



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE BUILDING SCIENCE N1

28 July 2021

This marking guideline consists of 6 pages.

QUESTION 1

- | | |
|------|---------------------------------------|
| 1.1 | Square metre |
| 1.2 | Force |
| 1.3 | N |
| 1.4 | Kilogram per cubic metre |
| 1.5 | Kg/m^3 or kg.m^{-3} |
| 1.6 | Thermodynamic temperature |
| 1.7 | Kelvin |
| 1.8 | Cubic metre |
| 1.9 | Pressure |
| 1.10 | Kilopascal |

(10 × 1) **[10]**

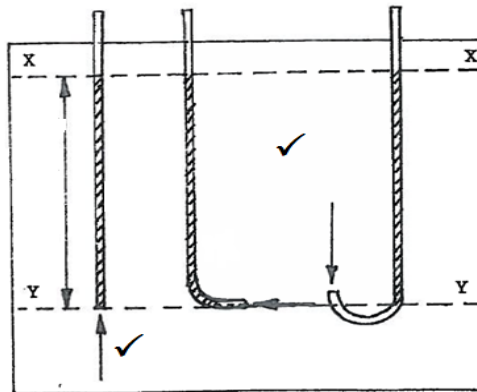
QUESTION 2

- | | |
|-----|-------|
| 2.1 | False |
| 2.2 | True |
| 2.3 | True |
| 2.4 | False |
| 2.5 | True |

(5 × 2) [10]

QUESTION 3

3.1



Method

- Pour coloured liquid into the three glass tubes until the liquid is the same height in all three.✓
- Then place the tubes in the large glass container with water so that their openings are all at the same depth.✓
- If the difference in height between X and Y is measured for each tube, it will be found that it is the same in all three tubes.✓
- This proves that the upward, downward and sideward pressure in liquids is the same at the same depth.✓

(6)

3.2 Diameter = 1 050 mm ÷ 1000
 $= \underline{1.05 \text{ m}}$ ✓✓

Pressure = $h \times d \times g$ ✓
 $= 1.5 \times 1.05 \times 10$ ✓
 $= 15.75 \text{ Pa} \div 1000$ ✓✓
 $= \underline{0.01575 \text{ kPa}}$ ✓✓

(8)
[14]

QUESTION 4

4.1 The relative density (r.d.) of a substance is the density of the substance compared to the density of water or the mass of any volume of the substance compared to the mass of an equal volume of water. (3)

4.2 Empty container = 23,5 g
 Empty container + paraffin = 45,5 g
 Volume of paraffin = 73,5 cm³

Mass of paraffin = Empty container – Empty container ✓
 $= 45.5 \text{ g} - 23.5 \text{ g}$ ✓
 $= \underline{22 \text{ g}}$ ✓

Density of paraffin = $\frac{M}{V}$ ✓
 $= \frac{22}{73.5}$
 $= \underline{0.30 \text{ g/cm}^3}$ ✓✓

(6)

4.3 R.D = $\frac{\text{Density of timber}}{\text{Density of water}}$

$0.82 = \frac{\text{Density of timber}}{1000 \text{ kg / m}^3}$ ✓

Density of timber = $0.82 \times 1000 \text{ kg/m}^3$ ✓

Density of timber = $\underline{820 \text{ kg/m}^3}$ ✓

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

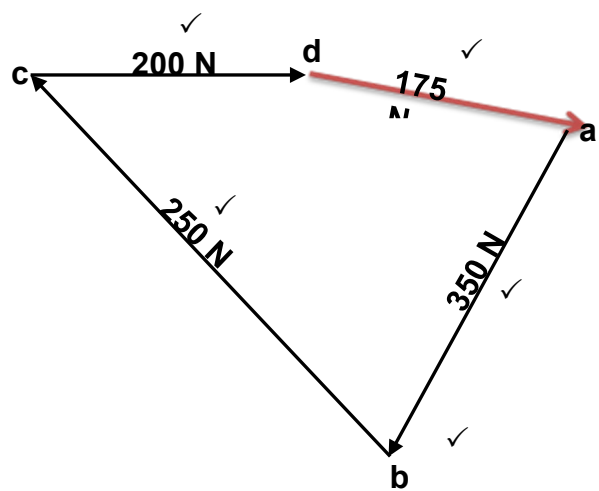
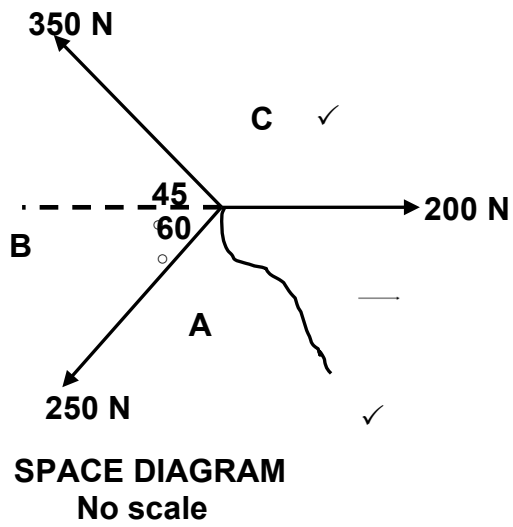
Mass = Density × Volume ✓
 $= 820 \text{ kg/m}^3 \times [4,5 \times 0.3 \times 0.075]$ ✓✓
 $= 820 \text{ kg/m}^3 \times 0.101$ ✓

Mass = $\underline{83.03 \text{ kg}}$ ✓

(8)
[17]

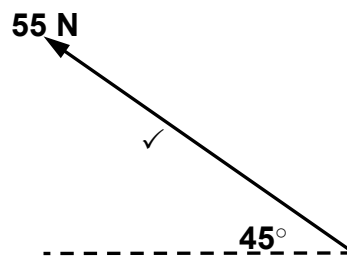
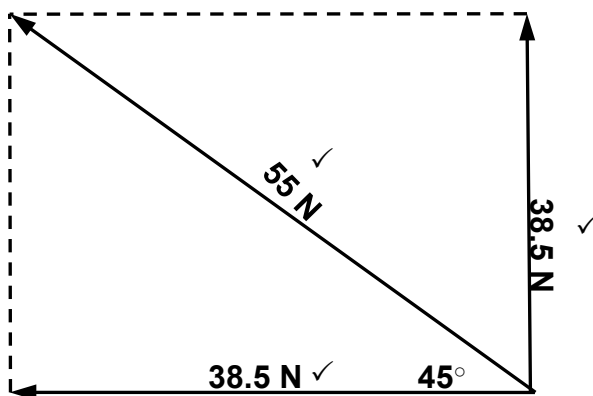
QUESTION 5

5.1

Resultant = $ad = 175 @ 12^\circ \text{ N of E}$

(8)

5.2

SPACE DIAGRAM
No Scale✓

FORCE DIAGRAM

Scale 1cm: 5 N✓

HC = 38.5 N✓

VC = 38.5 N✓

(8)
[16]

QUESTION 6

6.1

$$\overleftarrow{350 \text{ N}} - \overrightarrow{220 \text{ N}} \checkmark \checkmark$$

$$R = \overleftarrow{130 \text{ N}} \text{ towards the left-hand side} \checkmark \checkmark$$

(4)

6.2

Horizontal component

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

$$= 50 \cos 60^\circ \checkmark$$

$$= \overrightarrow{25 \text{ kN}} \checkmark$$

Vertical component

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

$$= 50 \sin 60^\circ \checkmark$$

$$= \overrightarrow{43.30 \text{ kN}} \checkmark$$

(6)
[10]

QUESTION 7

7.1 $3\,200\text{ kg} \times 10 = 32\,000\text{ N}$ ✓

$$= \frac{32000}{1000} \checkmark$$

$$= \frac{32}{2} \checkmark$$

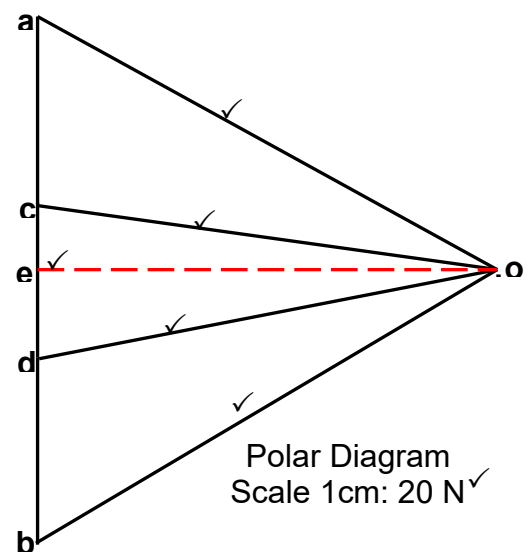
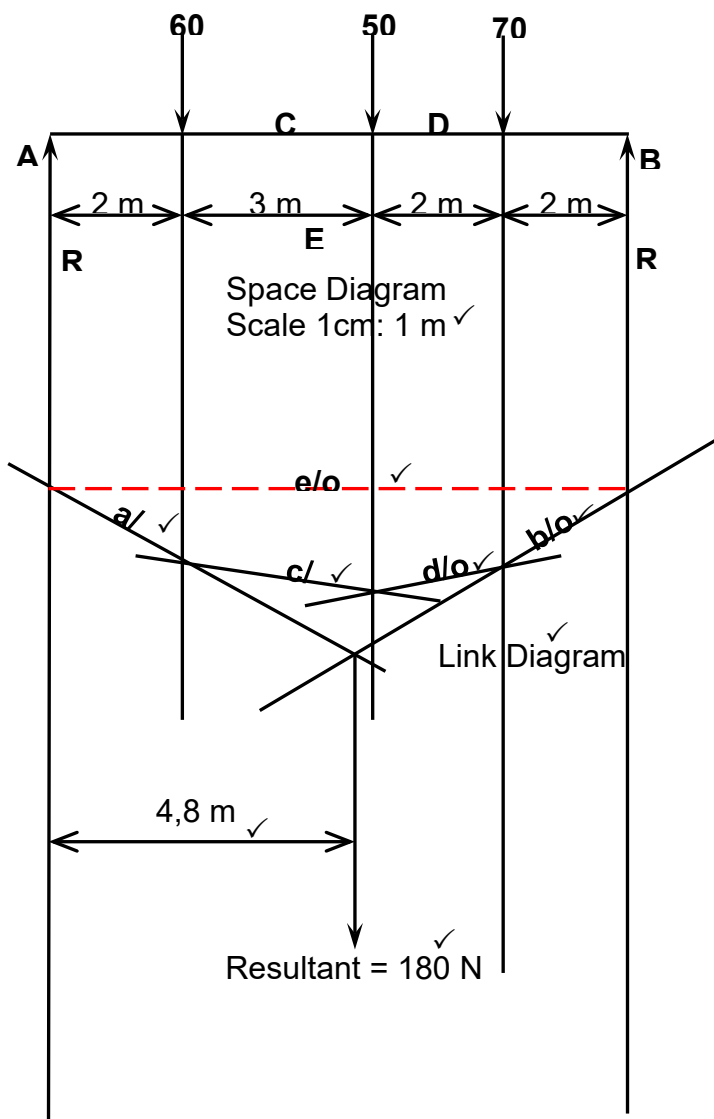
$$= 16\text{ kN} \checkmark$$

(4)

7.2 7.2.1 $R_L = ea \checkmark = 4.2\text{ m} = 84\text{ N} \checkmark \checkmark$
 $R_R = be \checkmark = 4.8\text{ m} = 96\text{ N} \checkmark \checkmark$

(6)

7.2.2



(13)

[23]**TOTAL: 100**