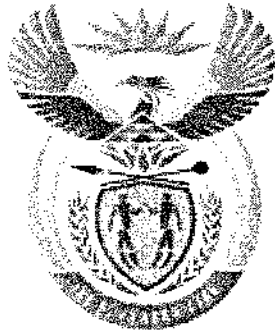


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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

BUILDING SCIENCE N1

18 NOVEMBER 2014

This marking guideline consists of 8 pages.

QUESTION 1

1.1 The volume of a given mass of gas is inversely proportional to the pressure exerted on it, providing the temperature remains the same. (3)

1.2
$$\begin{aligned} \text{°C} &= \text{K} - 273 \\ &= 200 - 273 \\ &= -73 \text{ °C} \end{aligned}$$
 (2)

1.3
$$\begin{aligned} P_1 V_1 &= P_2 V_2 \\ V_2 &= \frac{P_1 V_1}{P_2} \\ &= \frac{250 \text{ kPa} \times 4 \text{ m}^3}{400 \text{ kPa}} \\ &= 2,5 \text{ m}^3 \end{aligned}$$
 (5)
[10]

QUESTION 2

2.1
$$\begin{aligned} \text{Area} &= \text{length} \times \text{breadth} \\ &= 50 \text{ cm} \times 15 \text{ cm} \\ &= 750 \text{ cm}^2 \end{aligned}$$
 (3)

2.2
$$\begin{aligned} \text{Volume} &= \text{length} \times \text{breadth} \times \text{height} \\ &= 9 \text{ m} \times 0,15 \text{ m} \times 0,25 \text{ m} \\ &= 0,338 \text{ m}^3 \end{aligned}$$

OR

$$\begin{aligned} &= 9\,000 \text{ mm} \times 150 \text{ mm} \times 250 \text{ mm} \\ &= 337\,500\,000 \text{ mm}^3 \end{aligned}$$
 (3)

2.3

QUANTITY	UNIT	SYMBOL
Volumes (liquids)	Litre ✓	v l or litre
Pressure ✓	pascal	v Pa
force	Newton v	v N

(4)
[10]

QUESTION 3

- 3.1
- Malthoid✓
 - PVC✓
 - Bitumen-impregnated felt ✓
 - Thin layers of slate✓
 - Dense pressed bricks✓
- (Any 3 × 1) (3)

3.2 15 litres of water = 15 kg of water (1 litre = 1 kg)

$$\begin{aligned} \text{Water : cement ratio} &= \frac{\text{Mass of water}}{\text{Mass of cement}} \quad \checkmark \\ &= \frac{15 \text{ kg}}{30 \text{ kg}} \quad \checkmark \\ &= 0,5 \quad \checkmark \end{aligned} \quad (4)$$

3.3 Moisture content = $\frac{OM - DM}{DM} \times 100 \quad \checkmark$

$$\begin{aligned} &= \frac{75 - 50}{50} \times 100 \\ &= 50\% \end{aligned} \quad \checkmark \checkmark \quad (3)$$

[10]

QUESTION 4

4.1 The mass per unit volume of a substance is called its density, and is expressed in g/cm³ or kg/m³. (3)

4.2 Relative density = $\frac{\text{Density of substance}}{\text{Density of water}}$ ✓

or

= $\frac{\text{Mass of substance}}{\text{Mass of water}}$ ✓

(1)

4.3 Volume = length x breadth x width ✓
 = 5 x 0,07 x 0,12 m (correct conversion to m) ✓
 = 0,042 m³ ✓

Density = $\frac{\text{Mass}}{\text{Volume}}$ ✓
 = $\frac{40 \text{ kg}}{0,042 \text{ m}^3}$ ✓ = 952,381 kg/m³ ✓

(6)
[10]

QUESTION 5

5.1 A material is said to be porous when its mass is not solid throughout, but contains a certain amount of air space. This air space is usually divided up into a great number of very small spaces known as voids or pores which are distributed throughout the mass of the material.

(3)

- 5.2
- Furniture beetle ✓
 - Powder-post beetle ✓
 - Longhorn beetle ✓
 - Termites ✓
- (Any 3 × 1) (3)

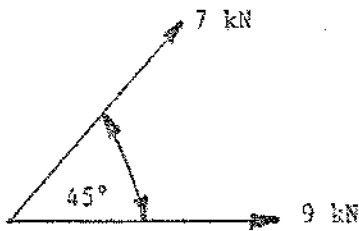
- 5.3
- It must be composed of the correct proportions of fine to coarse aggregates. ✓
 - It must have the correct cement : aggregate ratio. ✓
 - It must have the correct water : cement ratio. ✓
 - It must be well-mixed. ✓
 - It must be fully compacted. ✓
 - It must be well cured. ✓
- (Any 4 × 1) (4)
[10]

QUESTION 6

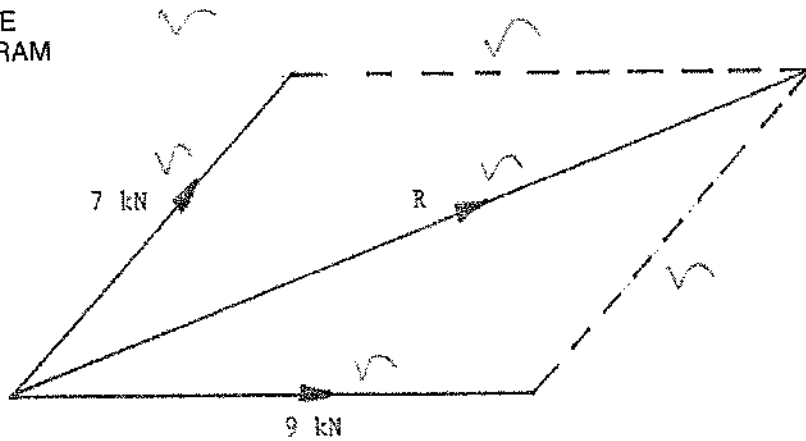
6.1 6.1.1 A force is that which changes or tend to change the state of rest or uniform motion of a body in a straight line. (2)

6.1.2 The unit in which a force is measured, is called a newton and the symbol used for newton is N. (2)

6.2



SPACE DIAGRAM



FORCE DIAGRAM

SCALE: 1 cm = 1 kN

RESULTANT = 14,8 kN/19,5 °N of E

(6)
[10]

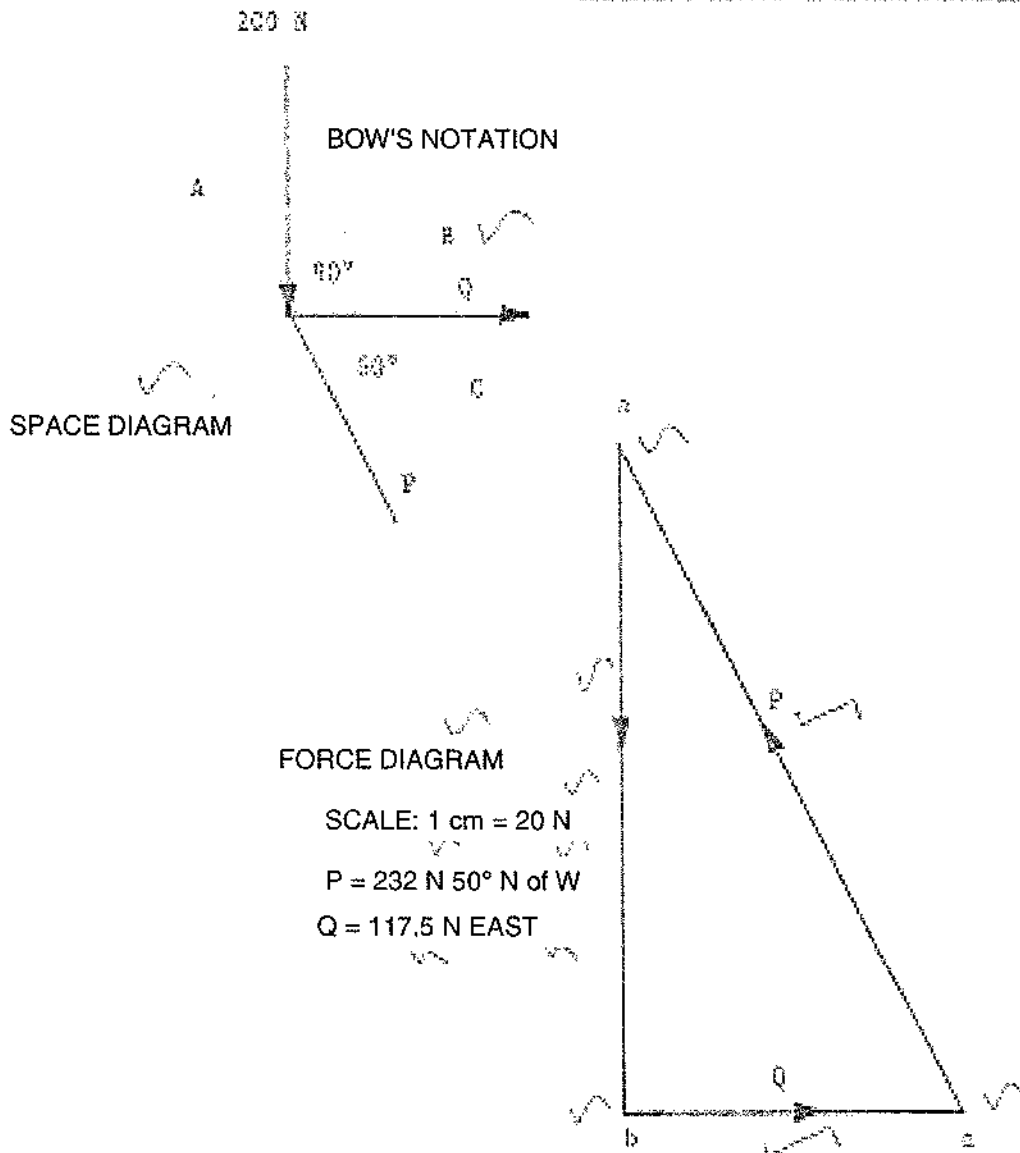
QUESTION 7

7.1 If three forces acting at a point are in equilibrium, they can be represented

in size or magnitude and direction by the sides of a triangle, taken in order.

(3)

7.2



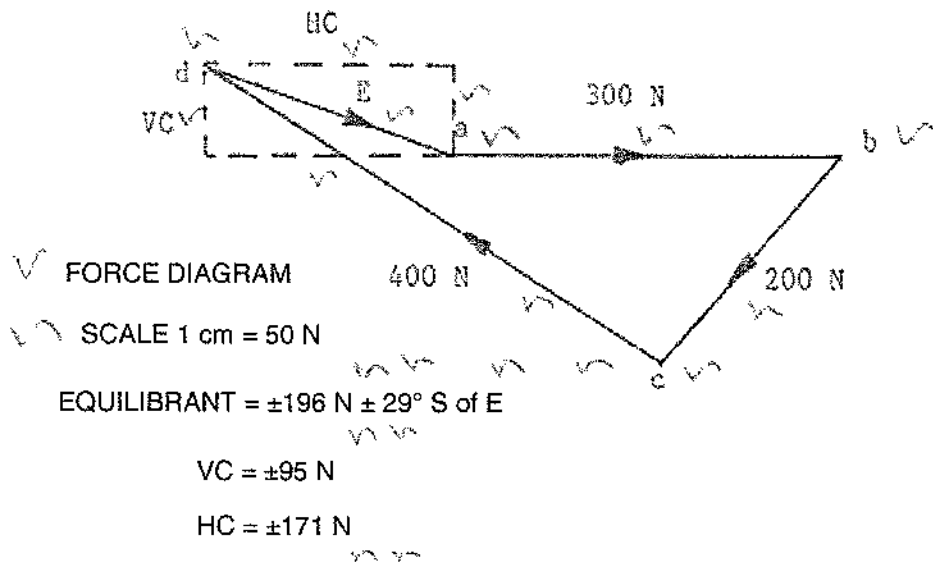
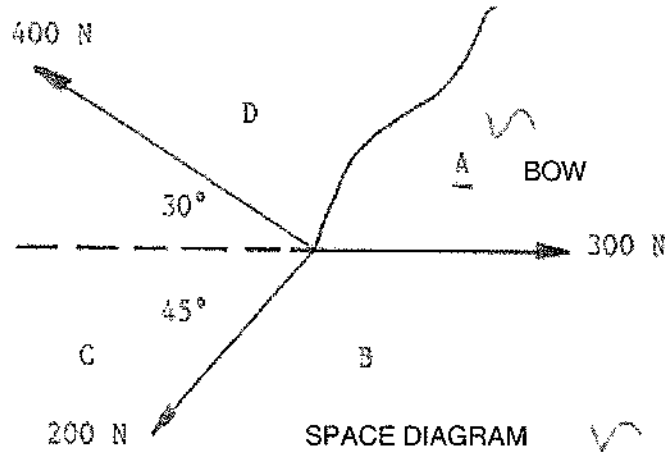
(7)
[10]

QUESTION 8

8.1 If more than three coplanar forces acting on a point are in equilibrium, they

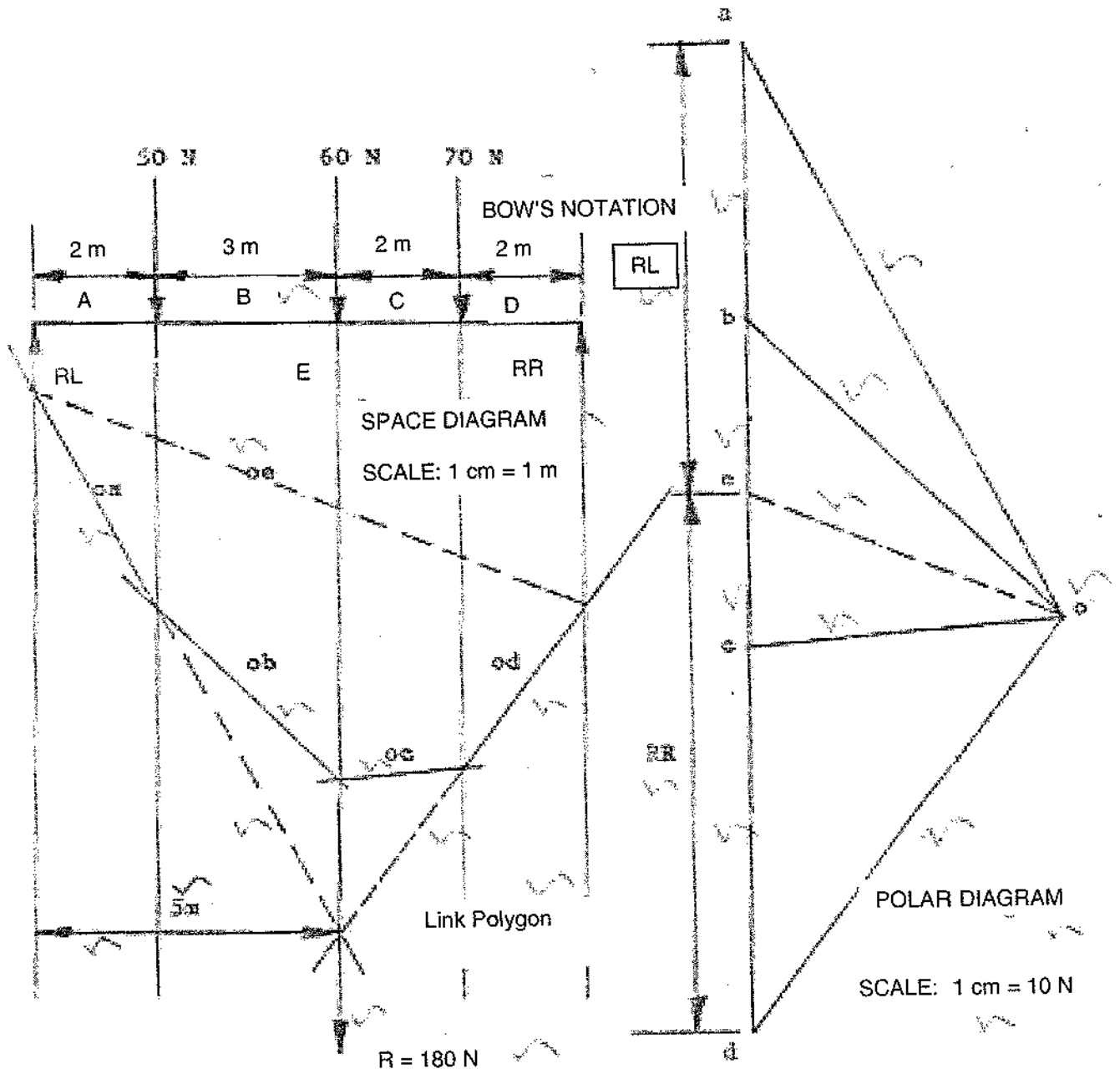
can be represented in magnitude and direction by the sides of a closed polygon, taken in order. (3)

8.2



(12)
[15]

QUESTION 9



RL = 82

RR = 98 N

[15]

TOTAL: 100