

Friday 14th of January 2022
ACTHA3000
2005053, Jacob Jones

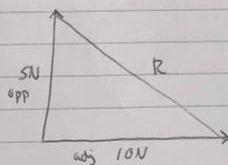
①

- a) area = m^2
- b) volume = m^3
- c) mass = kg
- d) force = N
- e) weight = N

② Density = $\frac{\text{mass}}{\text{Volume}} = \frac{kg}{m^3} = kg/m^3$

③

a)



$$R^2 = 5^2 + 10^2$$
$$R^2 = 125$$
$$R = \sqrt{125} = 11.2 N$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{5}{10} \Rightarrow \theta = \tan^{-1}\left(\frac{5}{10}\right) = 26.6^\circ$$

$\therefore$ the resultant is 11.2 N to the right, 26.6° above the horizontal



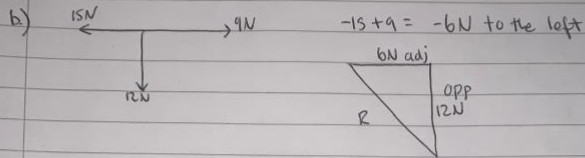
$$\text{bearing} = 90 - 26.6 = 63.4^\circ$$

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③



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

$$R^2 = 180$$

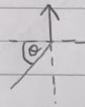
$$R = \sqrt{180} = 13.4N$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{12}{6}$$

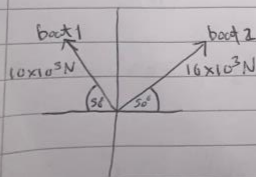
$$\theta = \tan^{-1}\left(\frac{12}{6}\right) \quad \theta = 63.43^\circ$$

∴ Resultant is 13.4N to the left, 63.43° below the horizontal

$$\text{bearing} = 270 - 63.43 = 206.57$$



④



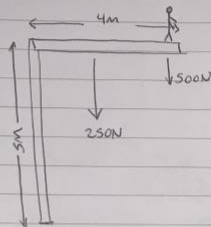
$$10\text{KN} = 10000\text{N or } 10 \times 10^4$$

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⑤



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- b.) R_T for parallel = $\frac{1}{\frac{1}{R_2} + \frac{1}{R_3}} = \frac{1}{\frac{1}{2} + \frac{1}{6}} = 1.5 \Omega$

R_T for parallel series = $R_1 + R_T + R_4 = 0.5 + 1.5 + 3 = 5 \Omega$

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

d.) voltage = $IR = 2.4 \times 3 = \underline{7.2V}$

e.) voltage across parallel = $2.4 \times \left(\frac{1}{\frac{1}{2} + \frac{1}{6}} \right) = 3.6 \text{ V}$

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

f. Use same ~~data~~ ^{voltage} as e) = 3.6V
current = $I = \frac{V}{R} = \frac{3.6}{6} = 0.6 \text{ A}$

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⑥

g) $R_1 \quad P = IV = 2.4 \times 1.2 = 2.88 \text{ W}$

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

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

$R_4 \quad P = IV = 2.4 \times 7.2 = 17.28 \text{ W}$

R_4 transfers the highest amount of energy