

LOCATION: SWANSEA

LLEOLIAD: ABERTAWE

LEVEL 3

LEFEL 3

EXAMINATION PERIOD
JANUARY 2022

CYFNOD ARHOLIADAU
IONAWR 2022

MODULE CODE: ACHA3000
INTRODUCTION TO MATHS & SCIENCE

TIME: 1 ½ HOURS

ANSWER ALL QUESTIONS

Where needed, take the value of gravity to be 9.81m/s^2

ANSWER ALL QUESTIONS

1. Write down the units for the following:

- a. Area m² [1 mark]
- b. Volume m³ [1 mark]
- c. Mass kg [1 mark]
- d. Force N [1 mark]
- e. Weight lb [1 mark]

2. Given the equations for density can be written as:

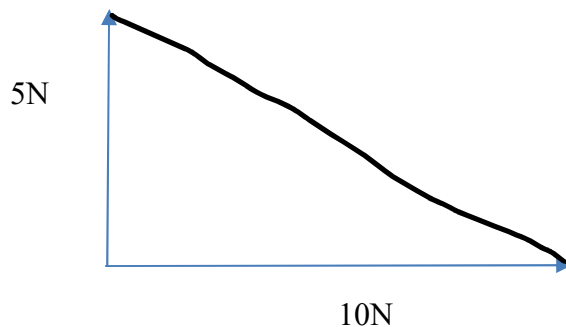
$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Write down the units of density. g/cm³ [1 mark]

3. Calculate the magnitude, direction and specify a bearing of the resultant for the following vectors:

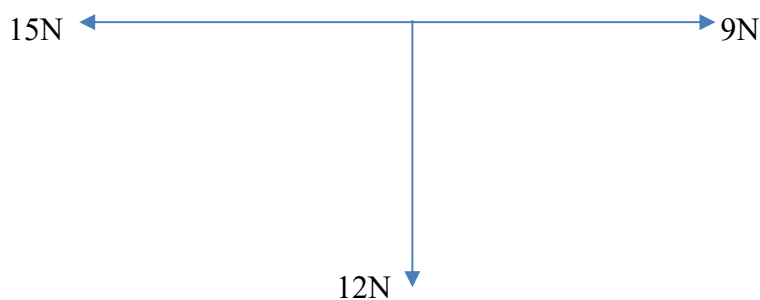
Magnitude – $5^2 + 10^2 = 30 = 45$

a.



[13 marks]

b.



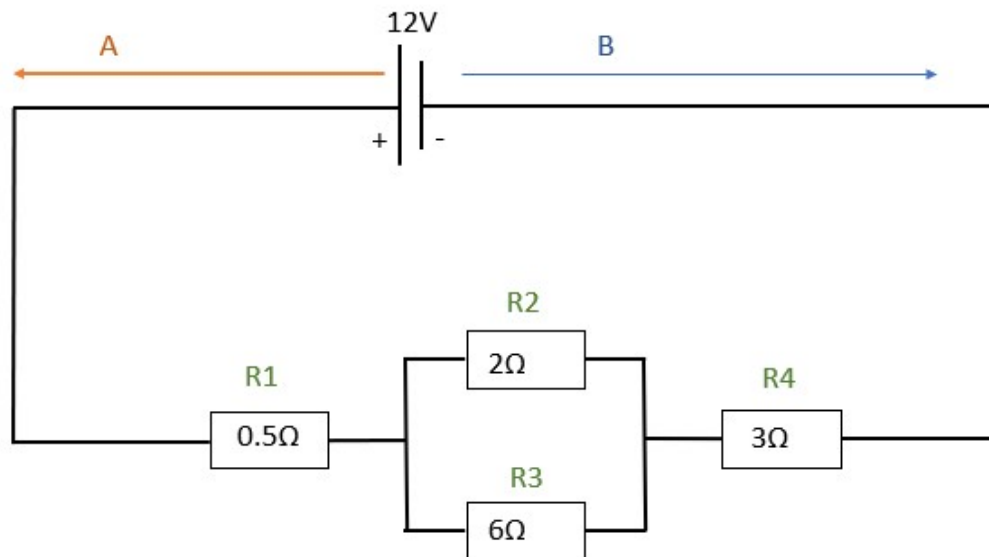
[15 marks]

4. A ship is towed at a constant speed by two tug boats, each pulling the ship with a force of 10kN. The angle between the tug boat cables is 50 degrees. Draw a vector diagram [2 marks] and calculate:

- a. The resultant force on the ship, [6 marks]
- b. The drag force on the ship. [2 marks]

5. A uniform diving board has a length of 5m, and a weight of 250N. It is bolted to the ground at one end, and projects a distance of 4m beyond the edge of the swimming pool. A person of weight 500N stands on the free end of the diving board, draw a free body diagram of the diving board [4 marks] and calculate:
- The force on the bolts. [3 marks]
 - The force on the edge of the swimming pool. [3 marks]

6. A Circuit has a 12V battery as a DC source and 4 resistors. Resistors R2 and R3 are connected in parallel and in series with R1 and R4



- Which direction is conventional current flow in 'A' positive to negative or 'B' negative to positive [1 mark]
- What is the circuits total resistance [2 marks]
- what is the current draw on the battery [2 marks]
- what is the voltage across the 3Ω resistor (R4) [2 marks]
- what is the current through the 2Ω resistor (R2) [3 marks]
- what is the current through the 6Ω resistor (R3) [2 marks]
- Calculate which resistor transfers the highest amount of energy [3 marks]

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