



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING SCIENCE N3

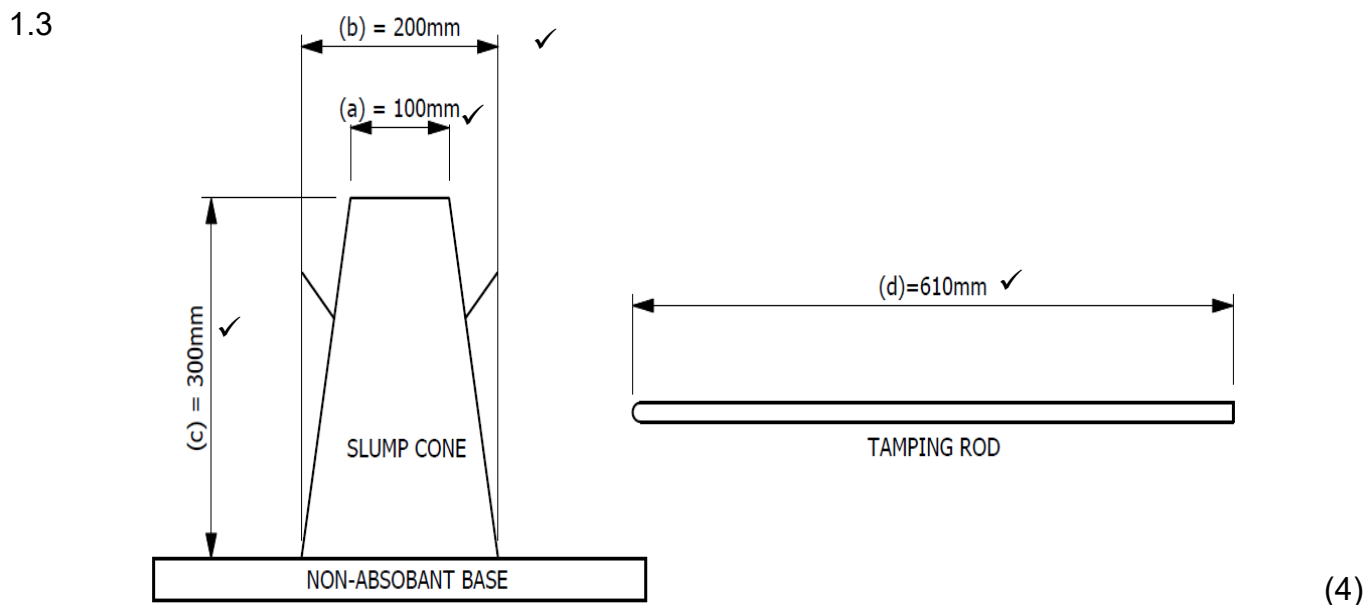
23 November 2023

This marking guideline consists of 8 pages.

QUESTION 1

1.1 A slump test is used to determine the workability of a fresh concrete mix. (1)

1.2 Initial drying shrinkage is the **largest amount of shrinkage**✓ that takes place during the setting and hardening process. (1)



(A) Flaking or peeling✓



(B) Blistering✓



(C) Cissing✓

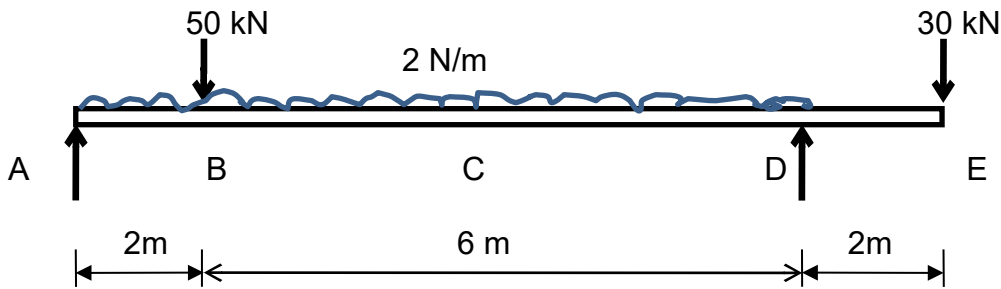


(D) Curtaining/Crinkling/Sagging✓

(4)
[10]

QUESTION 2

2.1



(1)

Taking moments about RL

$$(2 \times 2 \times 1) + (50 \times 2) + (2 \times 3 \times 3,5) + (2 \times 3 \times 6,5) + (30 \times 10) = 8RR \checkmark$$

$$RR = 58 \text{ kN} \checkmark$$

(2)

Taking moments about RR

$$8RL + (30 \times 2) = (2 \times 3 \times 1,5) + (2 \times 3 \times 1,5) + (2 \times 3 \times 4,5) + (50 \times 6) + (2 \times 2 \times 7) \checkmark$$

$$RL = 38 \text{ kN} \checkmark$$

(2)

2.2 $BM_A = 0 \text{ Nm}$

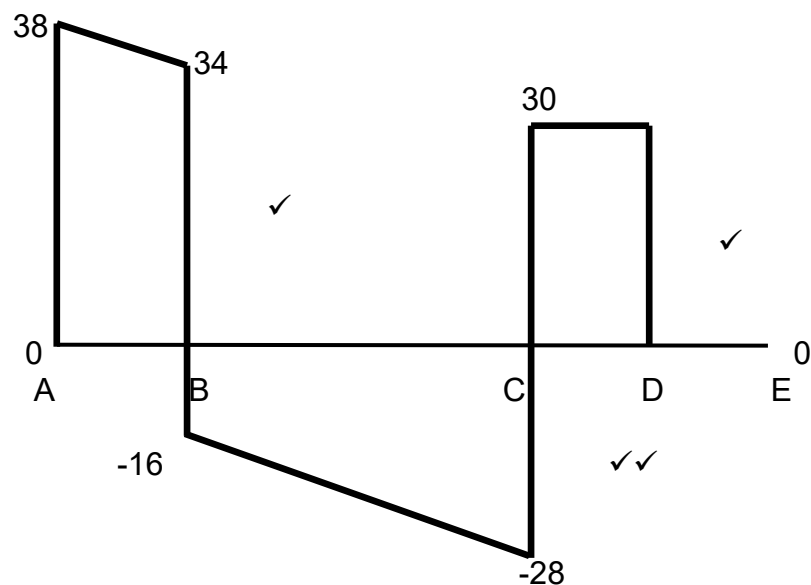
$$BM_B = (38 \times 2) + (-2 \times 2 \times 1) = 72 \text{ kNm} \checkmark$$

$$BM_C = (38 \times 5) + (-2 \times 2 \times 4) + (-50 \times 3) + (-2 \times 3 \times 1,5) = 15 \text{ kNm} \checkmark$$

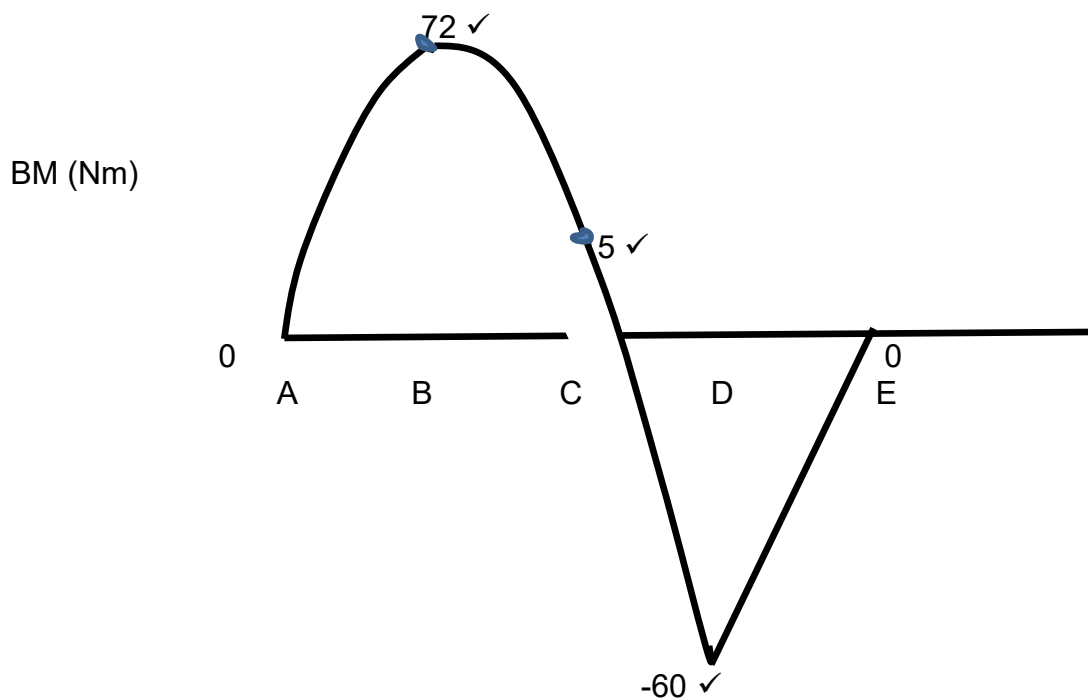
$$BM_D = (38 \times 8) + (-2 \times 2 \times 7) + (-50 \times 6) + (-2 \times 3 \times 4,5) + (-2 \times 3 \times 1,5) = -60 \text{ N} \checkmark \quad (3)$$

2.3

SF (N)



(4)

(3)
[15]**QUESTION 3**

3.1 3.1.1 Taking moments about the left-hand reaction

$$R_L \times 4 = 1 \times 1,5 + 62 \times 3 \checkmark$$

$$\therefore R_L = 1.875 \text{ kN} \checkmark$$

(2)

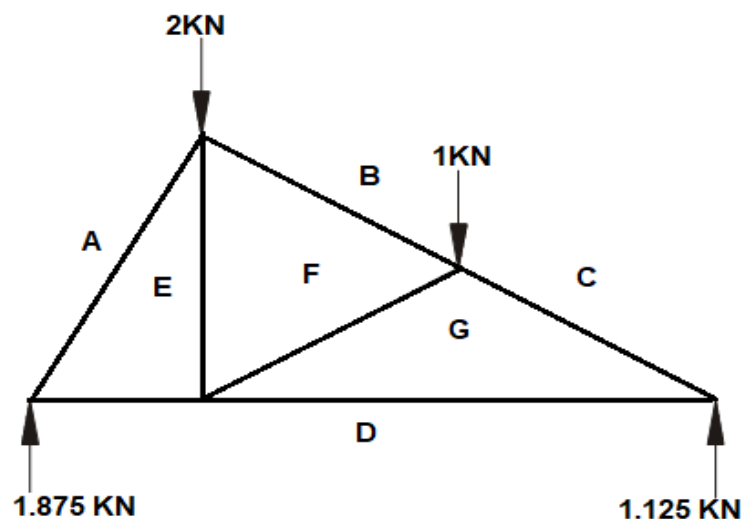
3.1.2 Taking moments about right-hand reaction

$$2 \times 1 + 1 \times 2,5 = R_R \times 4 \checkmark$$

$$\therefore R_R = 1,125 \text{ kN} \checkmark$$

(2)

3.1.3



(2)

●

+/- 3 tolerance[illegible]

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QUESTION 4

SHAPE	AREA (mm ²)	X (mm) From AC	Y (mm) From AB	AY (mm ³)	AX (mm ³)	Marks
(1)	1 080 ½✓	90½✓	261½✓	281 880½✓	97 200½✓	(2 ½)
(2)	720 ½✓	90½✓	198½✓	142 560 ½✓	2 160½✓	(2 ½)
(3)	1 080½✓	90½✓	135 ½ ✓	145 800½✓	97 200½✓	(2 ½)
(4)	1 080½ ✓	90½✓	129 ½ ✓	139 320½✓	97 200½✓	(2 ½)
(5)	720½ ✓	90½✓	66½✓	47 520½✓	2 160½✓	(2 ½)
(6)	1 080½ ✓	90½✓	3 ½ ✓	3 240½✓	97 200½✓	(2 ½)
TOTAL	5 760 ✓			760 320½✓	393 120½✓	(2)

(18)

$$y = \Sigma Ay / \Sigma A$$

$$= 760\,320 / 5\,760 \, \frac{1}{2} \, \checkmark$$

$$= 132 \, \text{mm} \, \checkmark$$

$$x = \Sigma Ax / \Sigma A$$

$$= 393\,120 / 5\,760 \, \frac{1}{2} \, \checkmark$$

$$= 68,25 \, \text{mm} \, \checkmark$$

(3)

[21]**QUESTION 5**

5.1 Parallel component = $W \sin \theta$
 $= 33 \times 9,81 \times \sin 30^\circ \checkmark$
 $= 161,87 \text{N} \checkmark$

(2)

5.2 Perpendicular component = $W \cos \theta$
 $= 33 \times 9,81 \times \cos 30^\circ \checkmark$
 $= 280,36 \text{N} \checkmark$

(2)

5.3 $F_\mu = \mu W \cos \theta$
 $= 0,5 \times 280,36 \checkmark$
 $= 140,18 \text{ N} \checkmark$

(3)

5.4 $F_{\text{down}} = \mu W \cos \theta - W \sin \theta \checkmark$
 $= 140,18 - 161,87 \checkmark$
 $= 21,69 \text{ N} \checkmark$

(2)

5.5 $F_{\text{up}} = \mu W \cos \theta + W \sin \theta$
 $= 140,18 + 161,87 \checkmark$
 $= 302,05 \text{ N} \checkmark$

(3)

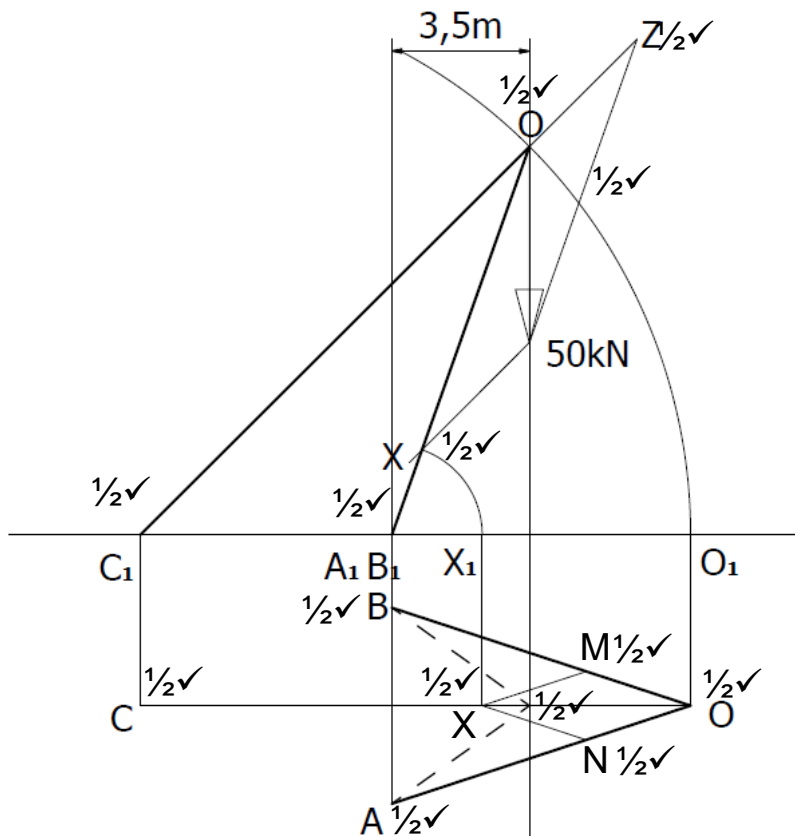
[12]

QUESTION 6

- 6.1 6.1.1 MCB protects a circuit by tripping or switching off✓ in case of an overcurrent or earth leakage.✓ (2)
- 6.1.2 Fuses protect the circuit by blowing (melting the fuse)✓ in case of an over current, thereby breaking the circuit, thus preventing the flow of electricity.✓ (2)
- 6.2 Requirements for placing distribution boards in a building:
- Must be situated in an easily accessible place.
 - Must not be installed in a bathroom or in humid place.
 - There must be clear unobstructed space in front of it.
 - Maximum height above finished floor level should be 2,2 m.
 - A minimum height from finished floor level should be 1,2 m.
 - Protected against corrosion.
 - Comply fully with the requirements of SANS10142.
- (Mark any FOUR) (4)
- 6.3 Alternating current refers to current that reverses the direction of flow✓ or changes the direction of flow and is generated from sources like a generator. Direct current refers to electric current that flows in one direction✓ and is generated from sources like a battery. (2)

[10]

QUESTION 7



OZ = FORCE IN BACKSTAY = 38.7kN✓

ON = FORCE IN LEG OA = 27.9kN✓

OM = FORCE IN LEG OB = 27.9kN✓

(10)

+/- 3 tolerance

Correctness of sketch = 2 marks

(2)

[12]

TOTAL: 100