higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING SCIENCE N1

23 November 2023

This marking guideline consists of 8 pages.

Copyright reserved

QUESTION 1

1.1 C
1.2 D
1.3 E
1.4 A
1.5 B

(5 × 1) **[5]**

QUESTION 2

2.1 False
2.2 True
2.3 True
2.4 False
2.5 True

(5 × 2) **[10]**

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 Empty container = 10,5 g
Empty container + paraffin = 43,5 g
Volume of paraffin = 31,4 cm^3

Mass of paraffin = Empty container – Empty container✓
= 43,5 g – 10,5 g
= 33 g✓

Density of paraffin = $\frac{M}{V}$ ✓
= $\frac{33}{31.4}$
= 1,051 g/cm^3✓✓ (5)

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

$0,75 = \frac{Density\ of\ timber}{1000\,kg/m^3}$ ✓

Density of timber = 0,75 × 1 000 kg/m^3 ✓

Density of timber = 750 kg/m^3 ✓

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

Mass = Density × Volume ✓

= 750 kg/m^3 × [9 × 0,228 × 0,05]✓

= 750 kg/m^3 × 0,103✓

Mass = 76,95 kg ✓ (7)
[15]

QUESTION 4

4.1
- Must have correct proportions of fine to coarse aggregates
- Must have the correct cement-aggregate ratio
- Must have the correct water-cement ratio
- Must be mixed well
- Must be fully compacted
- Must be cured well (6)

4.2 $Water\text{-}cement\ ratio = \frac{mass\ of\ water}{mass\ of\ cement}$ ✓

Mass of water = water-cement ratio × mass of cement✓

Mass of water = 0,73 × 40 kg

Mass of water = 29,2 kg✓

1 kg of water = 1 litre

Therefore, the amount of water required is 29,2 litres✓

(4)
[10]

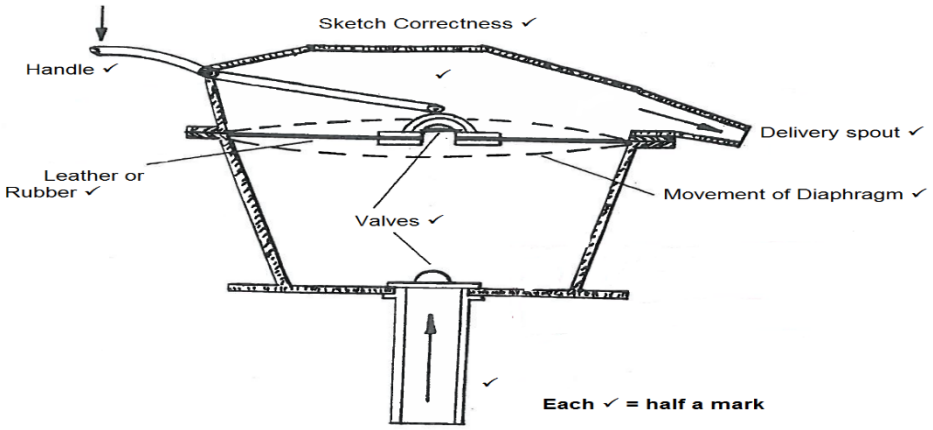
QUESTION 5

5.1 K = 273 + °C

= 273 + 35 °C✓

= 308 K✓ (2)

5.2



The diaphragm pump has a thick rubber or leather diaphragm bolted into the frame of the cylinder. This diaphragm is used to divide the cylinder into two sections. A large metal washer is bolted on either side of the rubber diaphragm and connected to a handle. When the handle is moved up and down, the rubber allows the washer to act as a piston, which moves up and down as a lift pump. (8)

5.3 Pressure = height × density × gravitational acceleration

= h × d × g✓

= 35 × 1 000 × 10✓

= 350 000 N/m^2✓

= 350 kPa✓✓ (5)

[15]

QUESTION 6

6.1 6.1.1 350 N – 220 N
R = 130 N towards the left-hand side (2 × 2) (4)

6.1.2 Equilibrant = 130 N towards the right-hand side (2)

6.2 Horizontal component:

HC = F Cos θ✓

= 50 Cos 60°✓

= 25 kN✓

Vertical component:

VC = Fsinθ✓

= 50 Sin 60°✓

= 43,30 kN✓ (6)

6.3 Refer to DIAGRAM SHEET 1 (attached). (6)
[18]

QUESTION 7

7.1 Bow's notation is the numbering of the spaces between the lines of action in a system of forces. (3)

7.2 Refer to DIAGRAM SHEET 2 (attached). (9)
[12]

QUESTION 8

8.1 If more than three 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. (4)

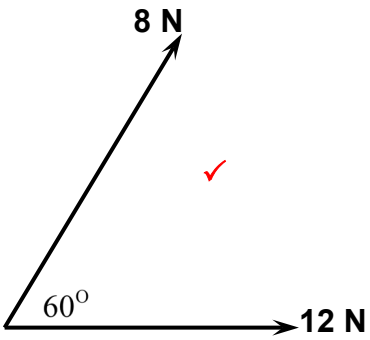
8.2 Refer to DIAGRAM SHEET 3 (attached). (11)
[15]

TOTAL: 100

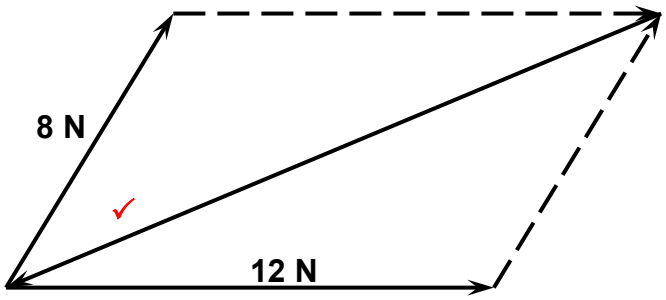
Copyright reserved

DIAGRAM SHEET 1

6.3



SPACE DIAGRAM ✓
No scale



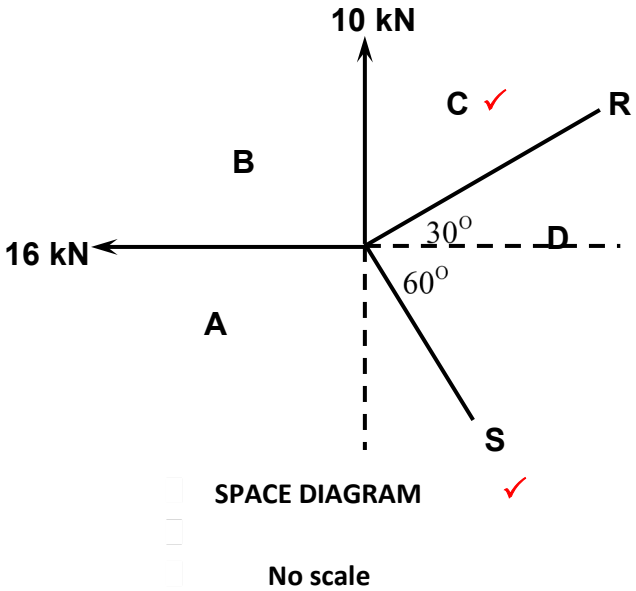
No scale to the drawing
FORCE DIAGRAM ✓
Scale 1 cm = 2 N

Equilibrant = 17,6 N at 24° to the horizontal ✓ ✓

(6)

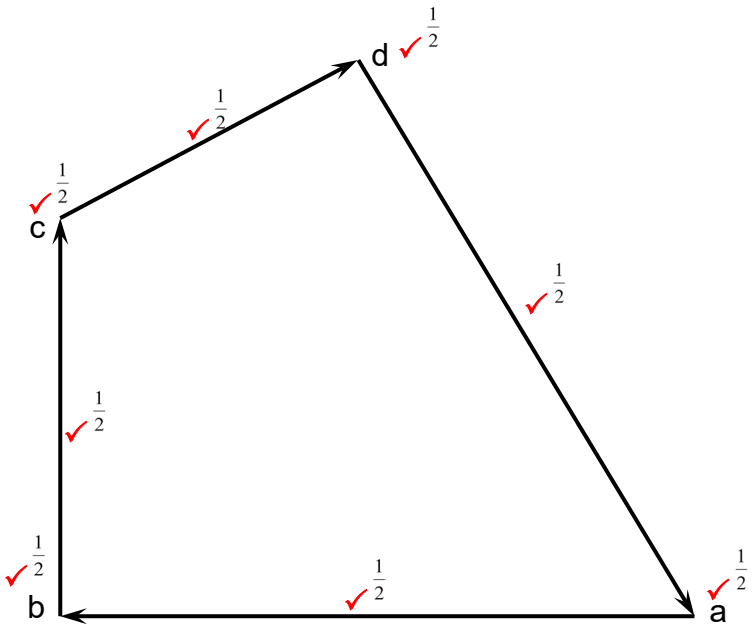
DIAGRAM SHEET 2

7.2



SPACE DIAGRAM

No scale



No scale to the drawing

FORCE DIAGRAM
Scale 1 cm = 2 kN

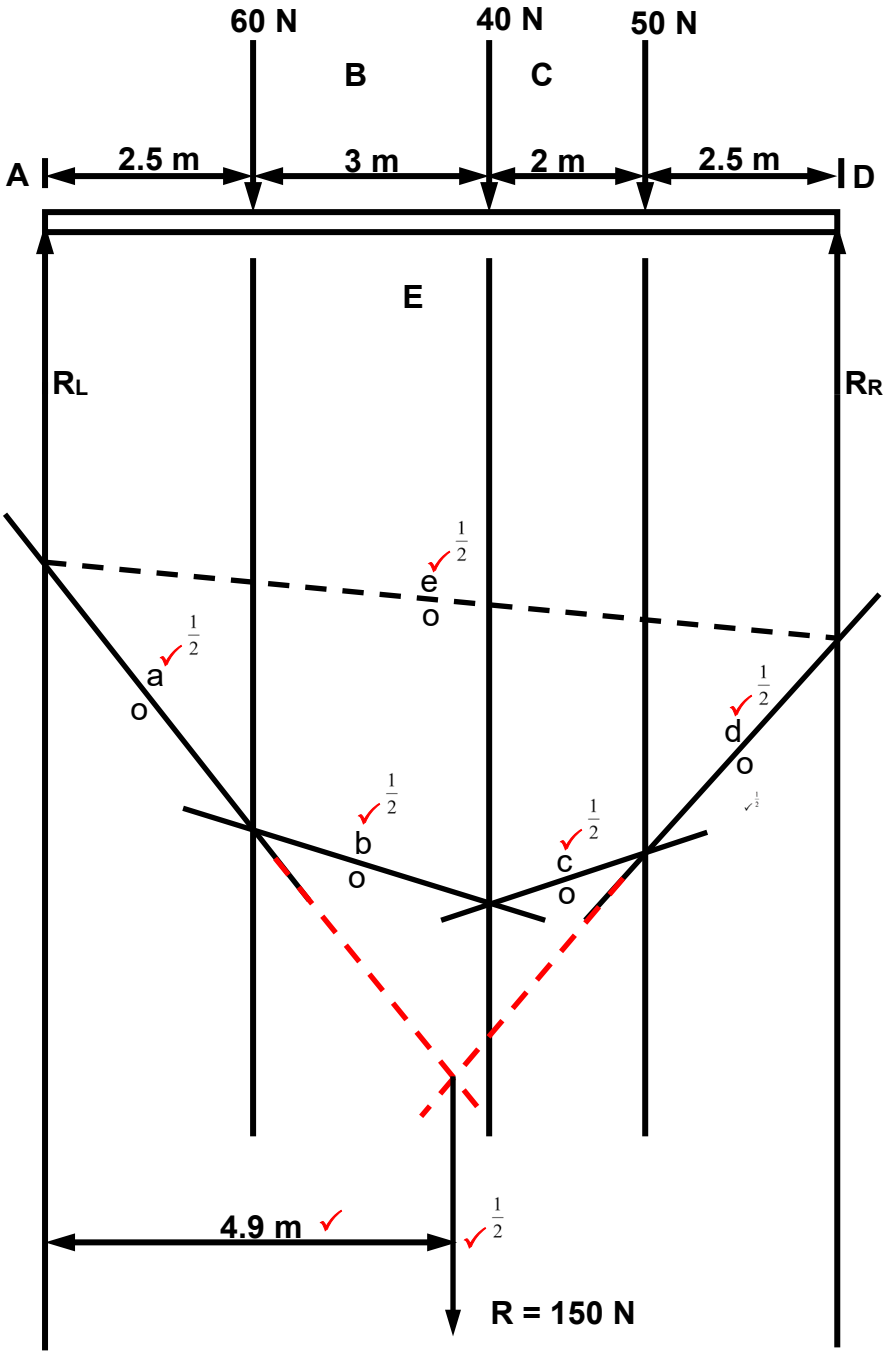
R = cd = 8.6 kN

S = da = 16.4 kN

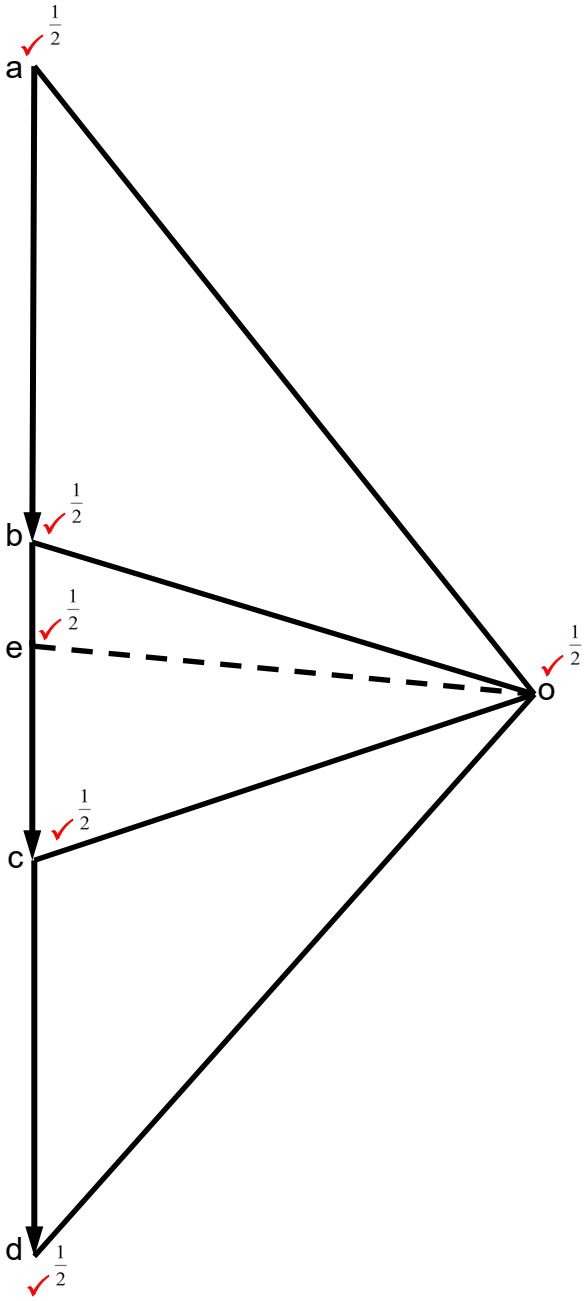
(6)

DIAGRAM SHEET 3

8.2



SPACE DIAGRAM
Scale 1 cm = 1 m



POLYGON DIAGRAM
Scale 1 cm = 10 N

R_R = de = 74 N

R_L = ea = 76 N

Copyright reserved