basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY

NOVEMBER 2017

MARKING GUIDELINES

MARKS: 200

These marking guidelines consist of 19 pages.

QUESTION 1: CONSTRUCTION, SAFETY AND MATERIALS

1.1
- Never use unsafe supports such as step ladders, drums, loose bricks, or crates on the scaffolding. ✓
- The worker should have worn a safety harness/safety rope/. ✓
- The worker should ensure that there are sufficient guard rails on the scaffolding.
- Always wear protective clothing when working on scaffolding/non slip safety footwear.
- The worker should ensure that the area is free of liquids and obstacles. (2)

ANY TWO OF THE ABOVE

1.2
- To prevent electric shock. ✓
- To keep the power tools in a working condition.
- To ensure the safety of the user.
- Live exposed wires can cause electrocution or fire. (1)

ANY ONE OF THE ABOVE

1.3
- The worker can be injured by the moving blade. ✓
- Measuring tools/tools may be damaged when touching the moving blade.
- Moving parts of the machine can be damaged (1)

ANY ONE OF THE ABOVE

1.4
- Tamping rod/rod ✓
- Cone/frustum/mould ✓
- Base plate/waterproof base ✓
- Folding ruler, tape measure, steel ruler/level/straight edge
- Shovel (3)

ANY THREE OF THE ABOVE

1.5
- Concrete mixer/machine mixed ✓
- Ready mixed concrete (1)

ANY ONE OF THE ABOVE

1.6
1.6.1 B ✓ (1)

1.6.2 C ✓ (1)

1.6.3 D ✓ (1)

1.6.4 F/M ✓ (1)

1.6.5 G ✓ (1)

1.6.6 J ✓ (1)

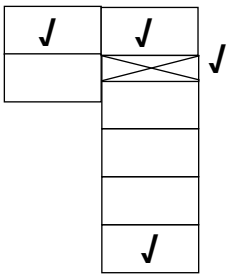
1.6.7 L ✓ (1)

1.6.8 I ✓ (1)

1.6.9 H ✓ (1)

1.6.10 A ✓ (1)

1.7 1.7.1



(4)

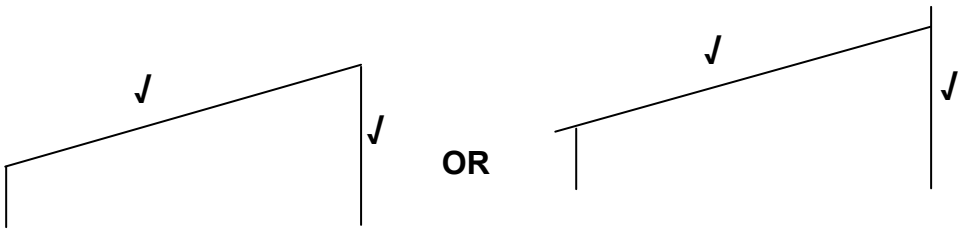
1.7.2 **PLAN COURSE OF A QUOIN IN ENGLISH BOND/ CORNER BUILT IN ENGLISH BOND ✓** (1)

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Stretcher course	1	
Corner brick	1	
Queen closer	1	
Header course	1	
TOTAL	**4**	

1.7.3
- The queen closer creates the bond in the wall/quarter lap. ✓
- The queen closer closes the gap in the wall in the header course.
- The queen closer prevents a straight vertical mortar joint.

ANY ONE OF THE ABOVE (1)

1.8



(2)

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Supporting walls	1	
Roof	1	
TOTAL	**2**	

1.9 1.9.1

- A brush/sponge can be used to apply paint to a ceiling. ✓
- A roller can be used to apply paint to a ceiling.
- A spray gun/spray-painting equipment can be used to apply paint to a ceiling.
- A sponge can be used to apply paint to a ceiling.

ANY ONE OF THE ABOVE (1)

1.9.2

- Painting it with a brush will avoid fine paint spray on the walls and the floors. ✓
- Using a roller will be quicker than using a brush/prevent stripes.
- Spray painting will be quicker that painting with a brush and a roller.
  A sponge can be used for the decorative application of paint.
- **ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER** (1)

1.10 1.10.1 Skirting/tile skirting ✓ (1)

1.10.2 Cornice ✓ (1)

ANY SUITABLE MATERIAL INDICATED FOR THE MANUFACTURING OF THE ABOVE COMPONENTS WILL BE ACCEPTED.

[30]

QUESTION 2: ADVANCED CONSTRUCTION AND EQUIPMENT

2.1 2.1.1 D ✓ (1)

2.1.2 B ✓ (1)

2.1.3 B ✓ (1)

2.1.4 D ✓ (1)

2.1.5 C ✓ (1)

2.2 2.2.1 Dumpy level/surveying instrument/levelling instrument ✓ (1)

2.2.2
- To measure vertical and horizontal heights/levels ✓
- To measure vertical and horizontal angles
- To measure distances
- It is used for surveying/setting out of buildings.

(1)

ANY ONE OF THE ABOVE

2.2.3 Tripod/baseplate ✓ (1)

2.2.4 Telescopic staff/levelling rod ✓ (1)

2.2.5
- To prevent it from getting damaged and wet. ✓
- To protect the instrument against dust/moisture/bumps/sun
- It is fragile.

(1)

ANY ONE OF THE ABOVE

2.3 2.3.1 Rib and block concrete ✓ (1)

2.3.2 A – Concrete floor slab/concrete/slab. ✓
B – Concrete hollow block/rib block/block ✓
C – Reinforced steel mesh/reinforcement bars/bars ✓ (3)

2.3.3
- The rib and block method can be used anywhere, even in water. ✓
- Components are precast, thus it saves a lot of building time.
- Placing is relatively quick.
- Provides excellent resistance against soil movement.
- Work can proceed, despite the weather conditions.
- Plastering the underside of the floor can take place without any delays.
- No extensive formwork or shuttering is necessary.
- It is approximately 30% lighter than in situ floor slabs.
- No skilled labour is required as the supply company also does the installation.
- It is cheaper.
- Less quantity of material is used.

(1)

ANY ONE OF THE ABOVE

2.4 2.4.1 A - Wall tie ✓
B - Damp proof course/DPC ✓ (2)

2.4.2
- Under the window sill ✓
- Under floor slab/Between the sub- and super structure
- At the base of external and internal walls
- Vertically at jambs or door frames
- Roof/parapet wall
- Above the lintel of a cavity wall

(1)

ANY ONE OF THE ABOVE

2.4.3 The cavity in the walls are to:
- prevent rain water from penetrating the inner skin of the wall. ✓
- provide high insulation against heat, cold and sound.
- enable the use of cheaper or alternative materials for inner skin of the wall.

ANY ONE OF THE ABOVE (1)

2.5 Intrados – Is the inner surface of arches ✓
Extrados – Is the outer surface of arches ✓ (2)

2.6 2.6.1 Cube/Cube mould/Mould ✓ (1)
ANY ONE OF THE ABOVE

2.6.2 Tamping rod/Rod/Trowel/Shovel ✓ (1)
ANY ONE OF THE ABOVE

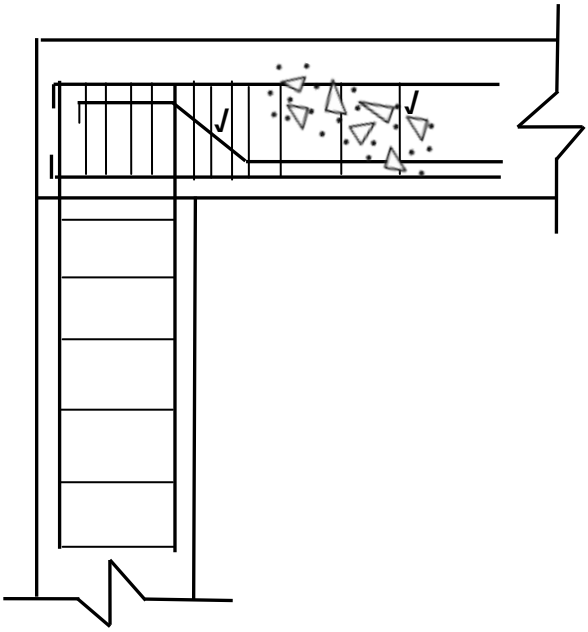
2.6.3 Cube test ✓ (1)

2.6.4
- The test is done to determine the compressive strength/crushing strength of concrete. ✓
- Test the strength of concrete.

(1)

ANY ONE OF THE ABOVE

2.7



ASSESSMENT CRITERIA	MARK	CANDIDATES MARK
Shear bar correctly drawn	1	
Stirrups correctly drawn and spaced	1	
TOTAL	**2**	

(2)

2.8 2.8.1 Twisted ribbed bar ✓

2.8.2 Ribbed bar ✓ (2)

2.9 2.9.1

- Wooden planks/timber ✓
- Block board
- Laminated board
- Shutter board
- Plywood boards
- Metal shutter

(1)

ANY ONE OF THE ABOVE

2.9.2 B – Wedges ✓
C –Yoke ✓
D – Clamp/Cleat ✓
E – Threaded rod/bolt and nut/bolt ✓ (4)

2.9.3

- The yokes will not be tightened/Yokes will not be able to be joined. ✓
- The formwork will not be kept in place/collapse.
- The formwork will not be square.
- The yokes will not be in place.
- The formwork will not be rigid.
- Concrete will escape from the corners of the formwork.

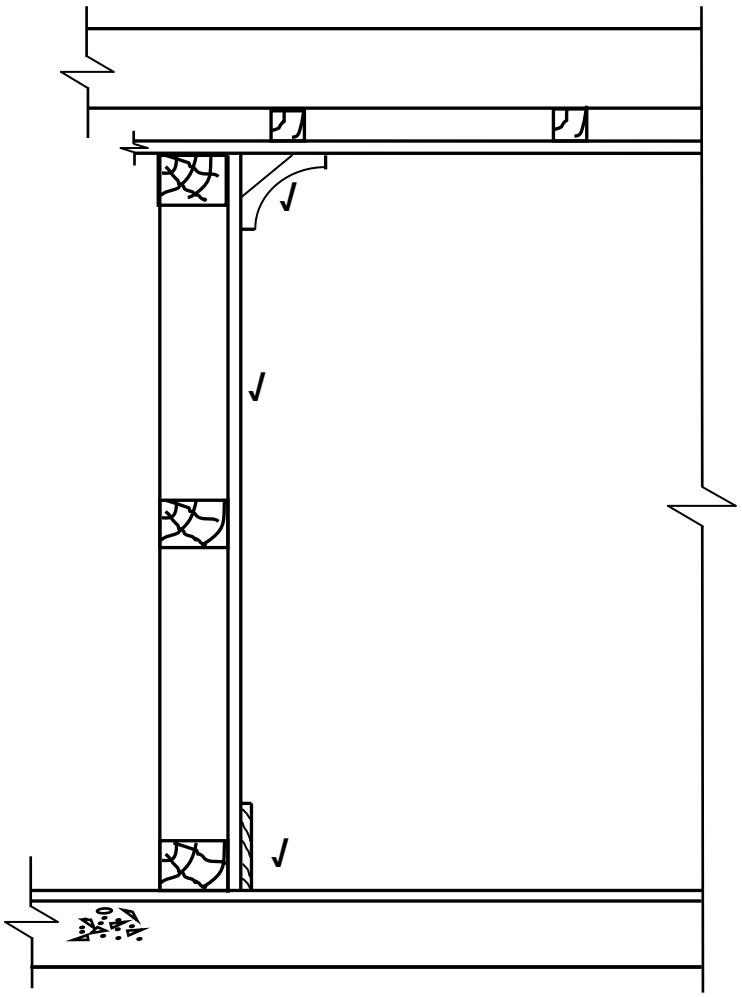
(1)

ANY ONE OF THE ABOVE

2.10
- There is insufficient soundproofing ✓
- There is less insulation against cold and heat
- It cannot be use externally
- The dry wall can easily be damaged/burnt
- The dry wall cannot carry heavy loads

ANY ONE OF THE ABOVE (1)

2.11



ASSESSMENT CRITERIA	MARK	CANDIDATES MARK
Cladding correctly drawn	1	
Cornice/moulding at ceiling correctly drawn	1	
Skirting/quadrant at floor correctly drawn	1	
TOTAL	**3**	

(3)

2.12
- Preformed concrete piles ✓
- Steel tube caisson piles
- Driven in-situ piles
- Short bored piles

ANY ONE OF THE ABOVE (1)

[40]

QUESTION 3: CIVIL SERVICES

3.1 3.1.1 S – trap ✓ (1)

3.1.2 To prevent sewer-gas (foul air) from the sewerage system to enter the building. ✓ (1)

3.2
- The season/Cloud cover/weather conditions ✓
- Time of day ✓
- Duration of sunshine
- Cleanliness of glass panel
- Shadows over glass panels
- The intensity of direct sunlight
- The position/orientation of the panel to north
- Pitch of the panel
- The type of solar heater/panel

(2)

ANY TWO OF THE ABOVE

3.3 3.3.1 Heating element/Element ✓ (1)

3.3.2
- The cold water inlet is placed at the bottom of the geyser so that the incoming cold water does not mix with the hot water/incoming cold water heated by the element. ✓
- The hot water outlet is placed at the top to discharge hot water which is concentrated at the top of the geyser. ✓

(2)

OR ANY OTHER ACCEPTABLE ANSWER

3.3.3 Temperature and pressure safety valve/Safety valve/Pressure valve ✓ (1)

3.4 3.4.1
- The grid receives/drains storm water/allow storm water to enter storm water system/pipe. ✓
- Water is guided to flow off our roads on to the road kerbs and then into the road channel into the storm water pipes.
- Prevent waste like paper and plastic bags to block the storm water pipes.
- For safety purposes

(1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

3.4.2
- Roads will overflow with storm water. ✓
- Damage to the roads may be possible because of the storm water.
- Storm water will not be able to enter the grid.
- Storm water will flood surrounding areas

(1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

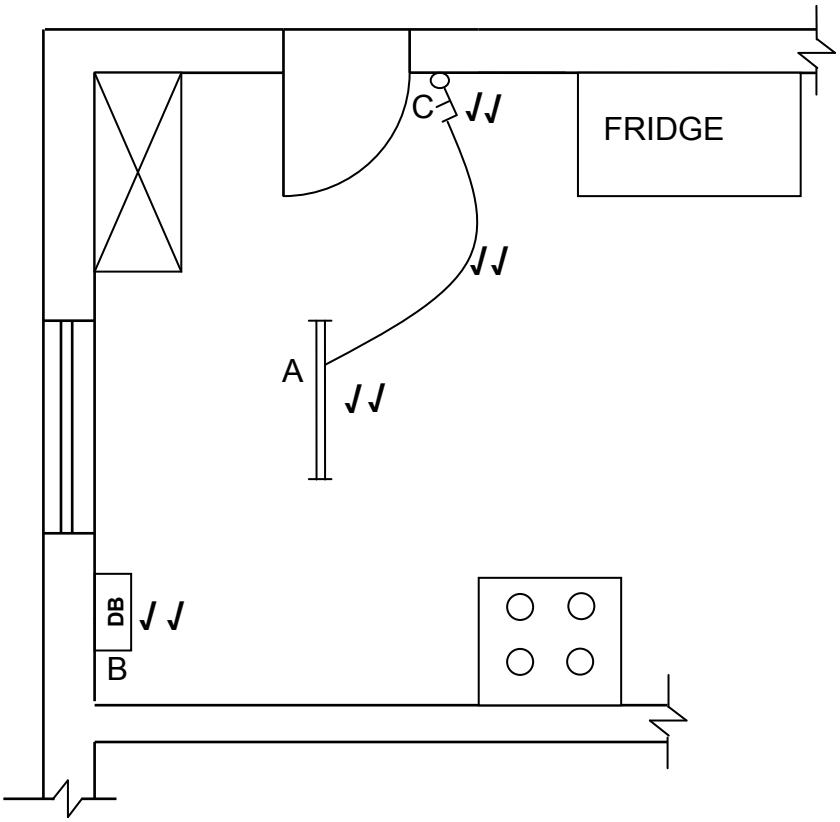
3.5

- Wind pump ✓
- Submersible water pump ✓
- Water pump
- Manual hand pump/hand pump
- Electric pump
- Solar powered pump

(2)

ANY TWO OF THE ABOVE

3.6

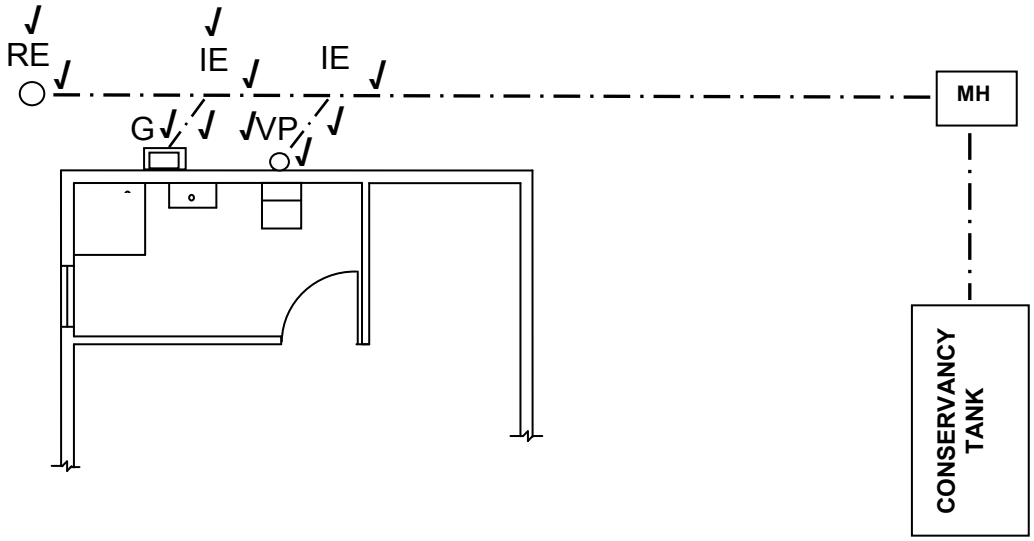


ASSESSMENT CRITERIA	MARK	CANDIDATES MARK
Fluorescent light	2	
Distribution board	2	
Double-pole light switch (one-way)	2	
Electric wiring	2	
TOTAL	**8**	

DRAWING SYMBOLS IN TEXTBOOKS FOR ABOVE ITEMS WILL ALSO BE ACCEPTED

(8)

3.7



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Rodding eye	1	
Gully	1	
Ventilation pipe/Vent pipe	1	
Branch pipes 45°	2	
Inspection eyes	2	
Any THREE abbreviations	3	
TOTAL	**10**	

(10)
[30]

QUESTION 4 QUANTITIES AND CALCULATIONS AND JOINING

4.1 4.1.1 Chipboard/drywall/counter sunk head screw/pozi drive screw ✓
Use:
Joining fabricated boards/machine made boards/board products/timber ✓ (2)

4.1.2 Steel cut nail/masonry nail ✓
Use:
Mainly used to fix skirting and cleats to brickwork ✓

OR

Oval nail
Use:
Used at edge of timber to prevent the timber from splitting

OR

Floor nail
Use:
Used to secure floor planks (2)

4.1.3 Sleeve anchor/Rawlbolt ✓
Use:
Fixing objects into concrete and brickwork/to join truss hangers against a wall ✓ (2)

4.2 • Wire nails/clamp/hurricane clamps ✓ (1)

4.3 Nails:
- Quicker to drive in than screws ✓
- Available in a variety of lengths, thicknesses and strengths ✓
- Various heads for invisible or decorative use
- Cheaper than screws
- Can be made of rust proof material (copper or stainless steel)
- Can be quickly removed
- Tough and resilient
- Can be straightened and reused
- Nails requires a less skilful worker
- Not as time consuming as when inserting screws.
- Application of nails is much faster than screws.

(2)

ANY TWO OF THE ABOVE

4.4 • Copper pipe/polycop pipes/PVC pipes/Composite pipes ✓ (1)

4.5	4.5.1	38/38 mm ✓	(1)
	4.5.2	3 ✓	(1)
	4.5.3	3 374/3 374 mm ✓	(1)
	4.5.4	3 600/3 600 mm ✓	(1)
	4.5.5	9 600/9 600 mm ✓	(1)
	4.5.6	3 600/3 600 mm ✓	(1)
	4.5.7	17 250/17 250 mm ✓	(1)

4.6

A	B	C	D
			Inside measurement of:
			Long walls = 7 000 mm – 2/220 mm ✓
			= 6 560 mm ✓
			Short walls = 4 000 mm – 2/220 mm ✓
			= 3 560 mm ✓
			(4)
1/	6,56		Inside area of the room is
	3,56 ✓	23,35 m^2 ✓	
			(2)
			Area of one ceiling board:
1/	4,2 ✓		One board is 4 200 mm x 1 200 mm
	1,2 ✓	5,04 m^2 ✓	(3)
			Length of skirting:
			= (6 560 + 3 560) x 2 ✓
			= 20 240 ✓ – 3 000 mm ✓
			= 17,24 m ✓
			OR
			= 13 120 ✓ + 7 120 ✓ - 3 000 mm ✓
			= 17 240 mm
			= 17,24 m ✓
			OR
			= 6 560 + 6 560 ✓ + 3 560 + 3 560 ✓ - 3 000 mm ✓
			= 17 240 mm
			= 17,24 m ✓
			(4)

[30]

IF A CANDIDATE DID NOT USE THE ANSWER SHEET TWO MARKS MUST BE DEDUCTED FROM THE TOTAL
IF A CANDIDATE DID NOT CONVERT TO METRES THE CANDIDATE SHOULD NOT BE PENALISED BUT THE FINAL ANSWER MUST BE IN SQUARE METRES/METRES
IF THE CANDIDATE WROTE THE MEASUREMENTS IN THE WRONG COLUMN ONE MARK MUST BE DEDUCTED FROM THE TOTAL

QUESTION 5: APPLIED MECHANICS

5.1 5.1.1 $\frac{(A1 \times d) + (A2 \times d)}{\text{Total area}}$

$$= \frac{(3\,600\ mm^2 \times 30\ mm) + (675\ mm^2 \times 25\ mm)}{4\,275\ mm^2}$$

$$= \frac{108\,000\ mm^3 + 16\,875\ mm^3}{4\,275\ mm^2}$$

$$= \frac{124\,875\ mm^3}{4\,275\ mm^2}$$

$$= 29{,}21\ mm$$

OR

Part	Area A (A)	X	AX
1	3 600 mm² ✓	30 mm ✓	3 600 mm x 30 mm = 108 000 mm³ ✓
2	675 mm² ✓	25 mm ✓	675 mm x 25 mm = 16 875 mm³✓
∑	4 275 mm² ✓		124 875 mm³

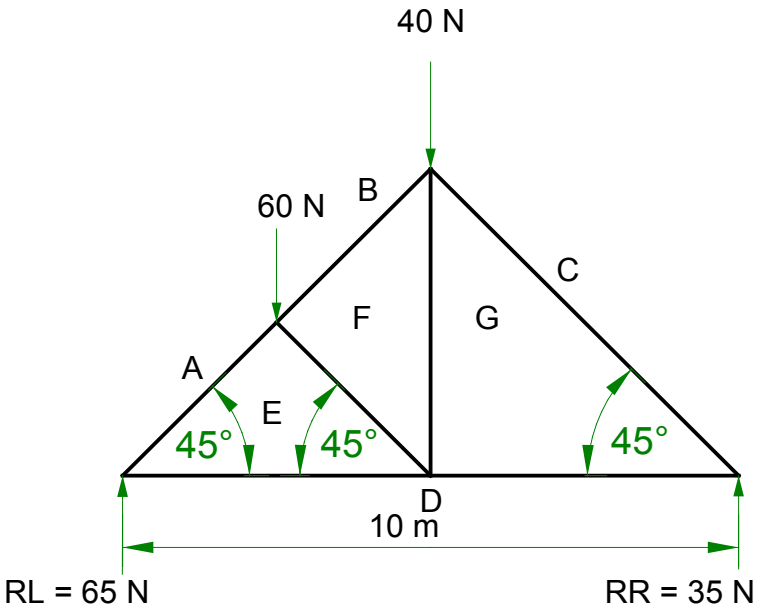
$$X = \frac{\sum Ax}{\sum A}$$

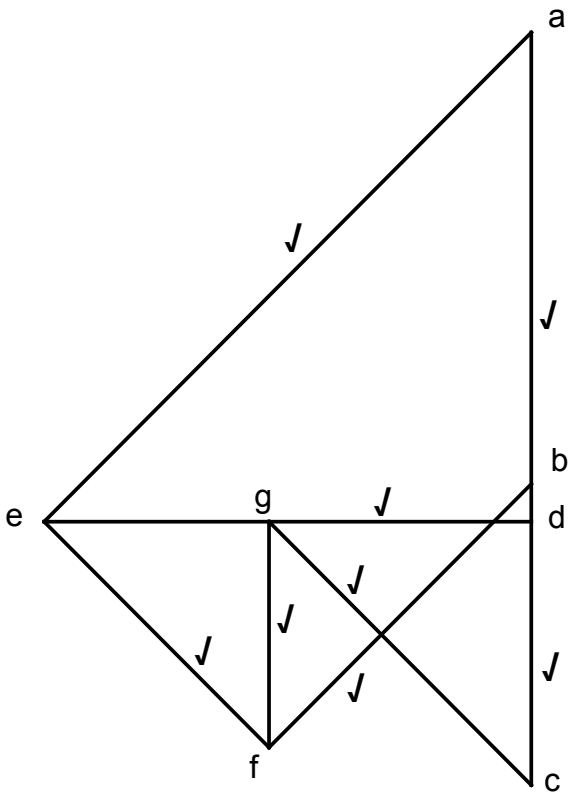
$$= \frac{124\,875\ mm^3}{4\,275\ mm^3}$$

$$= 29{,}21\ mm$$

IF A CANDIDATE SWOP AREA 1 AND 2 AROUND DEDUCT 1 MARK (10)

5.2.1





(8)

5.2.2

MEMBER	NATURE	MAGNITUDE
AE	Strut ✓	92 N ✓
DG	Tie ✓	35 N ✓

(4)

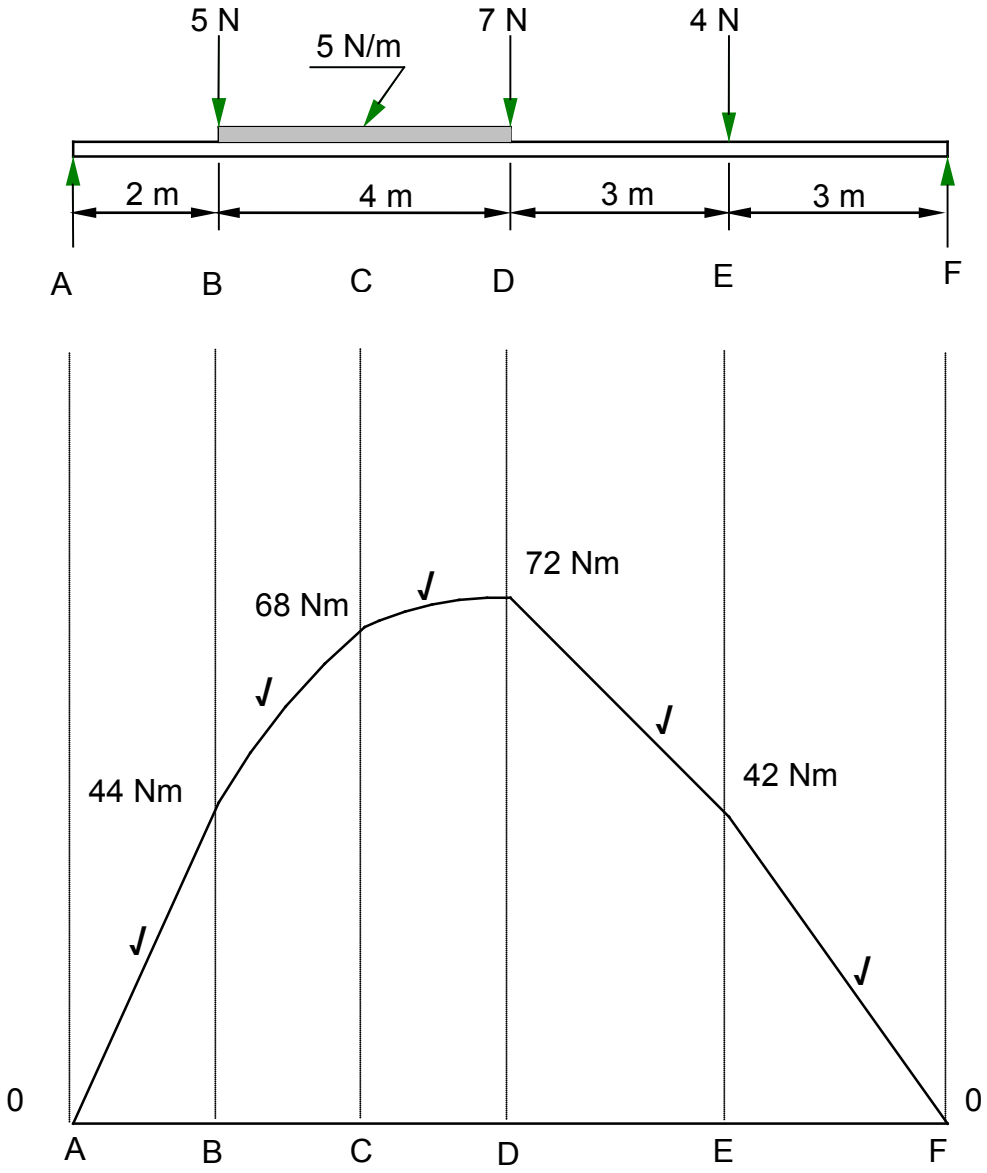
Tolerance of 1 N to either side
NOT TO SCALE DUE TO ELECTRONIC TRANSFER.
USE A MASK TO MARK THIS QUESTION.
IF THE CANDIDATE WROTE THE MEASUREMENTS IN THE WRONG COLUMN ONE MARK MUST BE DEDUCTED FROM THE TOTAL

5.3 5.3.1 20 N/m ✓ (1)

5.3.2 8 m ✓ (1)

5.3.3 4 m ✓ (1)

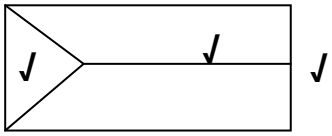
5.3.4



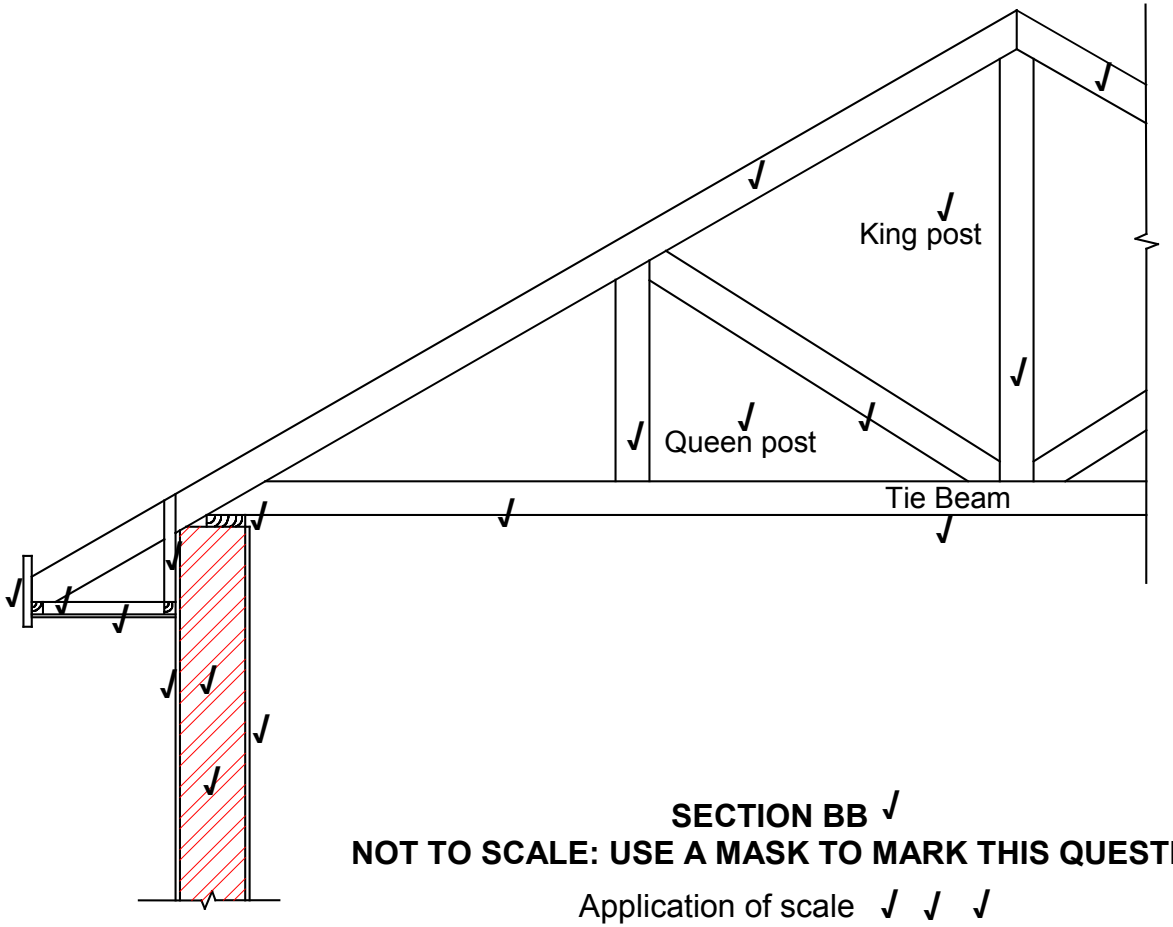
If the lines between B and D are straight lines no marks may be awarded for these lines.
NOT TO SCALE DUE TO ELECTRONIC TRANSFER. (5)
USE A MASK TO MARK THIS QUESTION.
BECAUSE DISTANCES BETWEEN AB, BC, ECT. MAY DIFFER ON THE ANSWER SHEETS OF THE PROVINCES.

[30]

ANSWER SHEET 6.1

NO.	QUESTIONS	ANSWERS	MARKS
1	Name the title of the drawing	South Elevation ✓	1
2	Identify number **1.**	Ridge/Ridge capping/Ridging ✓	1
3	Identify number **2**.	Tile roof/Tile/Roof tile/Concrete tile/roof covering ✓	1
4	Identify number **3**.	Gutter ✓	1
5	Identify number **4**.	Downpipe ✓	1
6	Identify number **5**.	North point/North direction/True North ✓	1
7	Identify number **6**	NGL/Natural ground level/Ground level ✓	1
8	Identify number **7**	Window Sill ✓	1
9	Name the type of roof on the eastern side of the house.	Gable ✓	1
10	Name the type of roof on the western side of the house.	Hipped roof ✓	1
11	Name the material that can be used for the fascia board?	Wood/Timber/Cement fibre/uPVC/Plastic/Galvanised sheet metal ✓	1
12	On how many sides of the building will you find fascia boards?	3 sides ✓	1
13	Draw the top view (roofline) of the roof for the elevation indicated in FIGURE 6.1 in the column alongside .		3
		TOTAL	**15**

QUESTION 6: GRAPHICS AND COMMUNICATION
ANSWER SHEET 6.2



SECTION BB ✓

NOT TO SCALE: USE A MASK TO MARK THIS QUESTION

Application of scale ✓ ✓ ✓

Correctness of drawing: **Wall ✓ Closed eave ✓ Roof truss ✓**

- **All parts of the drawing must be correctly drawn to receive a mark.**
- **If the section is drawn the wrong way around deduct one mark**

ASSESSMENT CRITERIA	MARKS	LM
Correctness of drawing	3	
External wall	1	
Symbol for wall	1	
Plaster	2	
Wall plate	1	
Tie beam	1	
Rafters	2	
Strut	1	
Queen post	1	
King post	1	
Fascia board	1	
Hanger	1	
Bearer	1	
Fibre cement ceiling board	1	
Any THREE labels	3	
Print 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**	

[40]