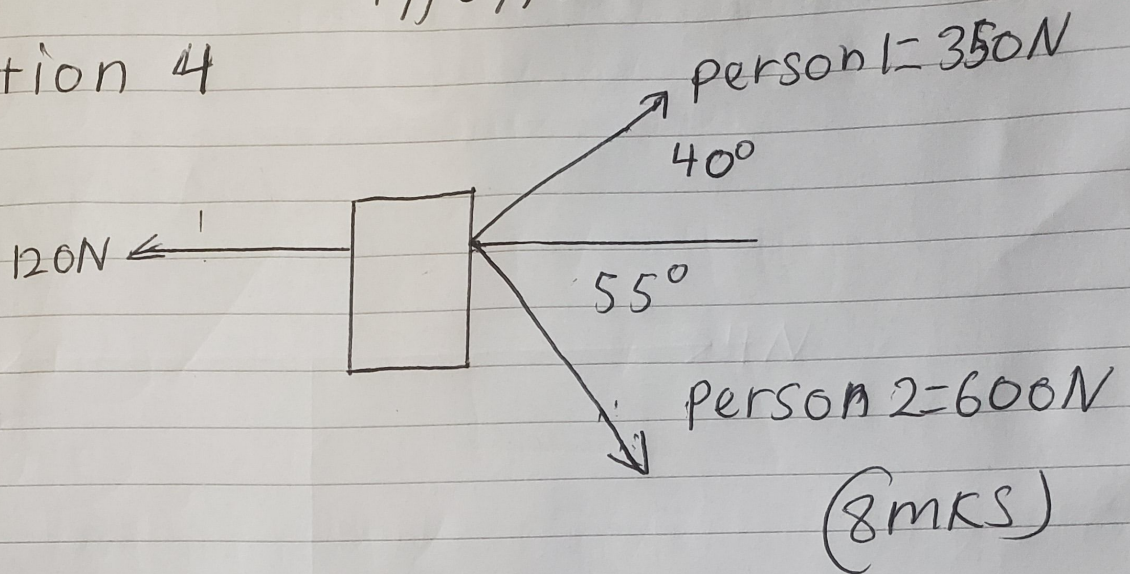
$$\theta = \tan^{-1}\left(\frac{14}{15}\right)$$

$$\theta = \tan^{-1}(0.93)$$

$$\boxed{\theta = 42.92^\circ}$$

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Question 4



Force due to person 1 in x direction

$$= 350 \cos(40^\circ)$$

$$= 350 \times 0.76$$

$$= 266 \text{ N}$$

Force due to person 2 in x -direction

$$= 600 \cos(55^\circ)$$

$$= 600 \times 0.57$$

$$= 342 \text{ N}$$

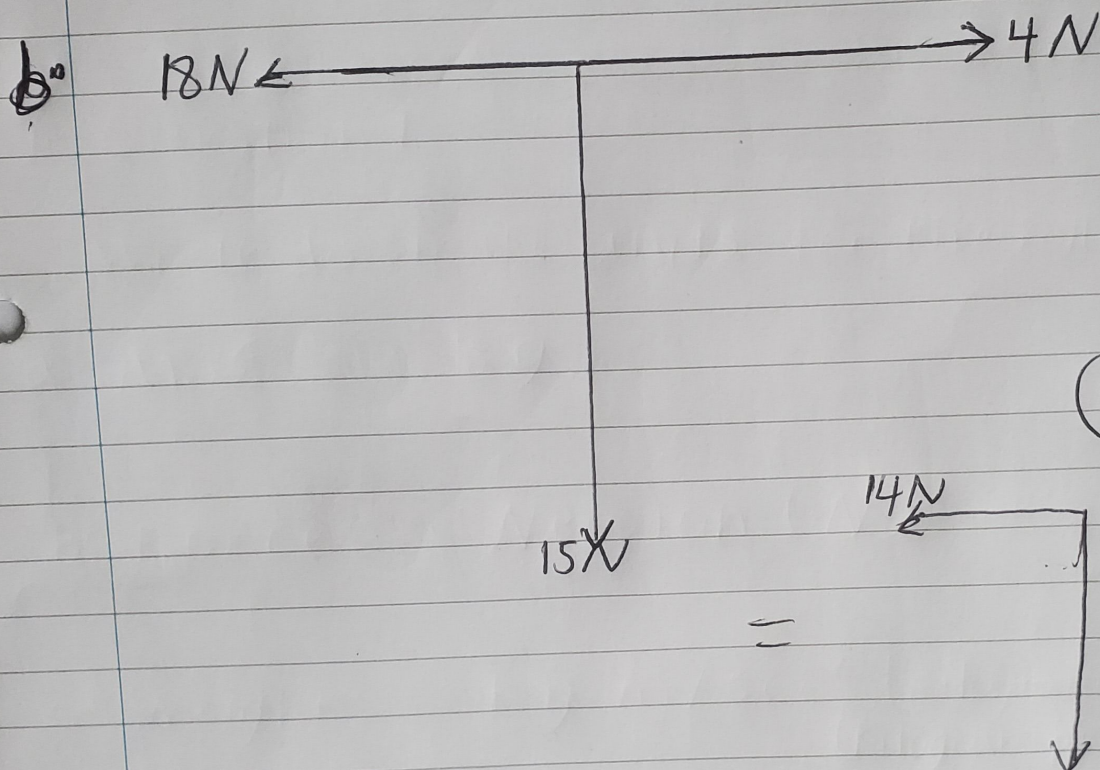
$$\text{Resultant} = 266 + 342 = 608 \text{ N}$$

Newton force

$$\text{Resultant} = 608 - 120$$

$$= 488 \text{ N}$$

Question 4



Resultant =

$$\begin{aligned} & \sqrt{(14)^2 + (15)^2} \\ &= \sqrt{196 + 225} \\ &= \sqrt{421} \end{aligned}$$

$$\text{Resultant} = 20.52$$

Direction

$$\begin{aligned} \theta &= \tan^{-1}\left(\frac{14}{15}\right) \\ \theta &= \tan^{-1}(0.93) \end{aligned}$$

$$\boxed{\theta = 42.92^\circ}$$

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Question 6

a. Current Flow in "A" direction positive ~~to~~
negative (1mk)

(b) Total Resistance

$$= \frac{3 \times 4}{3+4+5} + 10$$

$$= \frac{60}{12} + 10$$

$$= 5 + 10 = 15 \Omega$$

(c) current

$$V = IR$$

$$I = \frac{V}{R} = \frac{18}{15} = \frac{6}{5} = 1.2$$

(d) voltage across 10Ω

$$V = IR$$

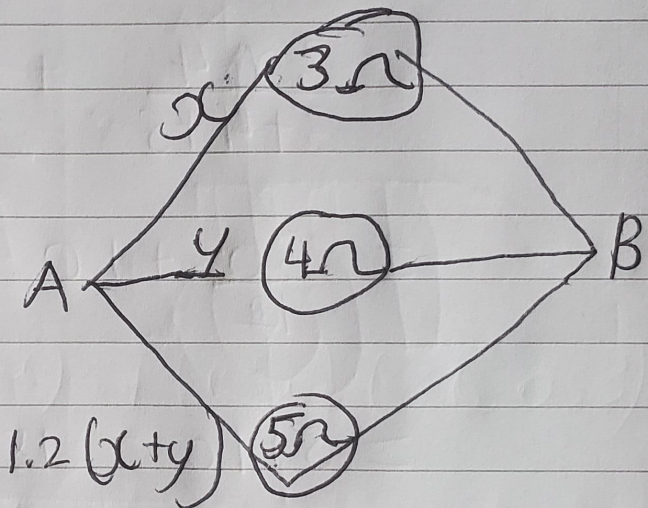
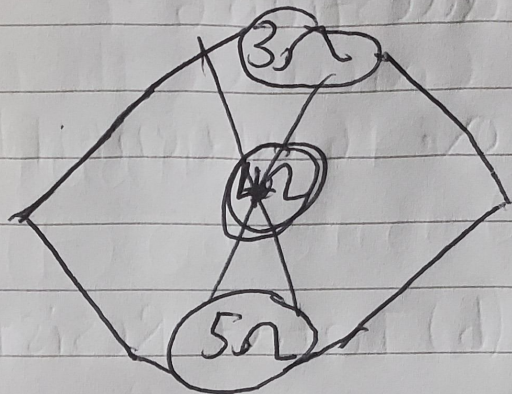
$$V = 1.2 \times 10$$

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$$V = 1.2 \times 10$$

$V = 12 \text{ V}$

(e) Voltage decreases at point A and B are same



$$2 - \frac{4y}{3}$$

$$4y$$

Q Continuation of
(E) Question 6 19/07/22

$$27 \frac{4y}{3}$$

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$$4y = 6 - 5x - 5y$$

$$9y = 6 - \frac{20y}{3}$$

$$\frac{38}{3}y = 6$$

$$y = \frac{18}{38}$$

$$\boxed{y = \frac{9}{19}} = 0.47$$

$$\boxed{x = \frac{36}{57}} = 0.63$$

$$\text{through } 5\Omega = 1.2 - 1.1$$

$$= 0.1$$

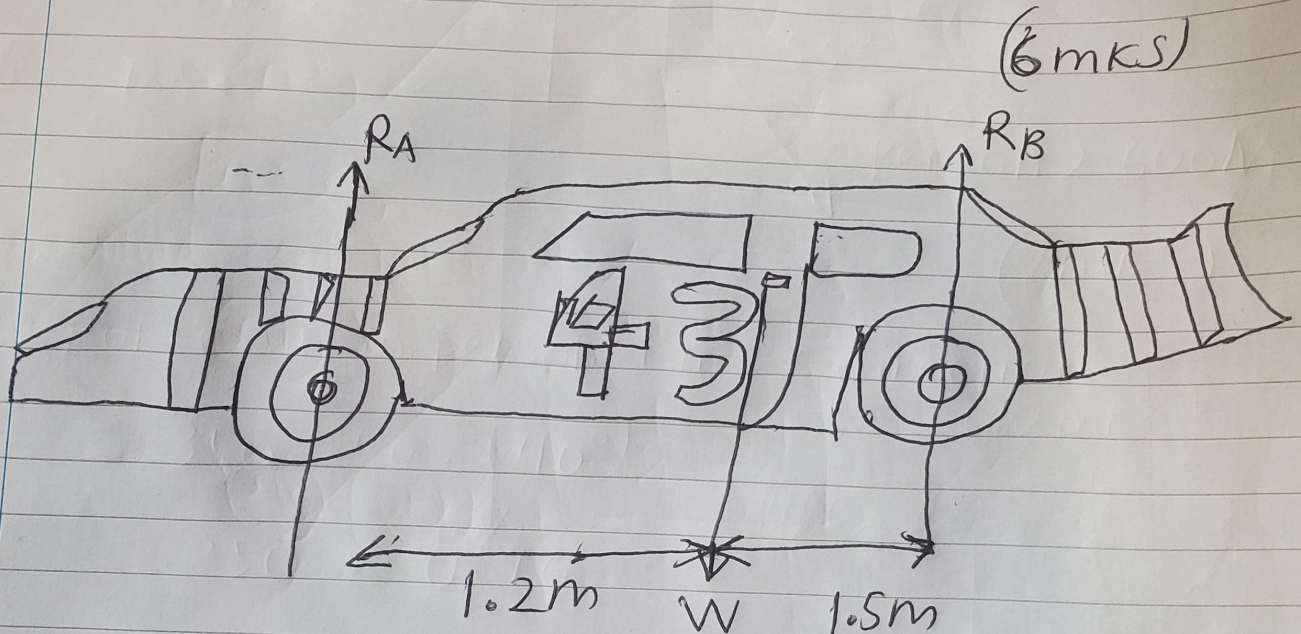
(e) Current through $4\Omega = 0.47$ amp

(f) Current through $5\Omega = 0.1$ amp

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Question 5

Calculate the reaction forces at the wheels of the car below given it has a mass of 1200 kg



$$4y = 6 - 5x - 5y$$

$$9y = 6 - \frac{20y}{3}$$

$$\frac{38}{3} y = 6$$

$$y = 18$$

$$y = \frac{9}{19} = 0.47$$

$$x = \frac{36}{57} = 0.63$$

$$\text{through } 5\Omega = 1.2 - 1.1 = 0.1$$

(e) Current through $4\Omega = 0.47$ amp
 (f) Current through $5\Omega = 0.1$ amp