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1.) UNITS

a.) AREA = m^2

b.) VOLUME = m^3

c.) MASS = kg

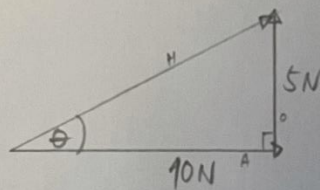
d.) FORCE = N

e.) WEIGHT = N

2.) UNITS OF DENSITY : $DENSITY = \frac{MASS}{VOLUME} \Rightarrow d = \frac{M}{V}$

3.) CALCULATE THE MAGNITUDE, DIRECTION, BEARING

a.)



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

$$\Sigma R^2 = 125$$

$$R = \sqrt{125}$$

$$R = 11.18$$

$$\tan \theta = \frac{OPP}{ADJ}$$

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

$$\theta = \tan^{-1}(5/10)$$

$$\theta = 26.57^\circ$$

RESULTANTS = 11.18 TO THE RIGHT

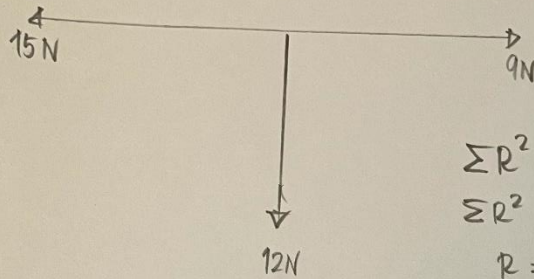
26.57° ABOVE THE HORIZONTAL

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

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3.)

b.)



$$\text{RESULTANT} = -15 + 9 \\ = -6 \text{ N}$$

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

$$\Sigma R^2 = -6^2 + 12^2$$

$$\Sigma R^2 = 180$$

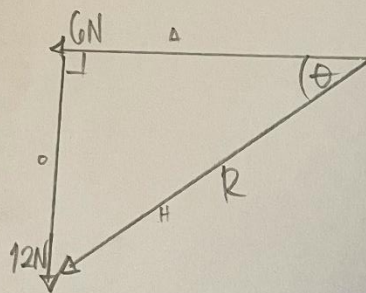
$$\Sigma R^2 = 108$$

$$R = \sqrt{180}$$

$$R = \sqrt{108}$$

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

$$\underline{R = 10.39 \text{ N}}$$



$$\text{TAN} = \frac{\text{OPP}}{\text{ADJ}}$$

$$\text{TAN } \theta = \frac{12}{6}$$

$$\theta = \text{TAN}^{-1}(12/6)$$

$$\underline{\theta = 63.43^\circ}$$

$$180 + 63.43 = 243.43^\circ \text{ BEARING}$$

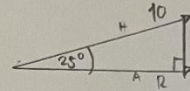
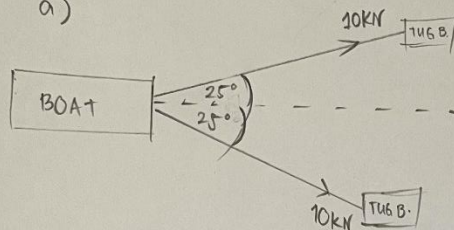
RESULTANT IS 10.39 N TO THE LEFT

63.43° BELOW THE HORIZONTAL

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4.)

a)



$$\cos = \frac{\text{ADJ}}{\text{HYP}}$$

$$\cos 20 = \frac{R}{10\text{KN} \times 1000}$$

$$10,000 \times \cos 20 = \frac{R}{10,000} \times 10,000$$

$$10,000 \times \cos 20 = R$$

$$R = 9396.93\text{N}$$

b.) DRAG FORCE ON THE SHIP

$$2 \times 9396.93 = 18793.86\text{N}$$

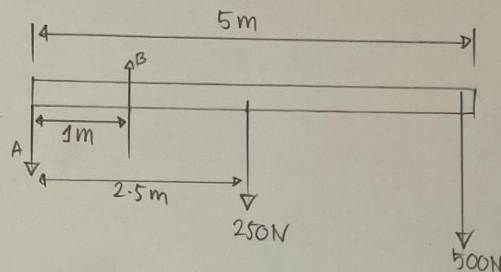
$\therefore$ RESULTANTS OF 2 TUG BOATS = DRAG 18793.86N

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5.)

A = BOLTS

B = EDGE OF THE POOL



a.) THE FORCE ON THE BOLTS.

TAKE MOMENTS ABOUT B

$$CWM = ACWM$$

$$(250 \times 1) + (4 \times 500) = (A \times 1)$$

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

b.) FORCE ON THE EDGE OF THE SWIMMING POOL.

TAKE MOMENTS ABOUT A

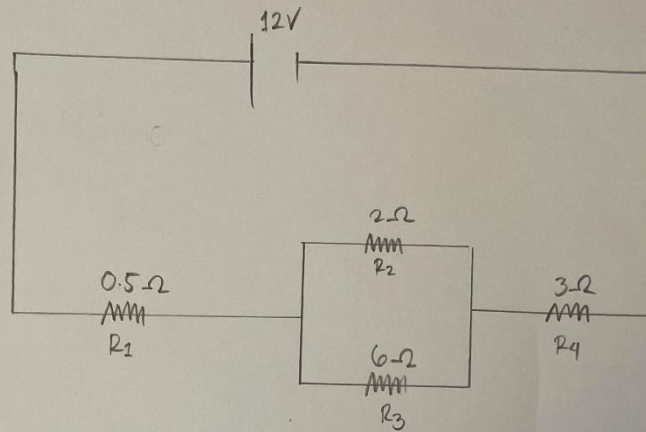
$$CWM = ACWM$$

$$(250 \times 2.5) + (500 \times 5) = (B \times 1)$$

$$\underline{3125 \text{ N} = B}$$

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6.)



a.) "A" POSITIVE TO NEGATIVE

$$b.) R_T = R_1 + R_4 \left(\frac{1}{\frac{1}{R_2} + \frac{1}{R_3}} \right)$$

$$R_T = 0.5 + 3 \left(\frac{1}{\frac{1}{2} + \frac{1}{6}} \right) = \underline{\underline{5\Omega}}$$

$$c.) V = IR \therefore I = \frac{V}{R} = \frac{12}{5} = \underline{\underline{2.4A}}$$

$$d.) V = IR = 2.4 \times 5 = \underline{\underline{12V}}$$

$$e.) V = IR = 2.4 \times \left(\frac{1}{\frac{1}{2} + \frac{1}{6}} \right) = \underline{\underline{3.6V}}$$

$$I = \frac{V}{R} = \frac{3.6}{2} = \underline{\underline{1.8A}}$$

$$f.) I = \frac{V}{R} = \frac{3.6}{6} = \underline{\underline{0.6A}}$$

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g.) $R_1 \quad P = IV \quad 2.4 \times 5 = 12 \text{ W}$

$R_2 \quad P = IV \quad 1.8 \times 3.6 = 6.48 \text{ W}$

$R_3 \quad P = IV \quad 0.6 \times 3.6 = 2.16 \text{ W}$

$R_4 \quad P = IV \quad 2.4 \times 5 = 12 \text{ W}$

$R_1 \text{ AND } R_4 =$
 $0.5 \Omega \text{ AND } 3 \Omega$