higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

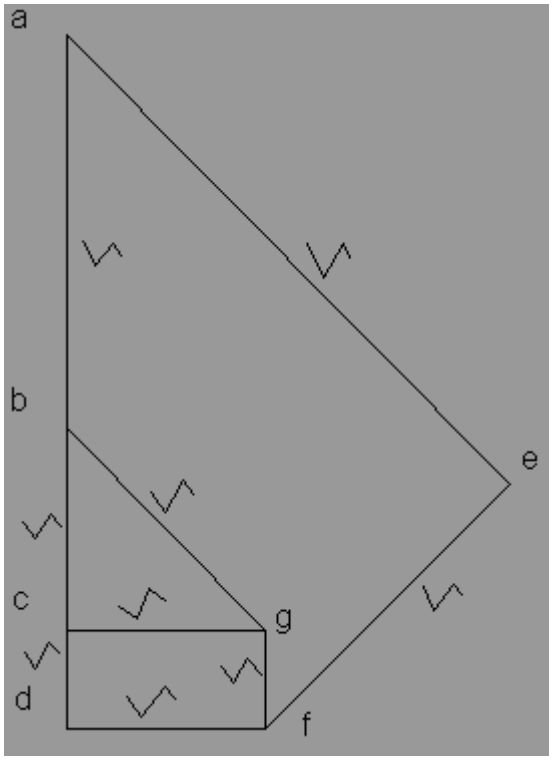
BUILDING SCIENCE N2

21 NOVEMBER 2016

This marking guideline consists of 6 pages.

QUESTION 1

1.1



9 × ½ = 4½

Scale = 1½ (6)

1.2

MEMBER	**MAGNITUDE** (1.2.1)	**NATURE** (1.2.2)
AE	12,7 kN√	Tie√
BG	5,7 kN√	Tie√
CG	4,0 kN√	Strut√
DF	4,0 kN√	Strut√
FE	7,1 kN√	Strut√
FG	2,0 kN√	Tie√

(12 × ½) (6)

1.3 If three or more concurrent, coplanar forces acting on a point and are in equilibrium,✓ they can be represented in magnitude and direction as vectors by the sides of closed polygon, taken in order.✓ (2)

[14]

QUESTION 2

Section	**2.1**	**2.2**	**2.3**
A	60 mm × 120 mm = 7200 mm^2	30 mm✓	216 000 mm^3✓
B	½ × 70 × 150 = 5 250 mm^2	⅓ × 150 + 60 = 110 mm✓	57 7500 mm^3✓
C	π × 25^2 = -1 963,5 mm^2	60 mm✓	117 809,7 mm^3✓
	∑Area = 10 486,5 mm^2✓✓		∑Moments = 675 690 mm^3✓✓
	(2)	(3)	(5)

2.4 $$x = \frac{\sum Moments}{\sum Area}$$ ✓

$$= \frac{675\,690}{10\,486,5}$$ ✓

$$= 64,434 \text{ mm from } \overline{yy}$$ ✓✓

(4)
[14]

QUESTION 3

		UNIT	**SYMBOL**
3.1	Density	Kilogram/cubic metre√	$kg.m^3$√
3.2	Force	Newton√	N√
3.3	Weight	Newton√	N √
3.4	Moment of a force	Newton metre√ OR Joule	N.m√ OR J
3.5	Torque	Newton metre√ OR Joule	N.m√ OR J
3.6	Pressure	Pascal or kiloPascal or megaPascal√ OR Newton per square meter	Pa or kPa or MPa√ OR N/m^2
3.7	Stress	Pascal or kiloPascal or megaPascal√ OR Newton per square meter	Pa or kPa or MPa√ OR N/m^2
3.8	Velocity	Metre per second√	m/s√
3.9	Heat energy	Joule√	J√
3.10	Specific heat capacity	Joule per kilogram Kelvin/or Joule per kilogram degree Celsius√	J/kg.K J/kg ^0C√

(10 x 1) **[10]**

QUESTION 4

Forces
5 kN/m × 7 m = 35 kN
10 kN/m × 4,5 m = 45 kN

Distances
4,5 m ÷ 2 = 2,25 m
2,25 m – 2 m = 0,25 m

7 m ÷ 2 = 3,5 m
3,5 m – 2 m = 1,5 m

4.1 RL × 5 = 17 × 5 + 15 × 2,5 + 35 × 1,5 + 45 × 0,25 – 12 × 2✓

RL × 5 = 85 + 37,5 + 52,5 + 11,25 – 24✓
$\frac{RL \times 5}{5} = \frac{162,25\ kN}{5}$✓
RL = 32,45 kN✓ (4)

4.2 RR × 5 = 15 × 2,5 + 35 × 3,5 + 45 × 4,75 + 12 × 7 + 17 × 0✓
= 37,5 + 122,5 + 213,75 + 84✓
$\frac{RR \times 5}{5} = \frac{457,75}{5}$✓
RR = 91,55 kN✓ (4)

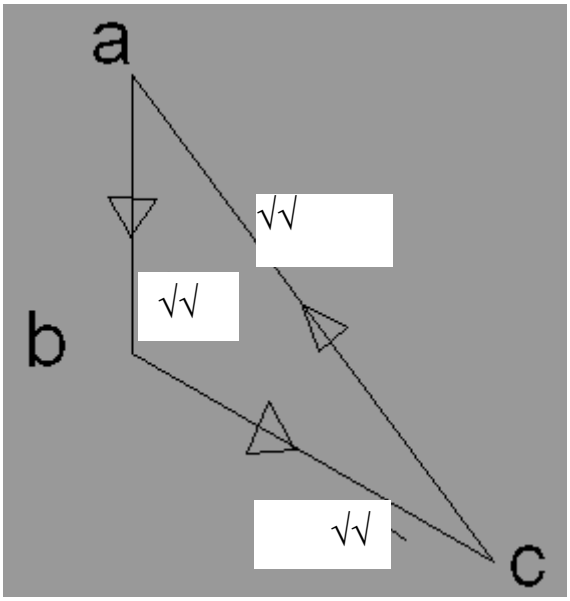
4.3 ↓↓ = ↑↑ 17 + 35 + 15 + 45 + 12 = 124 kN✓
91,55 kN + 32,45 kN = 124 kN✓ (2)
[10]

QUESTION 5

5.1 Cos 30° = 2/L
L = 2/cos30° ✓
L = 2,31 m✓

M sin60° × L = 50 × 3 ✓
M sin 60° × 2,31 m = 150✓
M sin 60° = 150/2,31✓
M = 64,94/sin 60° ✓
M = 74,98 kN ✓
M = 75 kN (7)

5.2



R_{Hinge}= 108,97kN ✓ @ 53°✓ North of West ✓

Scale = 1✓

(7)
[14]

QUESTION 6

6.1 Use a measuring cylinder and fill the cylinder up to say the 100 cm^3 mark.✓ Lower a piece of metal, 5 cm × 5 cm × 3 cm,✓ attached to a string,✓ into the cylinder.✓ Shake gently to remove all air bubbles.✓
Write down the new reading and subtract the 100 cm^3.✓ The end result should be 75 cm^3✓ which is the volume of the piece of metal.✓

Summary: The volume of liquid displaced✓ is equal to the volume✓ of the object✓ immersed in the liquid.✓

Consider other dimensions used as correct (12)

6.2
- Lactometer
- Accumulator or pipette hydrometer
- Acidimeter (3 × 2) (6)

[18]

QUESTION 7

7.1
- Waterproof if laid correctly
- Poor conductor of heat
- Attractive if done correctly
- Not so durable
- Not fire-resistant
- Fairly resistant to hail
- Expensive skilled labour
- Suitable grass are not readily available (Any 7 × 1) (7)

7.2
- Resistant to hail
- Waterproof
- Rust-proof but not recommended for coastal areas
- Attractive
- Easy to work with
- Light in mass
- Economical
- Low expansion coefficient (Any 7 × 1) (7)

7.3 7.3.1 1 350 mm

7.3.2 760 mm

7.3.3 1 050 mm (3 x 2) (6)
[20]

TOTAL: 100