



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING SCIENCE N3

25 November 2025

This marking guideline consists of 7 pages.

QUESTION 1

- 1.1
- DPC
 - Water pipes
 - Rainwater downpipes
 - Rainwater gutters
 - Drainage pipes
 - Socket outlets
 - Electrical conduits
 - Electrical switches
 - Pipe fittings (adapters, reducers, etc.)
 - Barge board
- (Any 4 × 1) (4)
- 1.2
- Provides a continuous protective film when dry
 - Protective film should adhere to the surface to which it is applied (adhesion)
 - Should be elastic enough to expand and contract with the surface on which it is applied
 - Should withstand elements to which it is exposed to
 - Should be economical to use
 - Should be easy to apply
 - Should have reasonable spreading and covering capacity (opacity)
 - Should be able to withstand the usage of the article to which it is applied
- (Any 5 × 1) (5)
- 1.3
- Easy to apply
 - Gives a smooth glossy finish (level out brush strokes)
 - Hard, durable finish
 - Attractive, glossy finish
 - Washable and easier to keep clean
 - Thick consistency that hides surface imperfections
 - The last long, resist cracking
 - Gives the long-term preservation.
 - Can be applied to long variety of surfaces
- (Any 4 × 1) (4)

[13]

QUESTION 2

- 2.1 Take moments about the hinge (RH)
- $$(R_{\text{roller}} \times 6) = (30 \sin 60^\circ \times 8) + (60 \sin 30^\circ \times 2) \checkmark$$
- $$(R_{\text{roller}} \times 6) = 207.846 \text{ kN} + 60$$
- $$R_{\text{roller}} = \frac{267.846}{6} \checkmark$$
- $$R_{\text{roller}} = 44.641 \text{ kN} \checkmark$$
- 2.2 Take moments about the roller (RR)
- $$(VC R_{\text{hinge}} \times 6) + (30 \sin 60^\circ \times 2) = (60 \sin 30^\circ \times 4) \checkmark$$
- $$(VC R_{\text{hinge}} \times 6) + 51.962 = 120$$
- $$(VC R_{\text{hinge}} \times 6) = 120 - 51.962 \checkmark$$

$$VC R_{\text{hinge}} = \frac{68.038}{6}$$

$$VC R_{\text{hinge}} = 11.34 \text{ kN (+)} \checkmark$$

OR

$$(VC R_{\text{hinge}}) = -(30 \sin 60^\circ + 60 \sin 30^\circ) + 44.641 \checkmark$$

$$(VC R_{\text{hinge}}) = -(30 + 25.951) + 44.641$$

$$(VC R_{\text{hinge}}) = -55.951 + 44.641 \checkmark$$

$$VC R_{\text{hinge}} = 11.34 \text{ kN (+)} \checkmark$$

2.3 HC on beam = 0 assume HC $R_{\text{hinge}} = (+)$
 $HC R_{\text{hinge}} + 60 \cos 30^\circ - 30 \cos 30^\circ = 0 \checkmark$
 $HC R_{\text{hinge}} = 51.962 - 15 \checkmark$
 $HC R_{\text{hinge}} = 36.962 \text{ kN (+)} \checkmark$

2.4 $R = \sqrt{VC^2 + HC^2}$

$$R = \sqrt{11.34^2 + 36.962^2}$$

$$R = 38.66 \text{ kN} \checkmark$$

Find angle

$$\tan \theta = \frac{VC}{HC}$$

$$\tan \theta = \frac{11.34}{36.922}$$

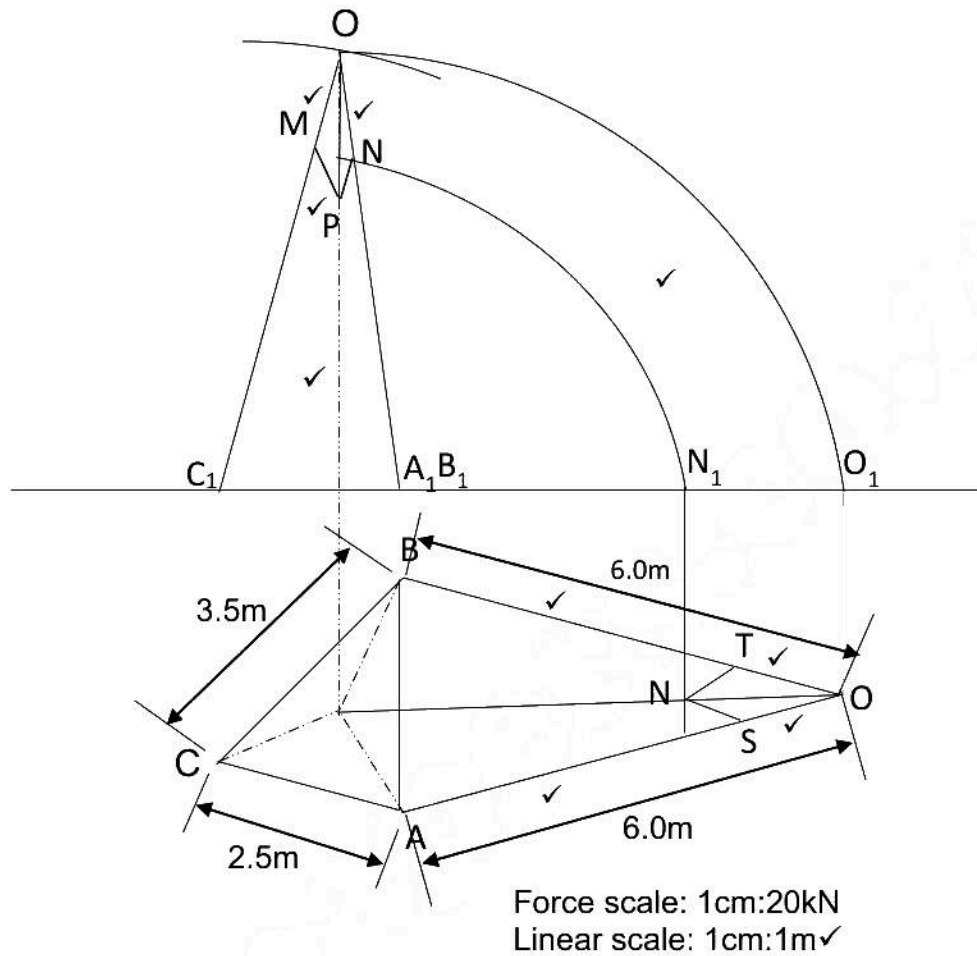
$$\theta = \tan^{-1} 0.307 \checkmark$$

$$\theta = 17.066^\circ$$

$$R = 38.66 \text{ kN acting } 17.066^\circ \text{ N of E} \checkmark$$

(4 × 3) [12]

QUESTION 3



OM = Force leg OC = 14.5 kN✓

OT = Force leg OB = 15 kN✓

OS = Force leg OA = 15 kN✓

+/- 1 tolerance

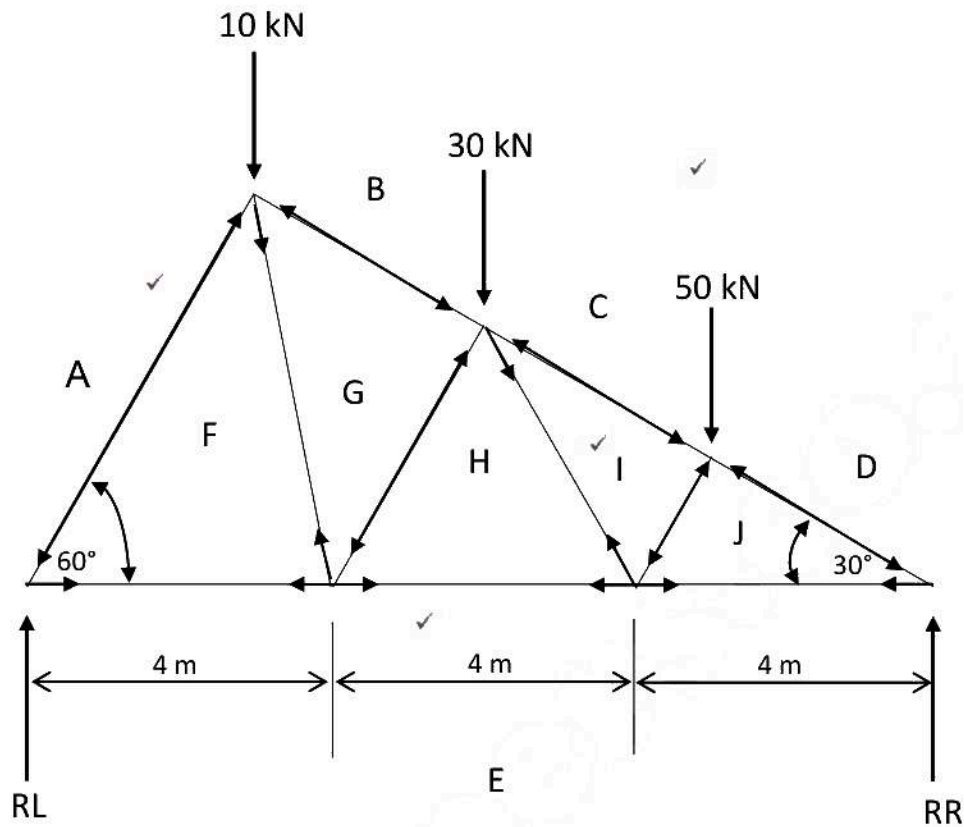
[13]

QUESTION 4

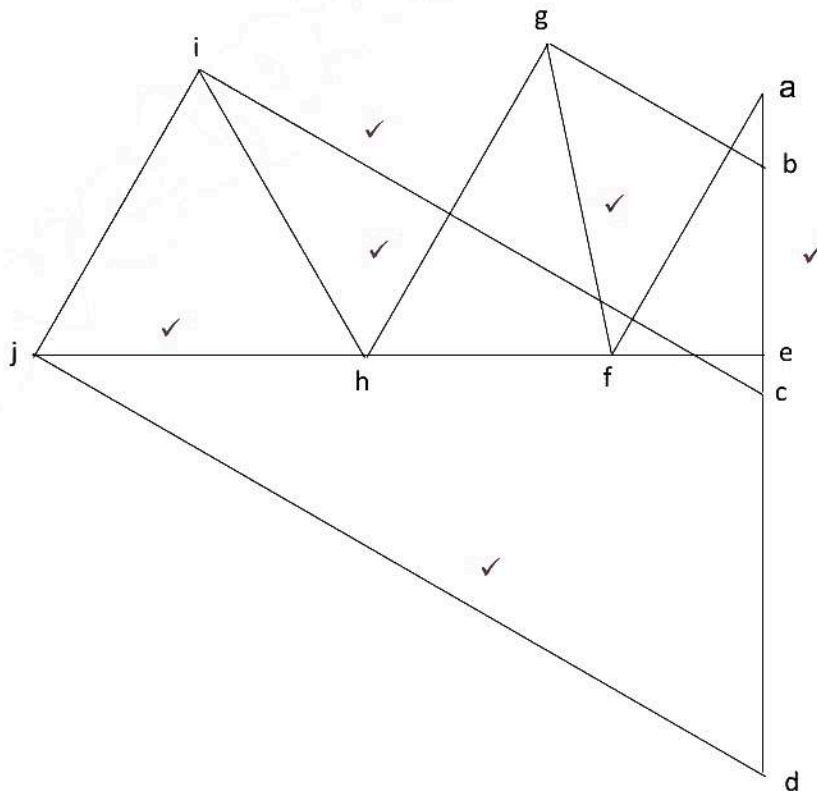
4.1 CM = ACM
 $12RL = (50 \times 3) + (30 \times 6) + (10 \times 9)$ ✓
 $RR = \frac{420}{12}$
 $RR = 35 \text{ kN}$ ✓

ACM = CM
 $12RR = (50 \times 9) + (30 \times 6) + (10 \times 3)$ ✓
 $RR = \frac{660}{12}$
 $RR = 55 \text{ kN}$ ✓

4.2



(4 × ½) (2)



(6 × ½)

MEMBER	MAGNITUDE (kN)	NATURE
AF	40kN✓	Strut ✓
BG	33kN✓	Strut✓
CI	86kN✓	Strut✓
DJ	112kN✓	Strut✓
EF	20kN✓	Tie✓
EH	52kN✓	Tie✓
EJ	97kN✓	Tie✓
FG	42kN✓	Tie✓
GH	48kN✓	Strut✓
HI	44kN✓	Tie✓
IJ	44kN✓	Strut✓

+/-2 tolerance

(22 × ½)

(11)
[20]

QUESTION 5

SECTION	AREA	x AB	y AC	AREA - x AB	AREA - y AC
1	50 × 50 = 2 500✓	25✓	25✓	2 500 × 25 = 62 500✓	2 500 × 25 =62 500✓
2	35 × 30 = 1050✓	67.5✓	25✓	1 050 × 67.5 = 70 875✓	1 050 × 25 = 26250✓
3	35 × 20 = 700✓	102.5✓	30✓	700 × 102.5 =71 750✓	700 × 30 = 21 000✓
	=4 250✓			=202125✓	=109750✓

$x = \frac{\text{AREA} - x \text{ AC}}{\text{AREA}}$ $x = \frac{202125}{4\,250}$ $x = 47.559 \text{ UNITS}✓$	$y = \frac{\text{AREA} - y \text{ AC}}{\text{AREA}}$ $y = \frac{109750}{4\,250}$ $y = 25.284 \text{ UNITS}✓$
--	--

(Any other analytical method may be accepted.)

[22]

QUESTION 6

CONDUCTORS AND NON-CONDUCTORS OF ELECTRICITY		
METALLIC CONDUCTORS	NON-METALLIC CONDUCTORS	NON-CONDUCTORS
Aluminium✓	Carbon✓	Dry air✓
Copper✓	Water✓	Glass✓
Gold✓	Wool✓	Rubber✓

[9]

QUESTION 7

- 7.1 Friction can be defined as a force that opposes motion✓ when the surface of one object✓ comes into contact with the surface of another object.✓ (3)

OR

Friction can be defined as the force resisting the relative motion✓ of solid surfaces, fluids and material elements ✓ sliding against each other. ✓

- 7.2 Component perpendicular = 50 N
Component parallel = 35 N

7.2.1 $F_1 = \mu W \cos \theta + \mu W \sin \theta$ ✓
 $40 = \mu W \cos \theta + 35$ ✓
 $\mu W \cos \theta = 40 - 35$ ✓
 $\mu W \cos \theta = 5 \text{ N}$ ✓ (4)

7.2.2 $F_\mu = \mu W \cos \theta$ ✓
 $F_\mu = \mu 50 \text{ N}$ ✓
 $\mu = \frac{5}{50}$ ✓
 $\mu = 0.1$ ✓ (4)

[11]

TOTAL: 100