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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY

FEBRUARY/MARCH 2015

MEMORANDUM

MARKS: 200

This memorandum consists of 16 pages.

QUESTION 1: CONSTRUCTION, SAFETY AND MATERIAL

1.1
- He is not wearing earmuffs/ear protection. ✓
- He is not wearing an overall. ✓
- He did not remove loose clothing like the tie. ✓
- He is not wearing a mask (dust, paint, gas, etc.). ✓
- He is not wearing safety glasses.

ANY FOUR OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (4)

1.2 1.2.1 A cornice is installed where the walls and ceiling meet. ✓
A skirting is installed where the wall and floor meet. ✓ (2)

1.2.2 A cornice is used as a decorative finish between the ceiling and wall. ✓
A skirting is used to seal the joint between the wall and floor. ✓
OR ANY OTHER ACCEPTABLE ANSWER (2)

1.3 1.3.1 It prevents insects penetrating the wood. ✓
Prevents rotting. ✓
I would use treated timber because it makes the wood less susceptible to fungi attack.
I would use treated timber because it is durable.
Enhances appearance.
ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

1.3.2 Coal-tar creosote ✓
Water-borne preservatives
Light Organic Solvent Preservatives – LOSP
Oil
Varnish
Paint
ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

1.4 To hold, bind or join the main bars together. ✓
To resist shear stress. ✓
To prevent the bending of main bars.
It prevents concrete from shearing
It keeps the bars in place.
ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

1.5 Dampness will enter the wall. ✓
Moisture will enter the building horizontal or vertically. ✓
A damp musty (damp) smell will prevail in the building.
Dampness will damage paint on the inside and outside of the wall.
ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

1.6 Clean the wall. ✓
Repair cracks and blemishes. ✓
Check for moisture. ✓
Seal the wall.
Apply a primer coat.
Paint the wall with a suitable paint for concrete.
Roll on concrete paint sealer.

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (3)

1.7 1.7.1 Angle-iron✓ (1)

1.7.2 Does not easily bend ✓
Welds well
Can easily be joined
Malleable
Ductile

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

1.7.3 Steel roof trusses ✓
Palisades/fences
Runners for sliding barriers/gates
Supports for fixing objects to walls

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

1.8 Rungs✓
Stiles ✓
Feet

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

1.9 1.9.1 Double casement window ✓ (1)

1.9.2 A – Window stile/stile ✓
B – Mullion/Muntin ✓
C – Window pane/glass ✓
D – Bottom rail ✓
E – Window sill ✓ (5)

1.10 Beam filling is the brickwork between the trusses/rafters from wall plate level to the underside of the roof covering. ✓ (1)
[30]

QUESTION 2 ADVANCE CONSTRUCTION AND EQUIPMENT

2.1 2.1.1 Concrete ✓ (1)

2.1.2 This part of the block will rest on the reinforced rib ✓ (1)

2.1.3 Reinforcing mesh/steel mesh ✓ (1)

2.1.4
- Sprinkle or spray water on the concrete after it has set. ✓
- Allow water to pool on the concrete surface.
- A sealer is also available on the market.
- Wet sand, hessian, canvas or any other protective covering (1)

2.1.5 Save material cost. ✓
Reduce the weight of the floor ✓
Can be used as a duct for conduits

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

2.2 2.2.1 Difference in height = (1,654 – 1,275) ✓✓
= 0,379 m or 379 mm ✓ (3)

2.2.2 Fall ✓ (1)

2.3 2.3.1 To mark out on the truss where the batten must be nailed. ✓ (1)

2.3.2 To line up all the roof trusses. ✓
To level roof trusses.

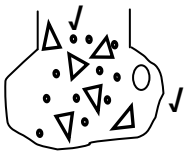
OR ANY OTHER ACCEPTABLE ANSWER (1)

2.4
- They should not be excessively exposed to the sun, as this may influence their accuracy (Nylon).√
- They should not be tampered with unnecessarily. √
- Avoid it from getting wet.
- Always store in a proper place.

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

2.5 2.5.1 A- Cable/steel cable ✓
B- Tube/steel casing ✓
C- Undisturbed earth/unstable soil/soft soil/soil ✓
D- Drop hammer ✓
E- Plug ✓ (5)

2.5.2



CRITERIA	MARK ALLOCATION
Concrete Symbol	1
Extended/Enlarged base (toe)	1

(2)

2.5.3 To hammer in the concrete plug ✓ (1)

2.5.4 It should be removed ✓ (1)

2.5.5 When an ordinary foundation cannot be used ✓
On loose soil/soft soil/unstable soil
No bed rock/rock bed available

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

2.5.6 Auger type pile/hammer-driven pile ✓ (1)

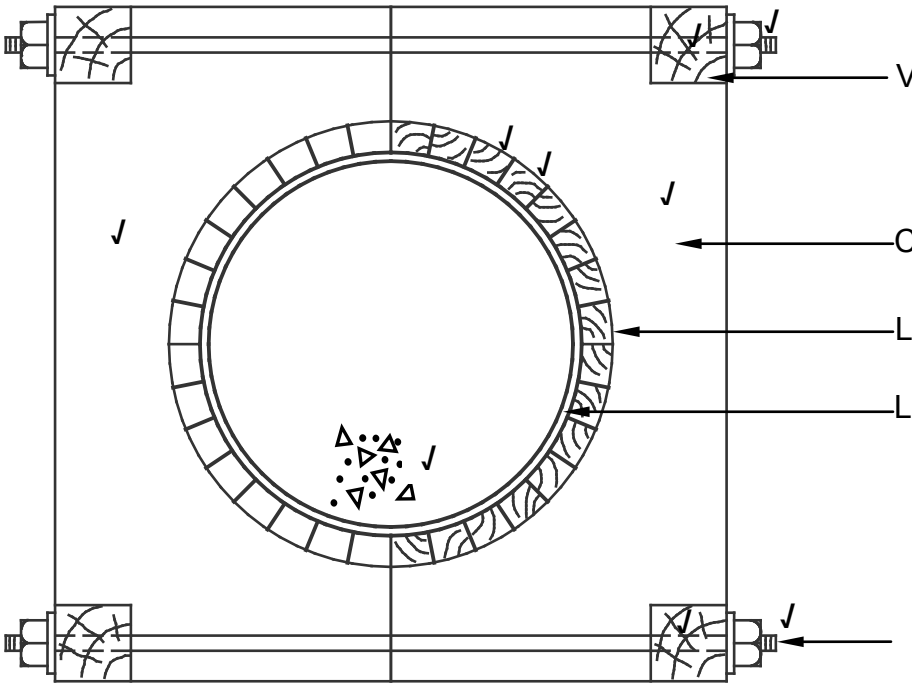
2.5.7 Can be used anywhere even in water ✓
Good stability
Easy to install
Resists stress
Can be used in any weather condition

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

2.6 Tiling is more durable than paint ✓
More cost effective over a period of time ✓
Easy to maintain
Enhance appearance

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

2.7

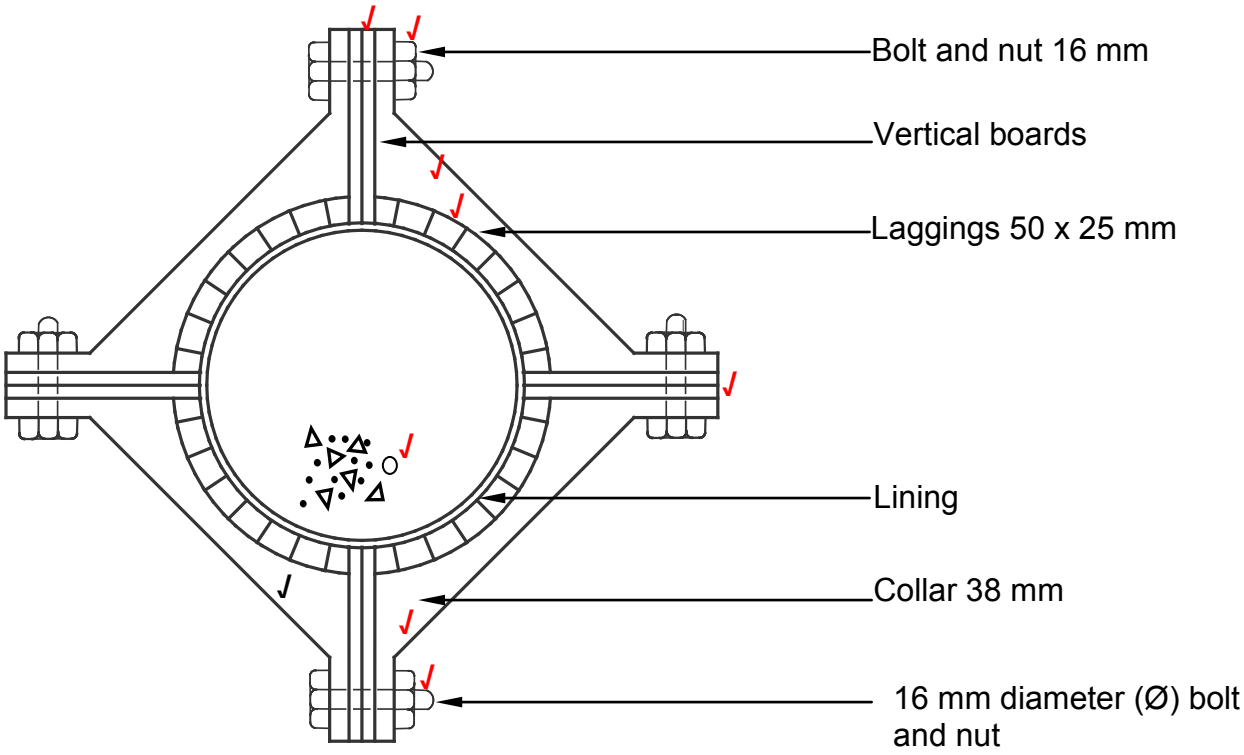


Formwork for round column ✓
Application of scale ✓ ✓

NOT TO SCALE: USE A MASK TO MARK THIS QUESTION

Assessment Criteria	Marks	Learner mark
Laggings 38 x 38 mm	2	
Vertical clamp/vertical boards	2	
Collars	2	
16 mm bolts/threaded rods and nuts	2	
Symbol for concrete	1	
Application of scale	2	
Title	1	
Total	**12**	

OR



Formwork for round column ✓
Application of scale ✓ ✓

NOT TO SCALE: USE A MASK TO MARK THIS QUESTION

Assessment Criteria	Marks	Learner mark
Laggings 38 x 38 mm	2	
Vertical clamp/vertical boards	2	
Collars	2	
16 mm bolts/threaded rods and nuts	2	
Symbol for concrete	1	
Application of scale	2	
Title	1	
Total	**12**	

[40]

QUESTION 3: CIVIL SERVICES

3.1 3.1.1 Rain/springs/dams/snow ✓

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

3.2.1 Copper ✓ (1)

3.2.2 Capillary joint ✓ (1)

3.3 Maintenance and repair work is very low. ✓
It is easy to maintain. ✓
It produces enough hot water for various households' purposes as long as there is electricity.

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

3.4 Water inside the geyser is discharged through the drain cock into ✓ the drip tray when the geyser needs to be drained. ✓

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

3.5 The season ✓
Cloud cover/cloudy weather ✓
The time of day
The duration of the sunshine
The angle at which the panel is mounted (an angle of 35° to the horizontal is ideal).
The height of the panels on the roof for the effective operation of the other parts of the system.
The position of the solar panel (facing north for the most sun)
Shadow of adjacent double story building/trees
The distance of the solar panel to the storage tank

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

3.6 Solar panel must face north at ±35° ✓
Circulation pipes must be insulated to avoid heat loss ✓
Solar panels must be SANS approved
Must not be installed in a shady area

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

3.7 3.7.1 Sewage – refers to waste water and soiled water ✓ (1)

3.7.2 Soil water – water that carries human waste. (1)

3.8 3.8.1 Slope in millimetres from A to B Slope 1 : 40 = 1 ÷ 40 = 0,025
= 35 m x 0,025 m ✓
= 0,875 m
= 875 mm ✓ (2)

OR

Slope in millimetres from A to B = Distance x Fall
= 35 m x 1:40
= 35 x 1 ÷ 40 ✓
= 0,875 m
= 875 mm ✓

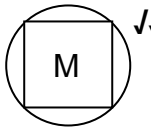
3.8.2 Invert level at A ✓ ✓
= 1 385 - 875 mm
✓
= 510 mm (3)

3.9 A – Gully trap ✓
B – Junction 45°✓ (2)

3.10 3.10.1 D ✓ (1)
3.10.2 C ✓ (1)
3.10.3 C ✓ (1)

3.11 It is much safer ✓
Bare cables cannot be seen ✓
Cables is not exposed to the weather and damage ✓
It also looks tidier than loose cables

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (3)

3.12 

✓✓ (2)

3.13 Channels ✓
Sloping hard surfaces ✓
Storm water pipes
Underground channels

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)
[30]

QUESTION 4: QUANTITIES AND CALCULATIONS AND JOINING

4.1 To attach roof structures to supporting walls ✓
To build frames into walls

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

4.2 4.2.1 Galvanized pipes ✓ (1)

4.2.2 PVC pipes ✓ (1)

4.3 4.3.1 It is used for rough carpentry work such as fixing fascia-boards, timber battens, metal and other materials to wood. ✓

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

4.3.2 It is used to attach hinges to doors ✓
When the head of the screw is required to be flush to the wood.

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

4.4 Gang nails ✓
Bolts and nuts ✓
Nails

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

ANSWER SHEET 4.5

A	B	C	D
			Centre line: Superstructure
			2 /10 500 mm = 21 000 mm ✓
			2 / 6 000 mm = 12 000 mm ✓
			= 33 000 mm ✓
			Minus 4/ 220 = 880 ✓
			= 32 120 mm
			Centre line = 32,12 m ✓ (5)
1/	32,12 ✓		Area of wall for superstructure
	2,7 ✓	86,72 m²✓	(3)
1/	2,0 ✓		Area of Door: = 1,6 m²
	0,8 ✓	1,6 m²✓	(3)
1/	1,0 ✓		
	0,6 ✓	0,6 m²✓	Area of Window = 0,6 m² (3)
			Total area of wall after deductions
			= 86,72 m² - 1,6 m² - 0,6 m² ✓ = 84,52 m² ✓ (2)
2/	84,52 ✓		
	50 ✓	8 452 ✓	8 452 bricks will be needed for the superstructure. (3)
			(19)
		OR	
1/	84,52		
	100	8 452	

4.6
- Battens/brandering ✓
- Ceiling board/Rhino board/Knotty pine ✓
- Cornice ✓
- Cover strips/Half rounds ✓
- Wire nails/Panel Pins
- Clout nails/Drywall screws

ANY FOUR OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (4)
[30]

QUESTION 5: APPLIED MECHANICS

5.1 ANSWER SHEET 5.1

Position of centroid from A–A $= \frac{(A1 \times d) + (A2 \times d) - (A3 \times d)}{\text{Total area}}$

✓ ✓ ✓

$= \frac{(2\,100 \times 65) + (2\,500 \times 25) - (450 \times 10)}{4\,150}$ ✓

$= \frac{136\,500 + 62\,500 - 4\,500}{4\,150}$ ✓

$= \frac{194\,500\ mm^3}{4\,150\ mm^2}$ ✓

$= 46{,}87\ mm$ ✓

OR

Take moments around A on Y-axis

✓ ✓ ✓ ✓

$4\,150\ mm^2 \times Y = (2\,100 \times 65) + (2\,500 \times 25) - (450 \times 10)$

$4\,150\ mm^2 \times Y = \frac{199\,000 - 4500}{4\,150\ mm}$ ✓

$= \frac{194\,500\ mm^3}{4\,150\ mm}$ ✓

$= 46{,}867\ mm$ ✓

OR

PART	AREA (A)	Y	AREA OF Y (AY)
Rectangle	2 100 mm²	$\frac{h}{2} = \frac{30}{2} = 15$ mm c = 50 + 15 = 65 mm ✓	136 500 mm³
Square	2 500 mm²	$\frac{s}{2} = \frac{50}{2} = 25$ mm ✓	62 500 mm³
Right-angled triangle	- 450 mm²	$\frac{h}{3} = \frac{30}{3} = 10$ mm ✓	- 4 500 mm³ ✓
Σ	4 150 mm² ✓		194 500 mm³

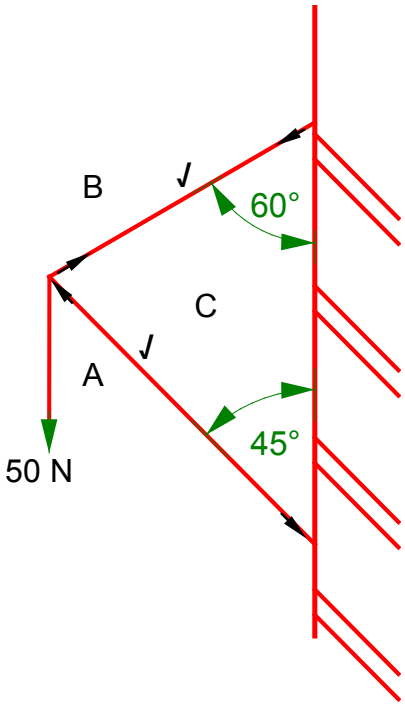
$\frac{\Sigma AY}{\Sigma A}$

$= \frac{194\,500\ mm^3}{4\,150\ mm^2}$ ✓

$= 46{,}87\ mm$ ✓

(8)

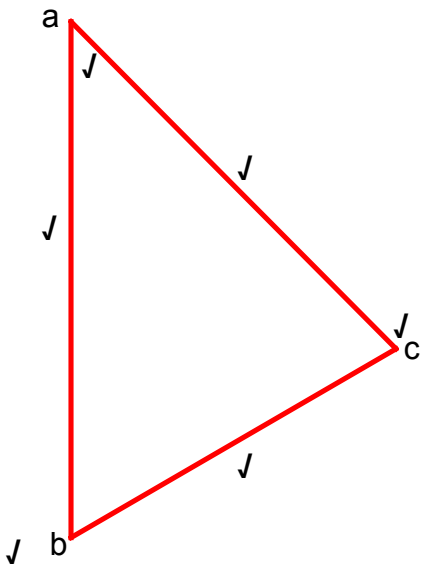
5.2
5.2.1



(2)

SPACE DIAGRAM
Nature of forces BC and CA = 2 marks

5.2.2



(6)

VECTOR DIAGRAM
NOT TO SCALE: USE A MASK TO MARK THIS QUESTION

5.2.3

MEMBER	NATURE	FORCE
BC	Tie ✓	37 N ✓
CA	Strut ✓	45 N ✓

Tolerance of 1 N to either side

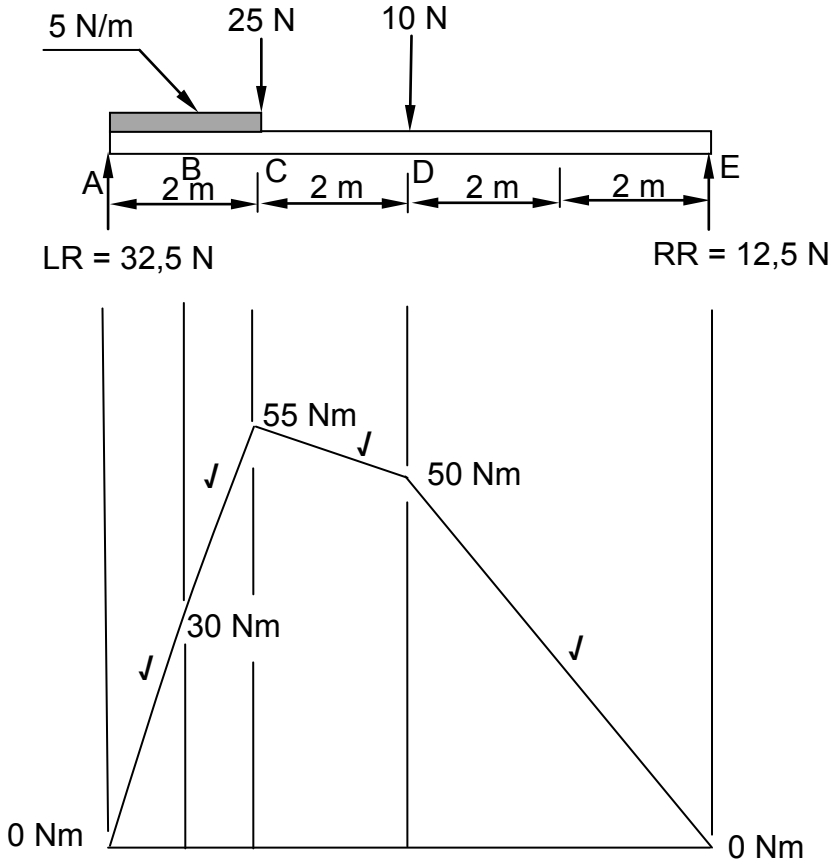
(4)

5.3 5.3.1 10 N ✓ (1)

5.3.2 1 m ✓ (1)

5.3.3 SFe (8 m from A) = 32,5 N – 10 N – 25 N – 10 N + 12, 5 N ✓✓✓✓
= 0 N (4)

5.3.4

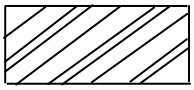


NOT TO SCALE: USE A MASK TO MARK THIS QUESTION
-1 MARK IF THE WRONG SCALE IS USED (4)

[30]

QUESTION 6.1

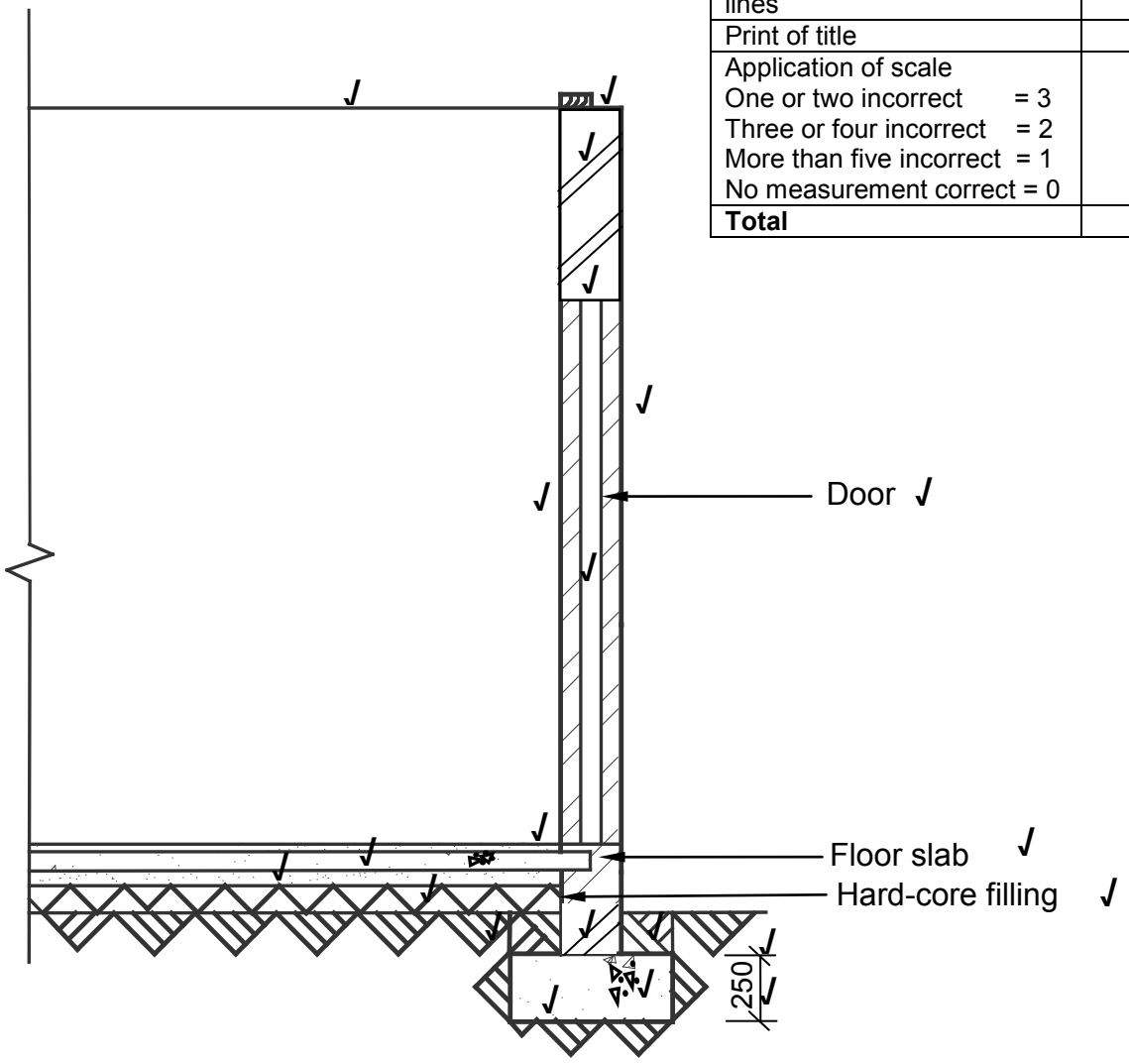
ANSWER SHEET 6.1

NO.	QUESTIONS	ANSWERS	MARKS
1	Identify number **1**.	Bath	1
2	Calculate the perimeter of the building	29 600 mm/29,6 m	1
3	Identify number **2**.	Wash basin	1
4	Identify number **3**.	Water closet	1
5	Calculate the area of the floor of the bathroom in m²?	9 m²	1
6	Identify number **4**.	Wash tub	1
7	Identify number **5**.	Built-in cupboard	1
8	Name the type of roof of the building	Hipped roof	1
9	Identify the electrical symbol at **6**.	Fluorescent light	1
10	Identify the electrical symbol at number **7**.	Double pole one way light switch	1
11	Draw the symbol to indicate a sectional view of a face-brick wall.		2
12	Identify number **8**.	Light – wall mounted	1
13	Which elevation of the house must be drawn if you want to see the front of the bedroom?	North elevation	1
14	How many doors are indicated on the drawing?	4 doors	1
		Total	**15**

QUESTION 6.2

ANSWER SHEET 6.2

ASPECT	MARKS	LEARNER MARK
Correctness of substructure	6	
Correctness of superstructure	7	
Correctness of any three drawing symbols	3	
Printing any three labels	3	
Dimension and dimension lines	2	
Print of title	1	
Application of scale One or two incorrect = 3 Three or four incorrect = 2 More than five incorrect = 1 No measurement correct = 0	3	
Total	**25**	



SECTION A-A√

APPLICATION OF SCALE √√√

NOT TO SCALE: USE A MASK TO MARK THIS QUESTION

[40]

TOTAL: 200