



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**BUILDING SCIENCE N1**

**7 April 2021**

**This marking guideline consists of 7 pages.**

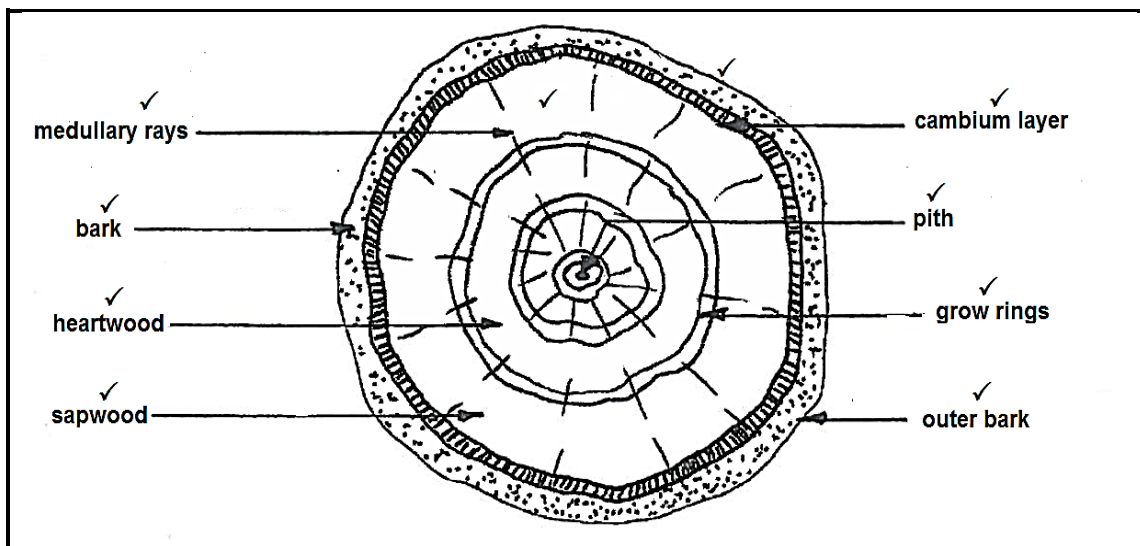
**QUESTION 1**

- 1.1 Newton metre✓ N.m✓
- 1.2 Pascal✓ Pa✓  
**OR**  
Kilopascal✓ kPa✓
- 1.3 Kilogram per cubic metre✓ kg/m<sup>3</sup> or kg.m<sup>-3</sup>✓
- 1.4 Kelvin✓ K✓
- 1.5 Newton✓ N✓

(5 × 1)

**[5]****QUESTION 2**

2.1



(8)

- 2.2
- The principle of the preservation of timber is the poisoning of the food on which fungi and insects live; their food is wood.✓ The usual method employed is to force a liquid into the timber so that it✓ permeates the cell walls and✓ renders them toxic to insects and fungi.✓

(4)

- 2.3
- Kiln seasoning
  - Natural seasoning

(2 × 1)

(2)

2.4      2.4.1      Volume =  $L \times B \times H$

$$= [750 \times 400 \times 50] \div 10 \checkmark$$

$$= 75 \times 40 \times 5 \checkmark$$

$$= \underline{15\,000\text{ cm}^3} \rightarrow \checkmark \quad (3)$$

2.4.2      Volume =  $L \times B \times H$

$$= [750 \times 400 \times 50] \div 1\,000 \checkmark$$

$$= 0,75 \times 0,40 \times 0,05 \checkmark$$

$$= \underline{0,015\text{ m}^3} \rightarrow \checkmark \quad (3)$$

**[20]**

**QUESTION 3**

- 3.1      False  
 3.2      True  
 3.3      False  
 3.4      True  
 3.5      True

(5 × 2)      **[10]**

**QUESTION 4**

- 4.1      • Cement  
          • Aggregate  
          • Water (3)

- 4.2      The bulking of sand is the increase in volume, due to moist conditions and wet weather. (3)

4.3      Water-Cement ratio =  $\frac{\text{Mass of water}}{\text{Mass of Cement}} \checkmark$

$$= \frac{25}{60} \checkmark$$

$$= \underline{0,42} \rightarrow \checkmark \checkmark \quad (4)$$

**[10]**

**QUESTION 5**

5.1 Charles' law states that the volume of a gas is directly proportional to the absolute temperature if the pressure is kept constant. (3)

5.2  $P_1V_1 = P_2V_2$

$$V_2 = \frac{P_1V_1}{P_2} \checkmark$$

$$V_2 = \frac{(250)(6)}{650} \checkmark$$

$$V_2 = \underline{2,31 \text{ m}^3} \checkmark \checkmark \quad (4)$$

5.3  $P = \text{height} \times \text{density} \times \text{gravity} \checkmark$

$$= 45 \times 1\,000 \times 10 \checkmark$$

$$= \frac{450\,000 \text{ Pa}}{1000} \checkmark \checkmark$$

$$= \underline{450 \text{ kPa}} \checkmark \checkmark \quad (6)$$

**[13]****QUESTION 6**

6.1 6.1.1  $\overleftarrow{\hspace{1cm}} \quad \overrightarrow{\hspace{1cm}}$   
630 N – 440 N  $\checkmark \checkmark$

$R = \underline{190 \text{ N towards the left-hand side}} \checkmark \checkmark \quad (4)$

6.1.2 Equilibrant =  $\underline{190 \text{ N towards the right-hand side}} \checkmark \checkmark \quad (2)$

6.2 Horizontal component

$$HC = F \cos \theta \checkmark$$

$$= 125 \cos 30^\circ \checkmark$$

$$= \underline{108,25 \text{ kN}} \checkmark$$

Vertical component

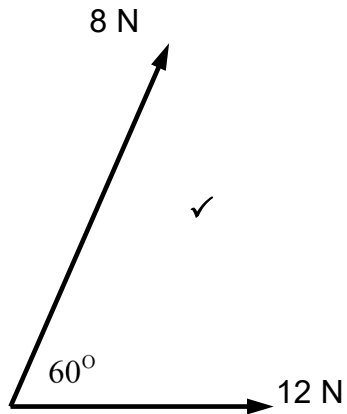
$$VC = F \sin \theta \checkmark$$

$$= 125 \sin 30^\circ \checkmark$$

$$= \underline{6\,205 \text{ kN}} \checkmark$$

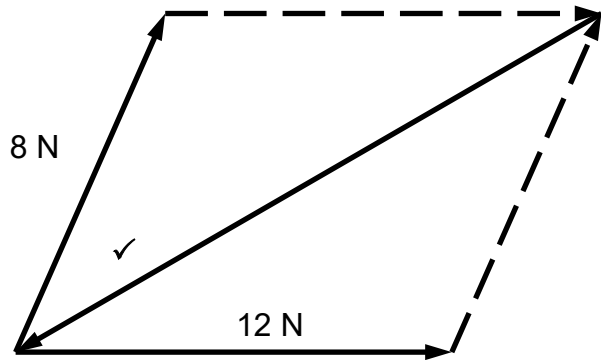
(6)

6.3



SPACE DIAGRAM ✓

No Scale



No scale to the drawing ✓

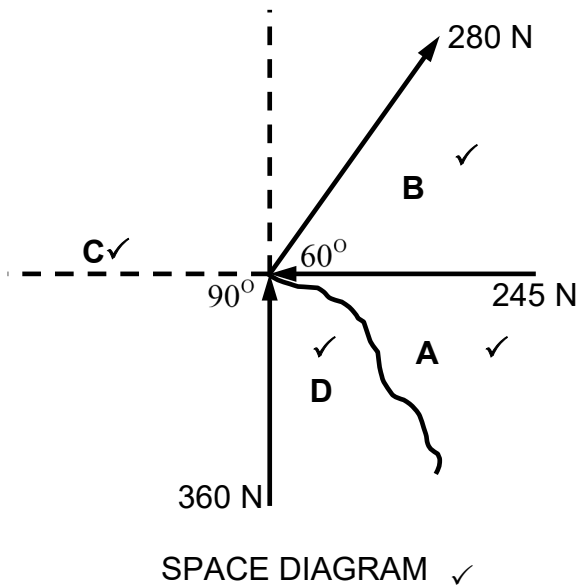
FORCE DIAGRAM

Scale 1 cm = 2 N

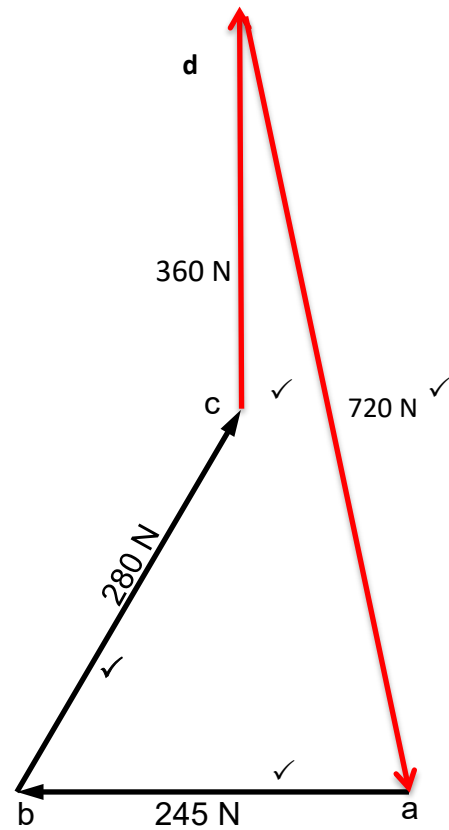
Equilibrant = 17,6 N at  $24^\circ$  to the horizontal

(6)  
[18]

## QUESTION 7



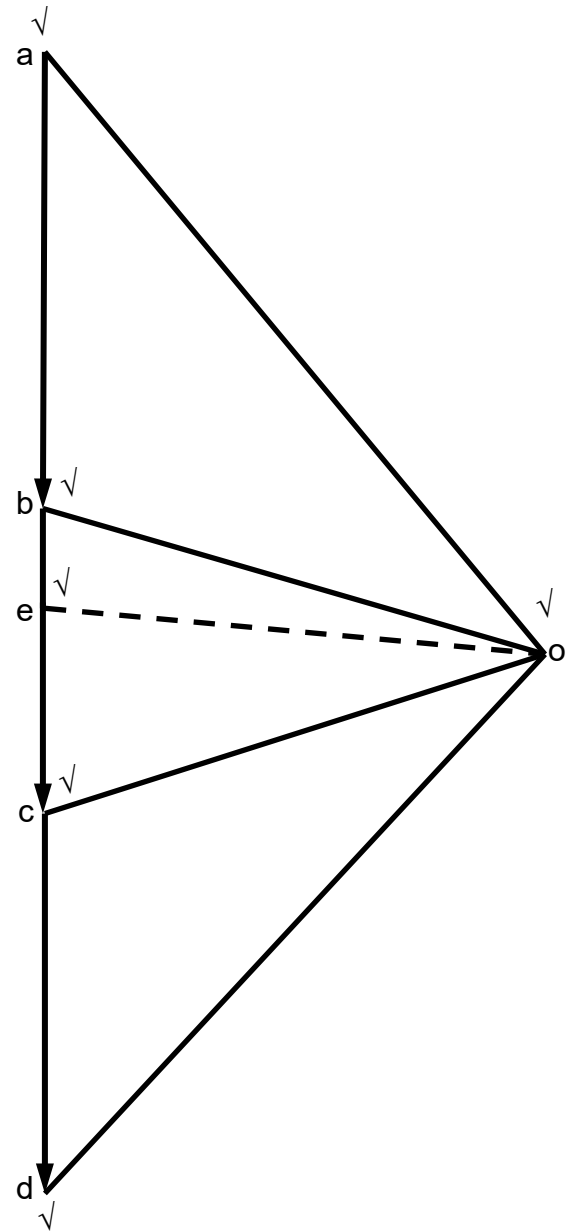
No scale

Resultant =  $cd = 150 \text{ N}$  ✓✓

No scale to the drawing

Scale: 1 cm = 50 N ✓

**[12]**

[illegible]
$$R_R = de = 74 \text{ N} \quad \checkmark$$
$$R_L = ea = 76 \text{ N} \quad \checkmark$$


**[12]**

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