



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY

NOVEMBER 2015

MEMORANDUM

MARKS: 200

This memorandum consists of 18 pages.

QUESTION 1: CONSTRUCTION, SAFETY AND MATERIALS

- 1.1
- Someone should have held the ladder. ✓
 - Catch nets should be installed to prevent tools and materials from falling on people below. ✓
 - The visitor should wear a hard hat.
 - The worker should wear a tool belt.
 - A scaffold could be built.
 - Meeting to be moved to a safer area.
- (2)

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

- 1.2
- Always ensure that saw is sharp. ✓
 - Use saws only for the purposes for which they were designed. ✓
 - Safety rules for the saw must be strictly adhered to.
 - Do not work with a saw with a loose or broken handle.
 - Report all defects and damages immediately.
 - Always keep your hands away or behind the cutting surface of the saw.
 - Maintain the correct cutting direction.
 - Do not bend the blades/points of saw when you are using them.
 - Blunt saws require more force and may lead to unnecessary accidents.
 - The work piece must be securely clamped to prevent it from moving.
 - Do not test the sharpness of the teeth with your fingers
- (2)

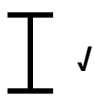
ANY TWO OF THE ABOVE

- 1.3
- Trenches that are excavated must be protected with a fence. ✓
 - Red warning lights or warning signs should be placed at intervals and must be clearly visible to warn the public of the danger.
- (1)

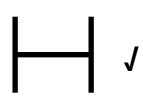
ANY ONE OF THE ABOVE

- 1.4
- Spray painting. ✓
 - Spray painting is a better option because plastics commonly have very smooth surfaces, so spray painting is a better option. ✓
 - Is easy to apply.
 - It is quicker.
- (2)

ANY TWO OF THE ABOVE

- 1.5
- 

I-beam



H-beam
- (2)

THREE DIMENSIONAL DRAWINGS CAN ALSO BE ACCEPTED

- 1.6 Admixtures are used to:
- change the property of the concrete mix. ✓
 - increase the workability.
 - increase or reduce the setting time.
 - increase the strength.
 - increases the durability.
 - reducing cost.
 - reduce water content.
 - improve pump ability
 - shorten curing time.
 - change the temperature range.
 - change the colour of concrete.
- (1)

ANY ONE OF THE ABOVE

- 1.7
- Plasticisers ✓
 - Accelerators
 - Retarders
 - Air entrainers/entrapment admixtures
 - Corrosion inhibitors
 - Damp proofing
 - Water-reducing admixtures
 - Anti-washout admixtures
 - Bonding admixtures
 - Colouring admixtures/oxides
- (1)

ANY ONE OF THE ABOVE

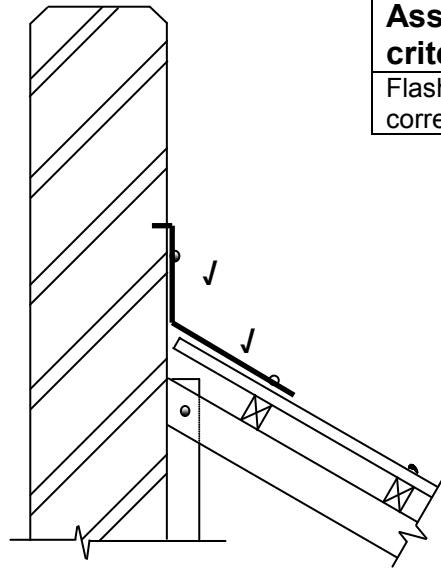
- 1.8
- Not fire resistant and therefore it must be treated/burns easily. ✓
 - It is more expensive than ordinary roof coverings/insurance is more expensive. ✓
 - A lot of maintenance is required/easily damaged.
 - Thatch is an organic material and can rot easily.
 - The thatch at the ridge capping needs to be re-thatched regularly.
 - Durability is more or less between 25 and 30 years if properly maintain.
 - Ideal breeding place for Insects and dust
- (2)

ANY TWO OF THE ABOVE

- 1.9
- Corrugated iron sheeting/galvanised sheeting ✓
 - IBR sheeting ✓
 - Concrete/clay roof tiles/tiles
 - Slate
 - Fibre cement sheeting
 - Fibre glass sheeting
 - Transparent IBR sheeting
 - Perspex sheeting
- (2)

ANY TWO OF THE ABOVE

1.10 1.10.1



Assessment criteria	Mark	Candidate's mark
Flashing correctly drawn	2	

(2)

1.10.2

- Waterproofing membrane with a sealing compound ✓
- Bituminous felt
- Plastic
- Copper sheet
- Galvanised sheet metal
- Lead sheet
- Aluminium sheet

(1)

ANY ONE OF THE ABOVE

1.10.3

- It is to seal off the gap between the wall and the roof. ✓
- To prevent rain from entering the roof.
- To prevent unwanted elements from entering the ceiling.

(1)

ANY ONE OF THE ABOVE

1.11 1.11.1

English bond ✓

(1)

1.11.2

- The English bond can only be built as a single brick wide wall. ✓
- One course will be a stretcher course followed by a header course.
- The second and second-last bricks will a queen closer in the header course. ✓
- If the course in a quoin on the front elevation is a stretcher course then the same course around the corner will be a course of headers.
- It is one of the strongest bond.

(2)

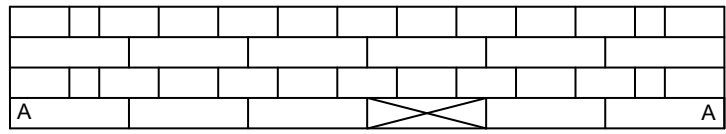
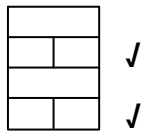
1.11.3

- The wall can be painted ✓
- The wall can be tiled
- The wall can be cladded (wood/stone/brick)

(1)

ANY ONE OF THE ABOVE

1.11.4 End view

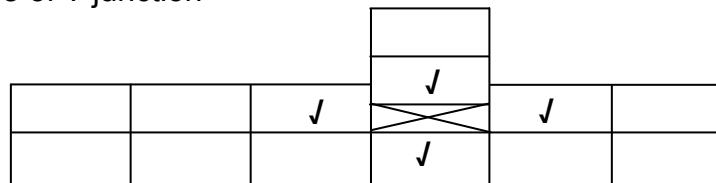


(2)

1.11.5

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Stretcher course	2	
Queen closer	1	
Header course	1	
TOTAL:	4	

Plan course of T junction



(4)

1.12

- Cement fibre ceiling board ✓
- Match board ceilings
- Sheet metal ceilings
- Knotty pine ceiling
- Gypsum board/Rhino board
- Plastic ceilings.
- Polystyrene ceilings
- Styrofoam

(1)

ANY ONE OF THE ABOVE

[30]

QUESTION 2: ADVANCED CONSTRUCTION AND EQUIPMENT

2.1 2.1.1 Electric mitre saw ✓ (1)

- 2.1.2
- The mitre saw can be used to make accurate cross cuts at different angles. ✓
 - The mitre saw can be used to cut angles or compound angles on roof truss members
 - The mitre saw can be used to saw mitres of skirtings. (1)

ANY ONE OF THE ABOVE

- 2.1.3
- The mitre saw enables precision cutting. ✓
 - It will save time. ✓ (2)

- 2.2
- Start by filling the pipe with water. Bring the water level in the transparent pipe in line with the first level. ✓
 - Take the other end of the pipe to the other position where the level must be transferred, maintaining the first level. Make a mark next to the water level at this point. ✓ (2)

- 2.3
- It will be used to provide electricity to all portable electrical equipment on the building site where no electricity is available. ✓
 - To provide electricity for the site office. (1)

ANY ONE OF THE ABOVE

2.4 2.4.1 Concrete spacer/Spacer/cover depth block ✓ (1)

- 2.4.2
- It is used to keep reinforcement bars away from soil and sides of trenches or shuttering (formwork). ✓
 - It is used to maintain cover depth of concrete/to keep reinforcement bars in position. (1)

ANY ONE OF THE ABOVE

2.5 2.5.1 Rib and block floor ✓ (1)

- 2.5.2
- It is cheaper. ✓
 - It is lighter and easy to work with. ✓
 - It is quicker to install.
 - It has a lighter load on foundations. (2)
 - Easy to trim around edges.

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

- 2.5.3
- It is more economical than in situ concrete floors. ✓
 - Very little or no shuttering is required. ✓
 - They provide superior sound and thermal insulation. ✓
 - It can be erected a lot quicker than in situ slabs.
 - Highly skilled labour is unnecessary.
 - No heavy lifting equipment is required. (3)
 - It is easier to install conduits.
 - The load of the building will be lighter on the foundation.

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

- 2.6 2.6.1
- Flat ✓
 - Semi-circular ✓
 - Circular
 - Segmental arch (2)

ANY TWO OF THE ABOVE

- 2.6.2 Key brick ✓ (1)

- 2.7 Slump test – Test the workability and consistency of the concrete mix. ✓
Cube test – Test the compressive strength of concrete. ✓ (2)

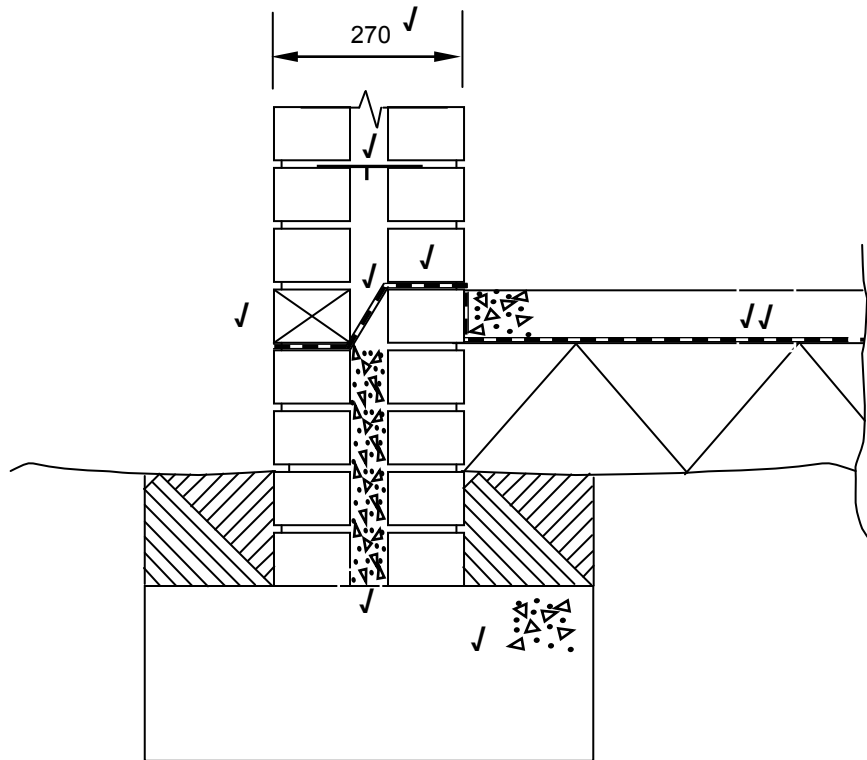
- 2.8 2.8.1 A - Anchor bar ✓
 B - Shear bar ✓
 C - Stirrup/Binder ✓
 D - Main bars of column ✓ (4)

- 2.8.2 Ribbed bars create a better bond with the concrete due to the rough surface of the bar. ✓ (1)

OR ANY OTHER ACCEPTABLE ANSWER

- 2.9 2.9.1 A – Landing / Floor ✓ (1)
- 2.9.2 B – Between 75 mm and 200 mm. ✓ (1)
- 2.9.3 C – Tread/Going ✓ (1)
- 2.9.4 D - String ✓ (1)

2.10



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Symbol for concrete foundation and concrete floor	1	
Damp-proof course between walls and cavity	2	
Damp-proofing under concrete floor	2	
Weep hole	1	
Concrete in cavity wall	1	
Wall tie	1	
Dimension of total width of wall	1	
TOTAL:	9	

(9)

2.11 Pile foundations/raft foundations ✓

(1)

2.12 Dry wall ✓

(1)

[40]

QUESTION 3: CIVIL SERVICES

- 3.1 3.1.1 C/B ✓ (1)
- 3.1.2 A ✓ (1)
- 3.1.3 E ✓ (1)
- 3.1.4 B ✓ (1)
- 3.1.5 D ✓ (1)
- 3.1.6 G ✓ (1)
- 3.1.7 F ✓ (1)
- 3.2 3.2.1 If there is no gully and the sewerage system is blocked sewage will flow out through the bath outlet/shower outlet/water closet into the house. ✓ (1)
- 3.2.2 If there is a blockage in the sewerage system there will be no access to remove the blockage. ✓ (1)
- 3.3 • By using an electric geyser. ✓
 • By using a gas geyser. ✓
 • By using a solar geyser.
 • By using fire to heat the water.
 • Electricity
 • Gas
 • Wood/fire/donkey (2)
 • Heat pump

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

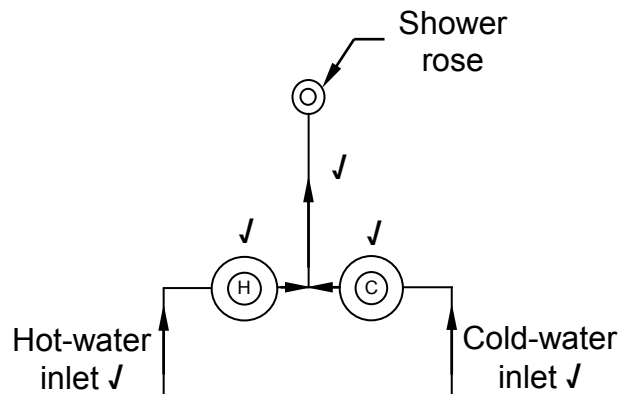
- 3.4 • Wind pump/mill/
 • Hand pump
 • A submersible pump
 • Motorised/solar pump (1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

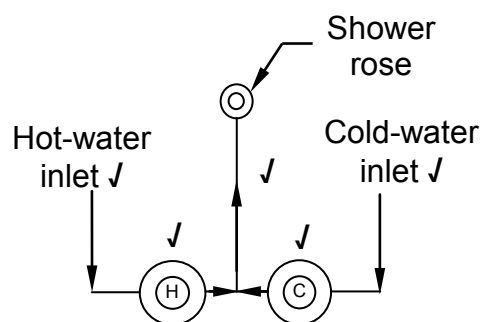
- 3.5 • Shallow wells ✓
 • Sea water (desalination)
 • Rain water
 • Dams
 • Rivers
 • Lakes (1)
 • Tanks/reservoirs/purchased water
 • Recycled water

ANY ONE OF THE ABOVE

3.6



OR



(5)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE LAYOUT

- 3.7 3.7.1 Single-bowl sink ✓ (1)
- 3.7.2 Gully ✓ (1)
- 3.7.3 Water meter ✓ (1)
- 3.8
- By using roof gutters rainwater will be channelled to an exit point. ✓
 - By using surface channels leading rainwater to exit point. ✓
 - By using hard surfaces rain water will be channelled to exit point.
 - By using grid-top manholes rain water will be channelled into the storm water pipe network. (2)

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

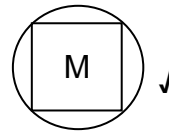
- 3.9 3.9.1 Conduits are chased into the wall. ✓ (1)
- 3.9.2
- A light switch/switch/isolator ✓ OR
 - Socket outlet/switched socket outlet/power point/plug. (1)
- 3.9.3 C Socket outlet/Power point ✓ (1)
- D Distribution board/box/Prepaid meter ✓ (1)
- E Meter box ✓ (1)

- 3.9.4
- The kick pipe is used to protect the electrical cable from damage. ✓
 - To enable the installation of the electrical cable to the meter box.
 - Easy replacement of electrical cables.
 - Electricity supply to the building.
 - Safety/neatness
- (1)

3.9.5



OR



(1)
[30]

QUESTION 4 QUANTITIES AND CALCULATIONS AND JOINING

4.1	4.1.1	2 ✓	(1)
	4.1.2	114 mm ✓	(1)
	4.1.3	44 mm ✓	(1)
	4.1.4	Muntin ✓	(1)
	4.1.5	810 mm ✓	(1)
	4.1.6	32 mm ✓	(1)
	4.1.7	230 mm ✓	(1)
4.2	4.2.1	C ✓	(1)
	4.2.2	B ✓	(1)
	4.2.3	D ✓	(1)
	4.2.4	A ✓	(1)
	4.2.5	D ✓	(1)
	4.2.6	D ✓	(1)
	4.2.7	A ✓	(1)
	4.2.8	A ✓	(1)

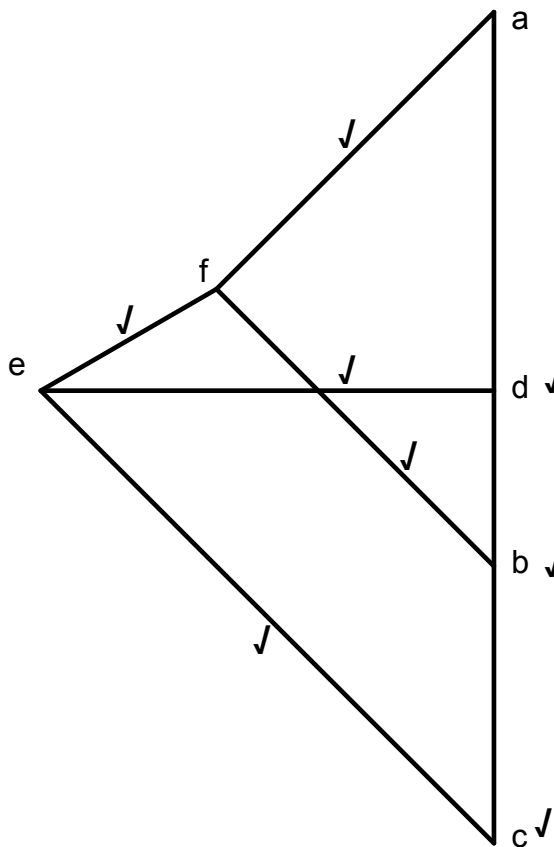
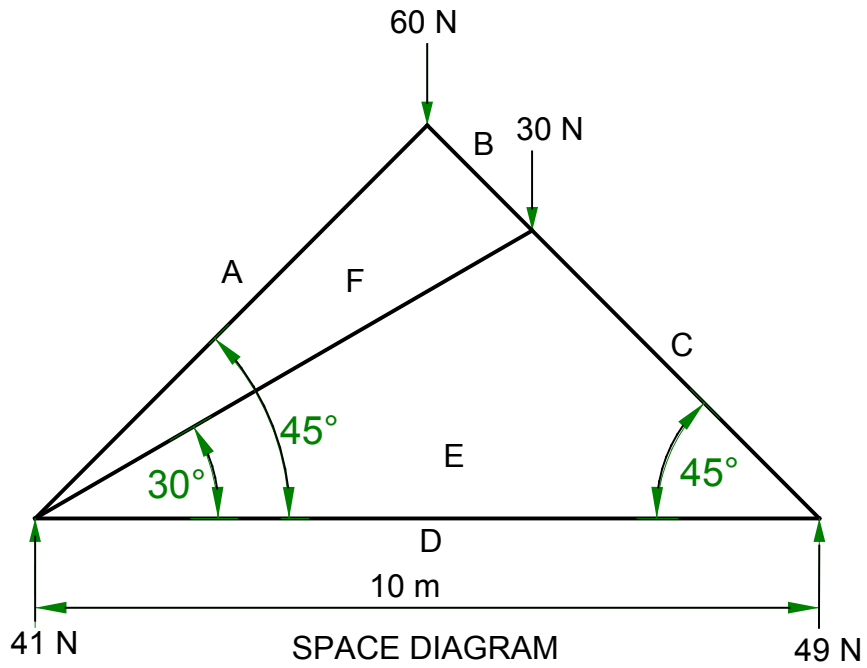
	A	B	C	D	
4.3.1				Internal measurements of:	
				Long walls = 5 240 J – 2/220 mm J	
				= 4 800 mm J	
				Short walls = 4 040 J – 2/220 mm J	
				= 3 600 mm J	(6)
	1/	<u>4,8</u> J		Internal area of the store room.	
4.3.2		<u>3,6</u> J	<u>17,28 m²</u> J		(3)
				Number of ceiling boards.	
	1/	<u>2,4</u> J		Area of one ceiling board (CB):	
		<u>0,9</u> J	<u>2,16 m²</u> J	One ceiling board is 2 400 mm x 900 mm	
4.3.3				Area is 2,16 m ²	
				Ceiling boards needed = $\frac{\text{Area of room}}{\text{Area of CB}}$	
				= $\frac{17,28}{2,16}$ JJ	
				= 8 Ceiling boards are needed J	(6)

[30]

QUESTION 5: APPLIED MECHANICS

- 5.1 5.1.1 $60 \text{ mm} \times 40 \text{ mm} = 2\,400 \text{ mm}^2 \checkmark$ (1)
- 5.1.2 $\frac{1}{2} \times 20 \times 30 \text{ mm} = 300 \text{ mm}^2 \checkmark$ (1)
- 5.1.3 $80 \text{ mm} \times 30 \text{ mm} = 2\,400 \text{ mm}^2 \checkmark$ (1)
- 5.1.4 $2\,400 \text{ mm} + 2\,400 \text{ mm} - 300 \text{ mm} = 4\,500 \text{ mm}^2 \checkmark$ (1)
- 5.1.5 $40 \text{ mm} \checkmark$ (1)
- 5.1.6 $60 \text{ mm} \checkmark$ (1)
- 5.1.7 $60 \text{ mm} \checkmark$ (1)
- 5.1.8 $40 \text{ mm} \checkmark$ (1)

5.2



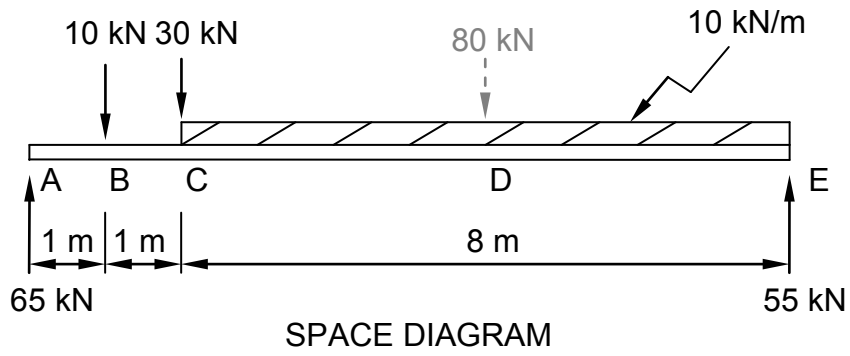
(8)

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

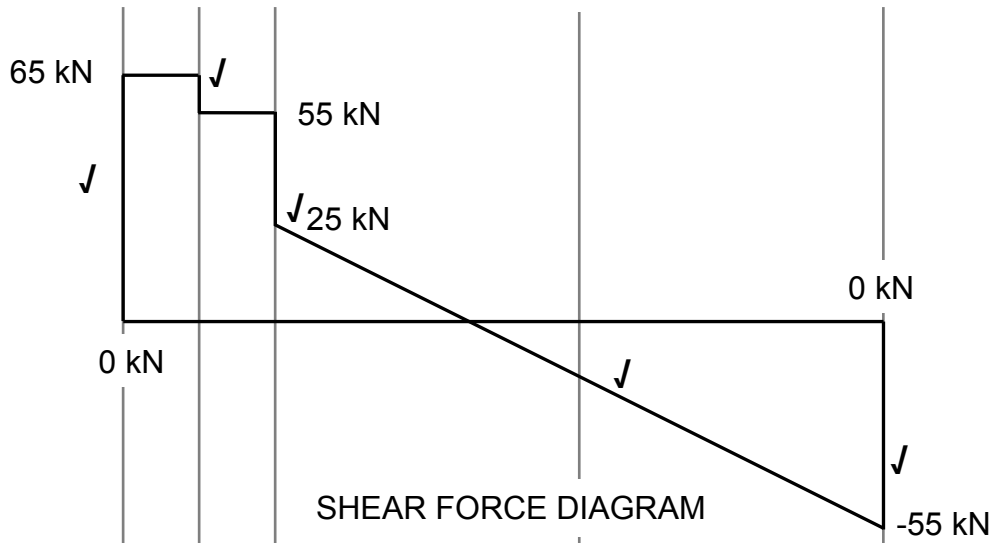
MEMBER	NATURE	MAGNITUDE
AF	Strut ✓	42,4 N ✓
CE	Strut ✓	69,2 N ✓

(4)

Tolerance of 1 N to either side

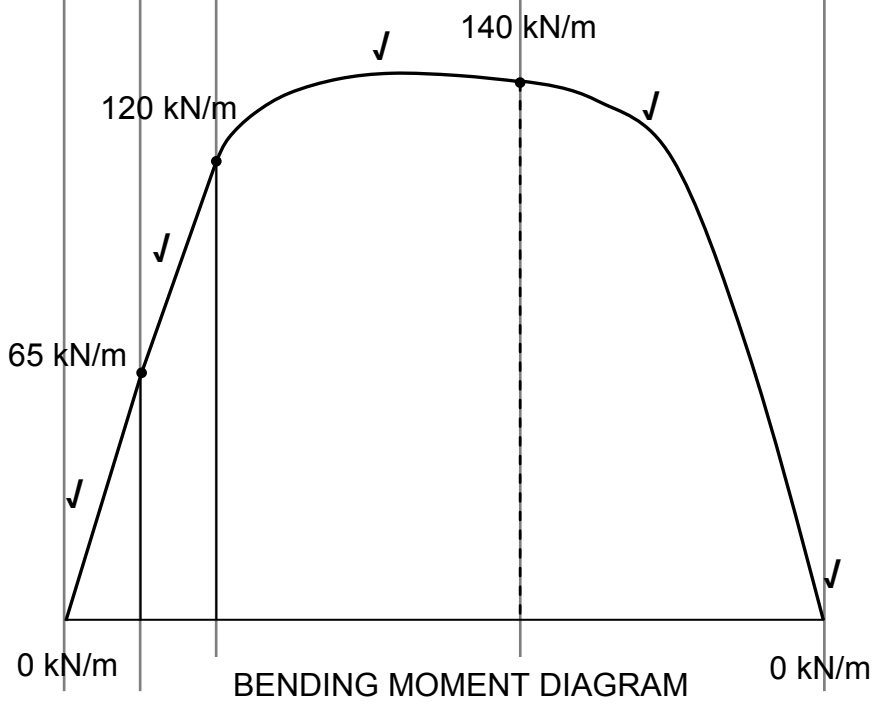


5.3.1




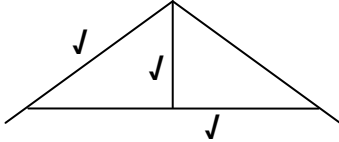
(5)

5.3.2



(5)
[30]

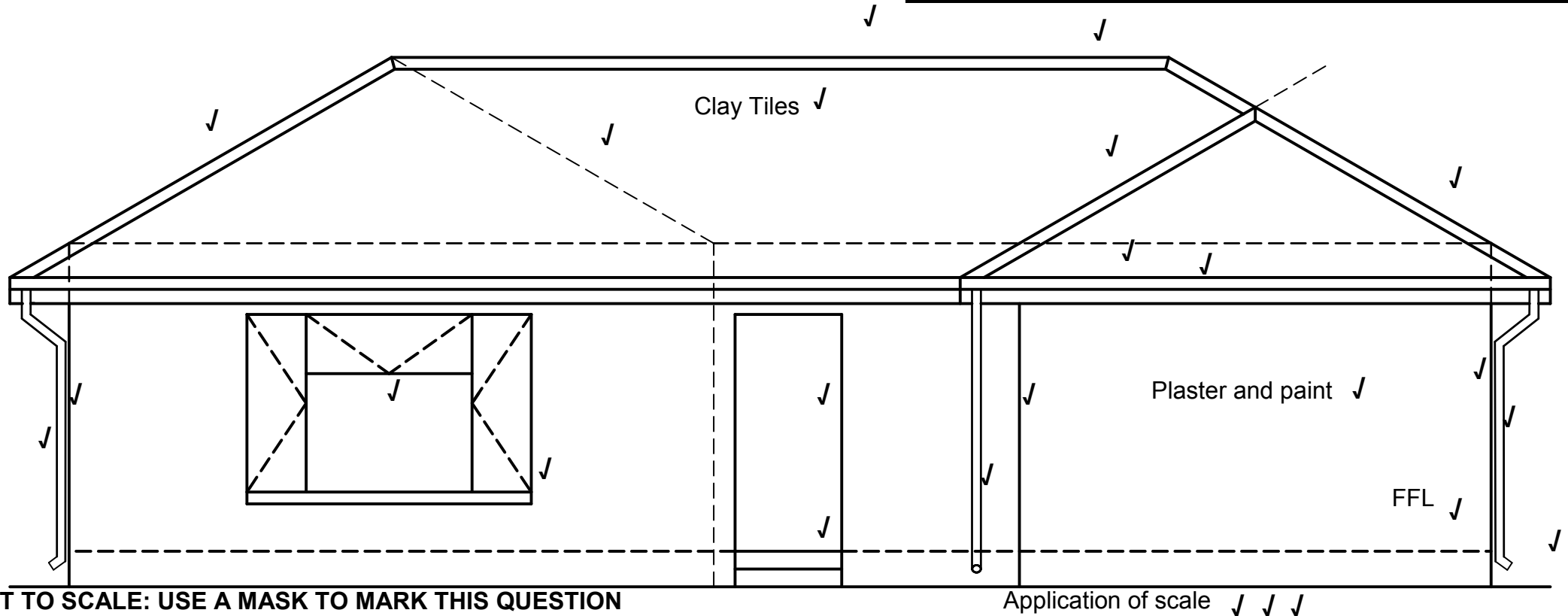
ANSWER SHEET 6.1

NO.	QUESTIONS	ANSWERS	MARKS
1	Identify the type of eave construction used in the drawing.	Closed eave/concealed eave	1
2	State the minimum pitch (slope) of number 1.	5° to 10°	1
3	State the standard dimension of number 2.	114 mm x 38 mm	1
4	State the centre-to-centre spacing between the brading of the ceiling construction.	300 mm/400 mm/ 450 mm Any ONE of the above	1
5	State the purpose of number 3.	To cover the opening between the ceiling and the wall. To prevent unwanted elements entering the ceiling.	1
6	Draw the drawing symbol for number 4.		1
7	State the width of the external wall indicated by number 5, excluding plaster.	220 mm	1
8	Name the colour coding that should be used for number 6.	Yellow	1
9	As a draughtsperson, recommend a type of roof sheeting for number 7.	Corrugated galvanised sheeting/IBR sheeting/Cement fibre sheet/Chromadeck/fibre glass Or any other acceptable answer	1
10	Name ONE material that can be used for number 8.	Fibre cement, Knotty pine, chicken mesh and soffit laggings, soffit board, slats Any ONE of the above	1
11	Identify number 9.	Quarter round mould/ Quadrant	1
12	What is the standard dimension of number 10?	114 mm x 38 mm	1
13	Draw a neat freehand line diagram of a kingpost roof truss.		3
TOTAL:			15

QUESTION 6: GRAPHICS AND COMMUNICATION

ANSWER SHEET 6.2

ASSESSMENT CRITERIA	MARKS	LM	ASSESSMENT CRITERIA	MARKS	LM
External walls	3		Ridge capping	1	
NGL (correctly indicated)	1		Determine roof height	1	
FFL (correctly indicated)	1		Any two labels	2	
Window	1		Application of scale	3	
Window sill	1		One or two incorrect = 3		
Door opening	1		Three or four incorrect = 2		
Step	1		More than five incorrect = 1		
Fascia board	1		No measurement correct = 0		
Rain-water down pipes	3				
Roof (correctly drawn)	4				
Gutter	1		TOTAL:	25	



**TOTAL: [40]
200**