

14/01/22

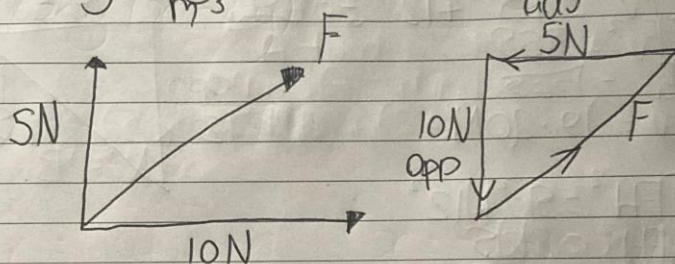
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1)

- a. Area = m^2
- b. Volume = m^3
- c. Mass = kg
- d. Force = N - kgm/s^2
- e. Weight = N

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

3



$$\sum F^2 = 10^2 + 5^2 = 125$$

$$\sum F^2 = 125$$

$$F = \sqrt{125}$$

$$F = 11.18N$$

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

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

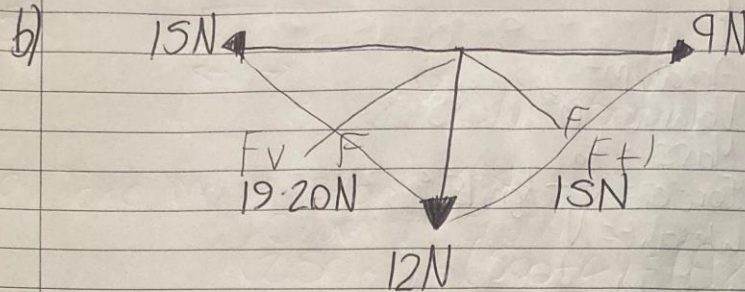
$$\theta = 63.43^\circ$$

Resultant is 11.18N to the right, 63.43° above the horizontal.

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

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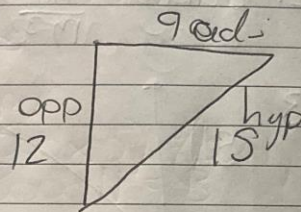


$$\sum F_v^2 = 15^2 + 12^2 = 369$$

$$\sum F_v^2 = 369$$

$$F_v = \sqrt{369}$$

$$F_v = 19.20\text{N}$$



$$\sum F_H^2 = 9^2 + 12^2$$

$$\sum F_H^2 = 225$$

$$F_H = \sqrt{225}$$

$$F_H = 15\text{N}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} \quad \theta = \tan^{-1} \left(\frac{12}{9} \right)$$

$$\theta = 53.13^\circ$$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \theta = \sin^{-1} \left(\frac{12}{15} \right)$$

$$\theta = 53.13^\circ$$

$$\sum F^2 = 15^2 + 12^2 + 9^2 = 450$$

$$\sum F^2 = 450$$

$$F = \sqrt{450}$$

$$F = 21.21\text{N}$$

~~Resultant~~ Resultant is 21.21N. Resultant of 15N and 12N is 19.20N to the left 53.13° left of the horizontal. Resultant of 9N and 12N

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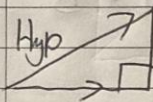
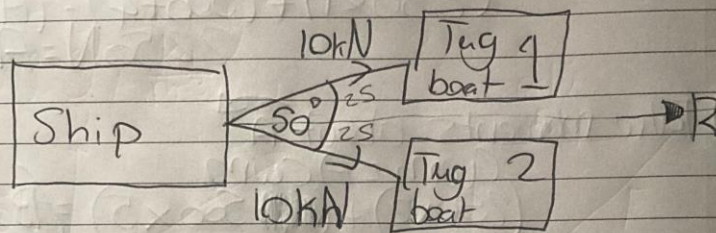
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15N to the right, 53.13° to the right next to the horizontal.

Resultant is 21.21 to the right of the horizontal line.

Bearing $90 - 53.13^\circ = 36.87$

(4)



$$R = \text{adj}$$

$$\cos 25^\circ = \frac{\text{adj}}{\text{Hyp}}$$

$$\cos 25^\circ = \frac{R}{10000}$$

$$10000 \times \cos 25^\circ = 9,063.07 \text{ N}$$

$$\text{For two tug boats} = 2 \times 9,063.07 = 18,126.14 \text{ N}$$

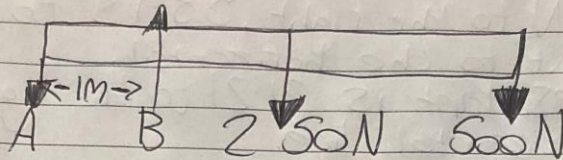
Resultant Force on the Ship = 18,126.14 N

Resultant of 2 boats = Drag = 18,126.14 N

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5)



a) Take Moments about B

$$\begin{aligned} \text{Cwm} &= \text{Acwm} \\ (250 \times 1) + (500 \times 4) &= (A \times 1) \\ 2250 \text{ N} &= A \end{aligned}$$

b) Take moments about A

$$\begin{aligned} \text{Cwm} &= \text{Acwm} \\ (250 \times 2) + (500 \times 5) &= (B \times 1) \\ 3000 \text{ N} &= B \end{aligned}$$

$$A = 2250 \text{ N}$$

$$B = 3000 \text{ N}$$

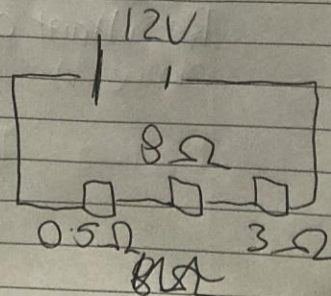
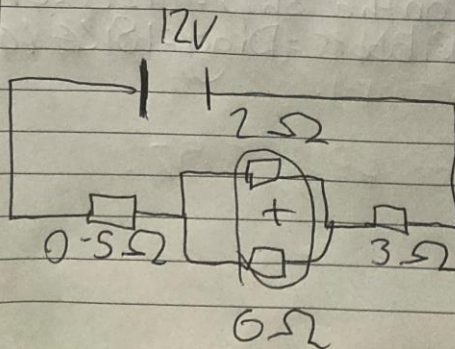
6.

a) Positive to negative. $R_1 + R_2 + R_3 + R_4 = 11.5 \Omega$

b) Total Resistance = $0.5 + 2 + 6 + 3 = 11.5 \Omega$

$$\frac{1}{0.5} + \frac{1}{2} + \frac{1}{3} = \frac{1}{R_T} = \frac{1}{11.5}$$

c) The current draw on the battery is $R = 0.406 \text{ A}$



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D) The voltage across the 3Ω resistor
 $= 3V$

E) The current through the 2Ω resistor
 $= 6A \quad \frac{V}{R} \quad 12:2=6$

F) The current through the 6Ω resistor
 $= 2A \quad \frac{V}{R} = \frac{12}{6} = 2$

g) R_4