



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING SCIENCE N1

2 April 2024

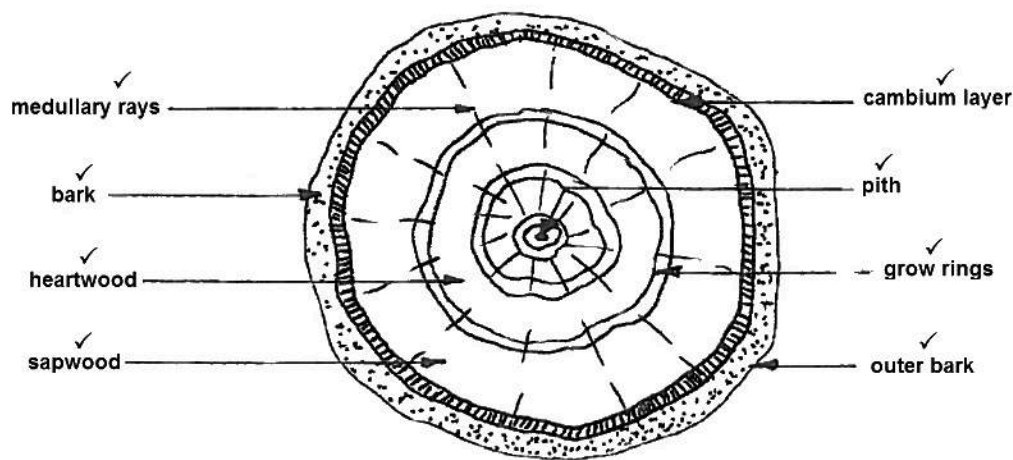
This marking guideline consists of 6 pages.

QUESTION 1

- 1.1 Volume = Area of base x height
= $3.142 (r)^2 \times h$ ✓
= $3.142 (22.5)^2 \times 120$ ✓
= $190\,876.5 \text{ mm}^3$ ✓ (3)
- 1.2 Area = $3.142 \times (r)^2$ ✓
= $3.142 \times (80)^2$ ✓
= $20\,108.80 \text{ mm}^2$ ✓ (3)
- 1.3 Metre per second or Kilometre per hour (m/s or km/h) (1)
- 1.4 Newton (N) (1)
- 1.5 Degrees Celsius ($^{\circ}\text{C}$) (1)
- 1.6 Pascal Or Kilopascal (Pa or kPa) (1)
- [10]

QUESTION 2

2.1



- 2.2 Preservation of timber is **poisoning of the food on which fungi and insects live.** (8)
- 2.3 2.3.1
- The conditions in the kiln can be controlled
 - The process only takes approximately 2 weeks
 - A lower moisture content can be reached
 - The attack of insects and fungi is prevented during process
- (Any 3 × 1) (3)

- 2.3.2
- The process requires little attention
 - Only slight defects occur in the timber
 - Timber of all thickness can be dried
 - No expensive apparatus or buildings are needed
 - Gradual drying prevents case-hardening, cracking and warping
- (Any 3 × 1) (3)

2.4 $V = \text{length} \times \text{breadth} \times \text{height}$
 $= 0.39 \times 0.14 \times 0.19 \checkmark$
 $= 0.01 \text{ m}^3 \checkmark \checkmark$ (3)
[20]

QUESTION 3

- 3.1 The relative density (r.d) of a substance is the **density of the substance compared with the density of water** or the **mass of any volume of the substance compared with the mass of an equal volume of water.** (3)

3.2 Mass of Paraffin = Empty container and paraffin – Empty container ✓
 $= 43.5 \text{ g} - 10.5 \text{ g}$
 $= 33 \text{ g} \checkmark$

Density of Paraffin = $\frac{M}{V} \checkmark$
 $= \frac{33}{31.4}$
 $= 1.051 \text{ g/cm}^3 \checkmark \checkmark$ (5)

3.3 $R.D = \frac{\text{Density of material}}{\text{Density of water}}$

Density of material = Relative Density × Density of water ✓

Density of material = $0.8 \times 1\,000 \text{ kg/m}^3 \checkmark$

Density of material = $800 \text{ kg/m}^3 \checkmark$

Density of material = $\frac{M}{V}$

Mass of the timber beam = $D \times V \checkmark$

Mass = $800 \text{ kg/m}^3 \times [7.5 \times 0.424 \times 0.148] \checkmark$

Mass = $800 \text{ kg/m}^3 \times 0.471 \checkmark$

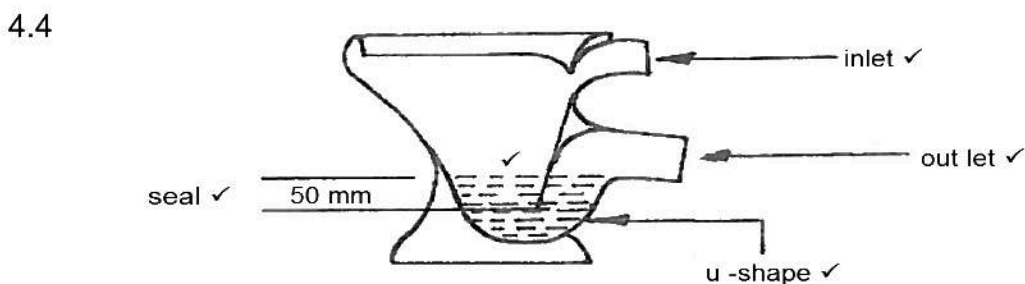
Mass = $376.5 \text{ kg} \checkmark$ (7)

QUESTION 4

4.1 The **volume of a gas varies directly** as its **absolute temperature changes**, if the **pressure is kept constant**. (3)

4.2 $P_1 V_1 = P_2 V_2$ ✓
 $P_2 = \frac{(6)(350)}{(3)}$ ✓
 $P_2 = 700 \text{ kPa}$ ✓ (3)

4.3 Density = R.d × density of material
 Density = $1.02 \times 1000 \text{ kg/m}^3$ ✓
 $= 1020 \text{ kg/m}^3$ ✓
 $P = h \times d \times g$
 $= 70 \times 1020 \times 10$ ✓
 $= 714\,000 \text{ Pa}$ ✓
 $= 714 \text{ kPa}$ ✓ (5)



(5)
[16]

QUESTION 5

5.1

- Cement
- Aggregate
- Water

(3)

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

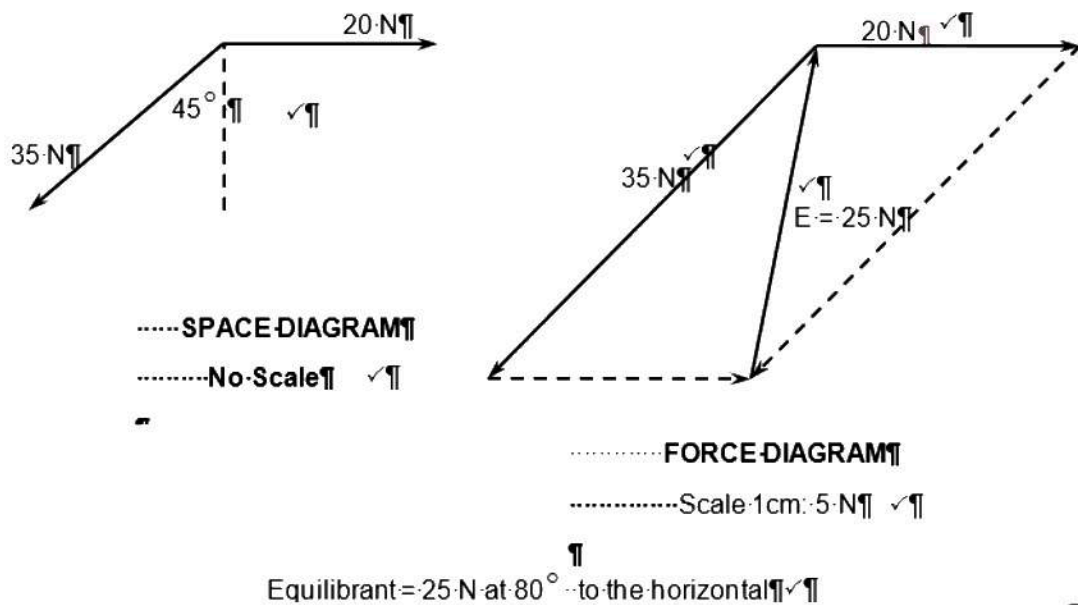
5.3 Water: Cement ratio = $\frac{\text{Mass of water}}{\text{Mass of Cement}}$ ✓
 $= \frac{25}{60}$ ✓
 $= 0.42$ ✓✓

QUESTION 6

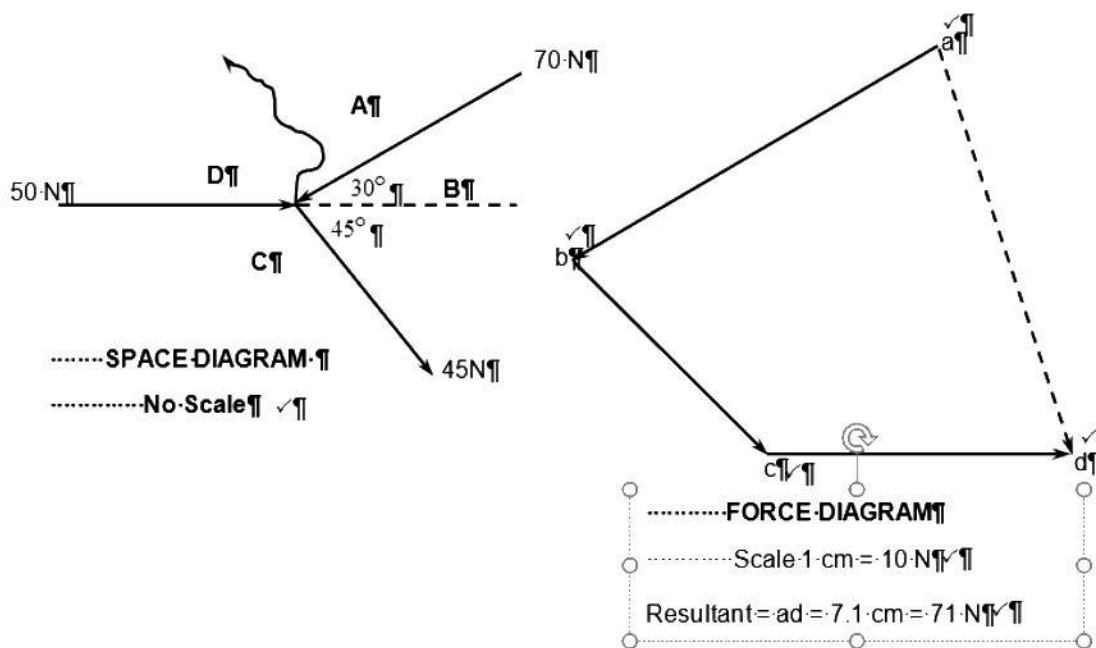
6.1 6.1.1 If two forces acting at a point are represented in size and direction by two adjacent sides of a parallelogram, the **resultant** of the two forces is represented in size and direction by the diagonal line of the completed parallelogram drawn from where the forces act. (3)

6.1.2 If three forces acting at a point are in equilibrium, they can be represented in size and direction by the **sides of a triangle**, taken in order. (3)

6.2

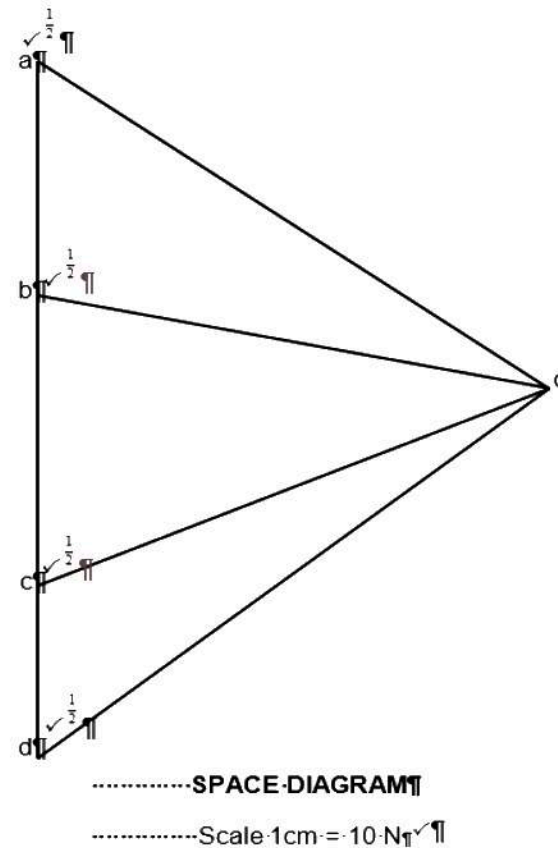
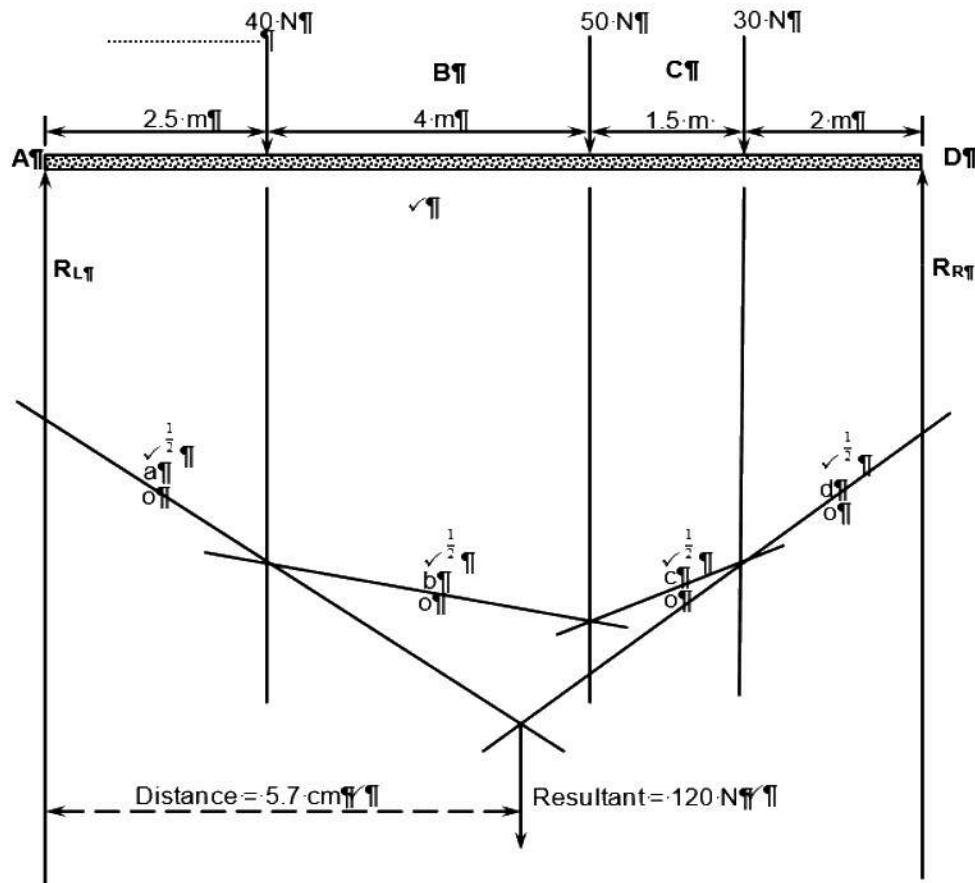


6.3



(7)
[20]

QUESTION 7



[9]

TOTAL: 100