

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

**NATIONAL CERTIFICATE
NOVEMBER EXAMINATION
BUILDING SCIENCE N1
25 NOVEMBER 2013**

This marking guideline consists of 9 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
$$\begin{aligned} \text{° C} &= \text{K} - 273 \\ &= 300 - 273 \\ &= 27 \text{ ° C} \end{aligned}$$
 (2)

1.3
$$\begin{aligned} P_1 V_1 &= P_2 V_2 \\ V_2 &= \frac{P_1 V_1}{P_2} \\ &= \frac{250 \text{ kPa} \times 6 \text{ m}^3}{400 \text{ kPa}} \\ &= 3,75 \text{ m}^3 \end{aligned}$$
 (5)
[10]

QUESTION 2

- 2.1
- Malthoid
 - PVC
 - Bitumen-impregnated felt
 - Thin layers of slate
 - Dense pressed bricks
- (Any 3 × 1) (3)

2.2 16 litres of water = 16 kg of water (1 litre = 1 kg)

$$\text{Water : cement ratio} = \frac{\text{mass of water}}{\text{mass of cement}}$$

$$= \frac{16 \text{ kg}}{40 \text{ kg}}$$

$$= 0,4$$
 (4)

2.3 Moisture content = $\frac{OM - DM}{DM} \times 100$

$$= \frac{85 - 60}{60} \times 100$$

$$= 41,667\%$$

(3)
[10]

QUESTION 3

3.1 Area = length x breadth

$$= 70 \text{ cm} \times 25 \text{ cm}$$

$$= 1750 \text{ cm}^2$$

(3)

3.2 Volume = length x breadth x height

$$= 10 \text{ m} \times 0,15 \text{ m} \times 0,25 \text{ m}$$

$$= 0,375 \text{ m}^3$$

or

$$= 10\,000 \text{ mm} \times 150 \text{ mm} \times 250 \text{ mm}$$

$$= 375\,000\,000 \text{ mm}^3$$

(3)

3.3

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

(4)
[10]

QUESTION 4

- 4.1 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)
- 4.2
- Furniture beetle ✓
 - Powder-post beetle ✓
 - Longhorn beetle ✓
 - Termites
- (Any 3 × 1) (3)
- 4.3
- 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. ✓
 - Fully compacted.
 - Be well cured.
- (Any 4 × 1) (4)
[10]

QUESTION 5

- 5.1 The mass ✓ per unit volume ✓ of a substance ✓ is called its density, and is expressed in g/cm³ or kg/m³. (3)
- 5.2
- $$\text{Relative density} = \frac{\text{density of substance} \checkmark}{\text{Density of water}}$$
- or
- $$= \frac{\text{mass of substance} \checkmark}{\text{mass of water}}$$
- Relative density = $\frac{\text{density of substance} \checkmark}{\text{Density of water}}$
- ✓or
- $$= \frac{\text{density of substance} \checkmark}{\text{Density of water}}$$
- ✓ (1)
- 5.3
- $$\text{Volume} = \text{length} \times \text{breath} \times \text{width}$$
- $$= \overset{\text{v}}{6} \times \overset{\text{v}}{0,08} \times \overset{\text{v}}{0,11} \text{ m (correct conversion to m)}$$
- $$= \overset{\text{v}}{0,} \overset{\text{v}}{053} \text{ m}^3 \quad (\text{correct conversion to m})$$

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

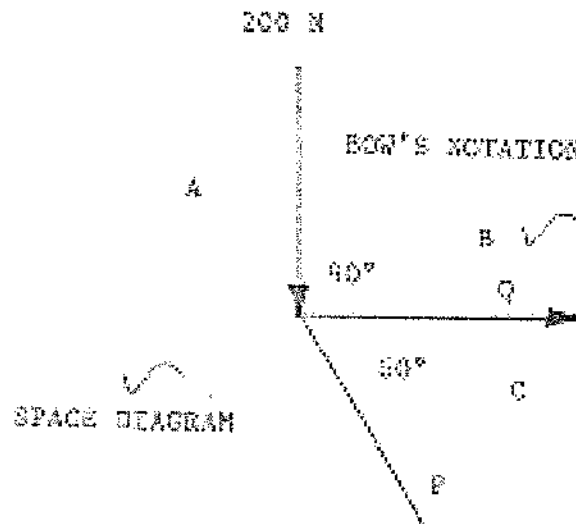
$$= \frac{30 \text{ kg}}{0,053 \text{ m}^3} = 566,038 \text{ kg/m}^3$$

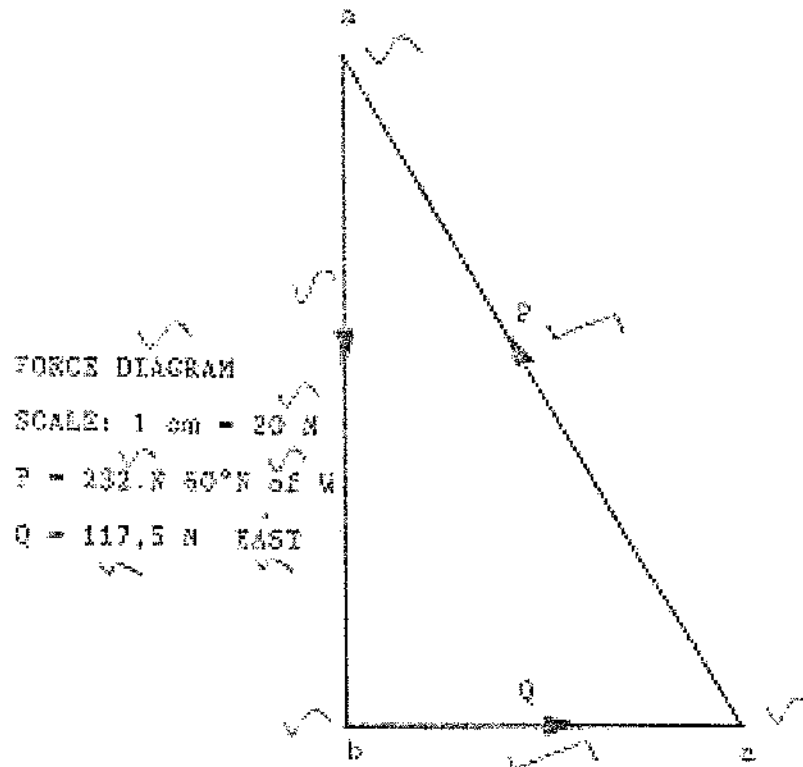
(6)
[10]

QUESTION 6

6.1 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. (Any 3 x 1) (3)

6.2





(7)
[10]

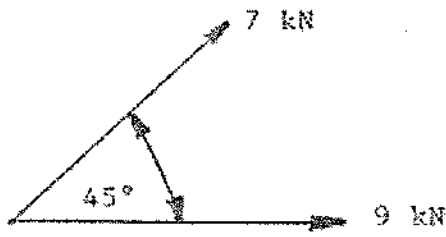
QUESTION 7

7.1 7.1.1 A force v is that which changes or tend to change v the state of rest or uniform motion v of a body in a straight line. v

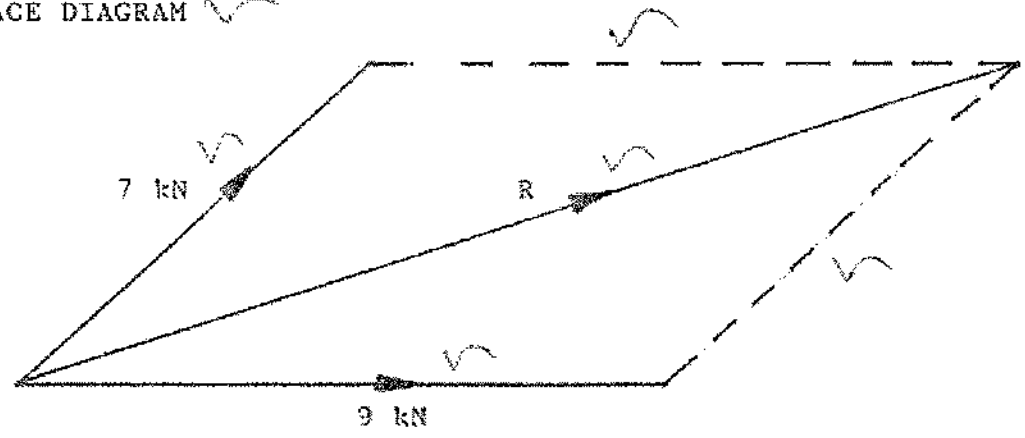
7.1.2 The unit v in which a force v is measured v , is called the newton and the symbol used for newton is N v .

(2 x 2) (4)

7.2



SPACE DIAGRAM



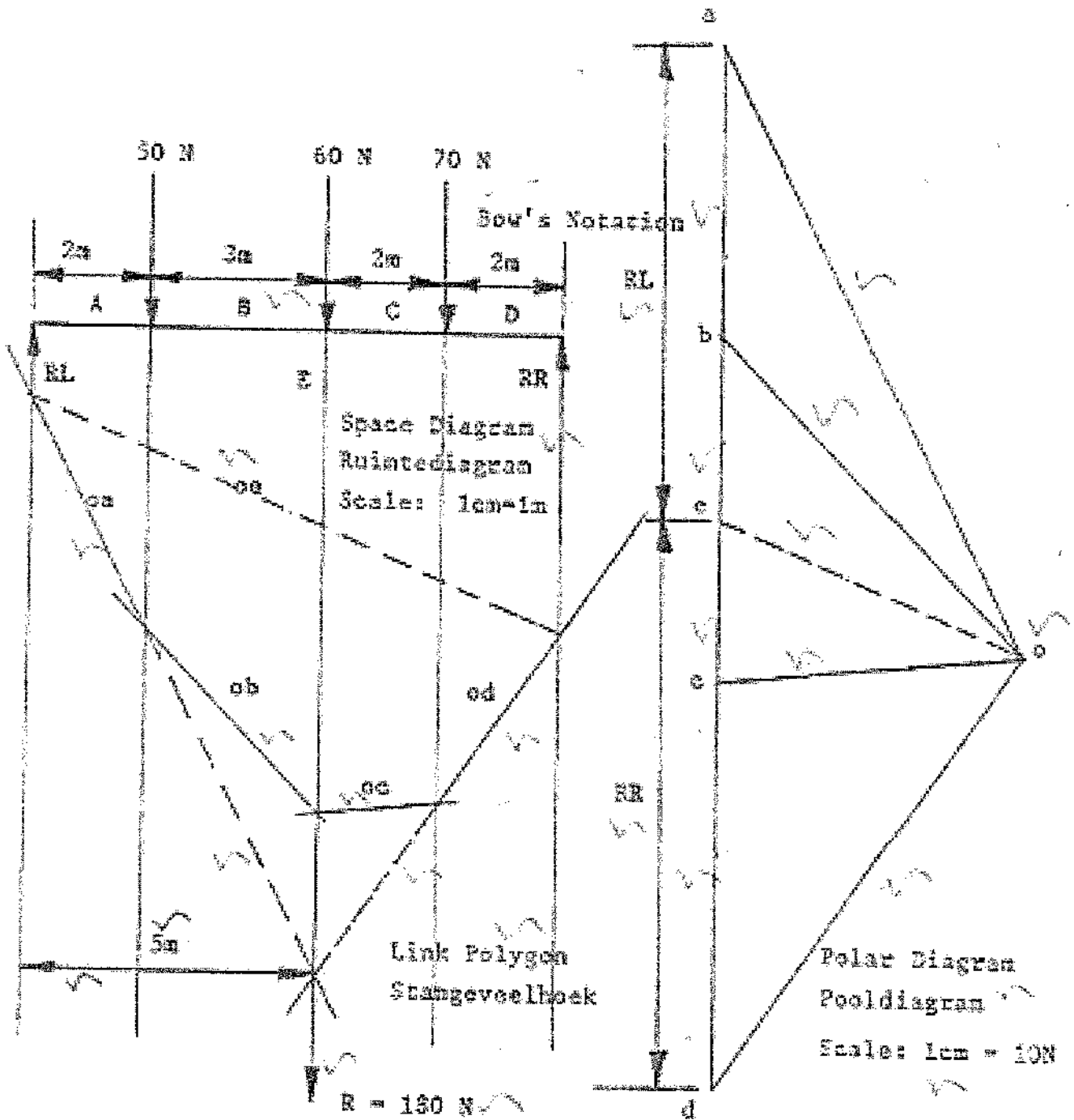
FORCE DIAGRAM

Scale: 1 cm = 1 kN

RESULTANT = 14,8 kN / $19,5^\circ$ N of E

(6)
[10]

QUESTION 8



RL = 82 N

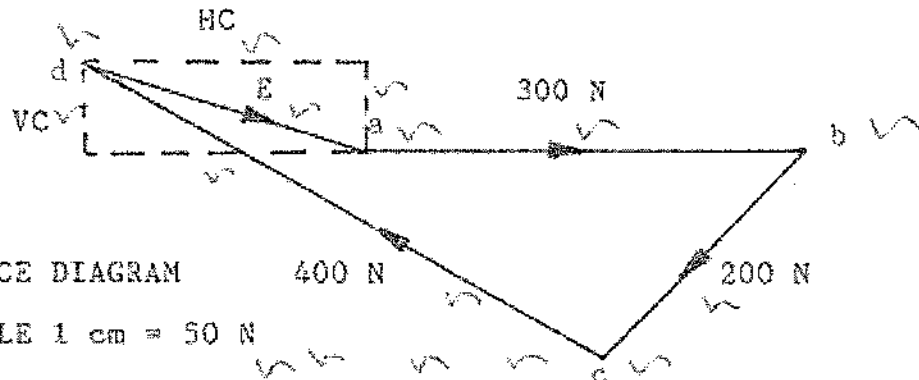
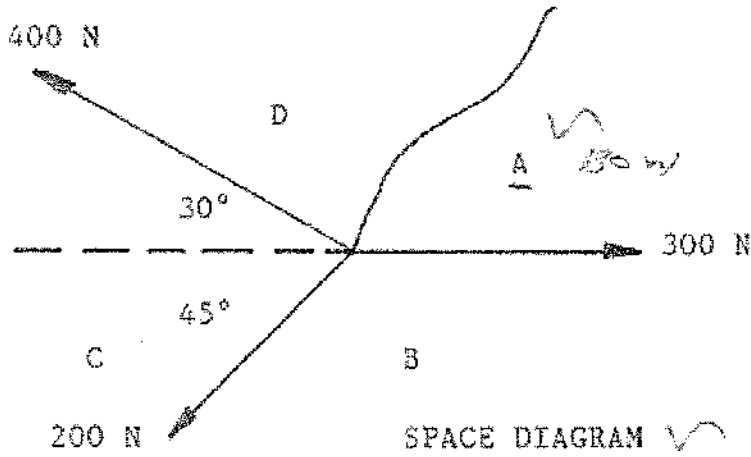
RR = 98 N

[15]

QUESTION 9

9.1 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)

9.2



✓ FORCE DIAGRAM 400 N
 ✓ SCALE 1 cm = 50 N
 EQUILIBRANT = ± 196 N ± 29° S of E
 VC = ± 95 N
 HC = ± 171 N

(12)
[15]

TOTAL: 100