



# basic education

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Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **SENIOR CERTIFICATE EXAMINATIONS**

**CIVIL TECHNOLOGY**

**2018**

**MARKING GUIDELINES**

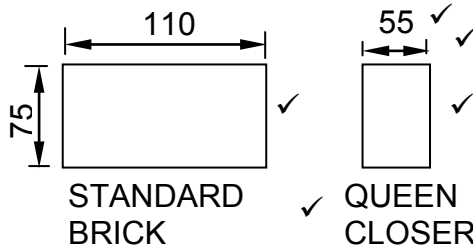
**MARKS: 200**

**This marking guideline consists of 17 pages.**

**QUESTION 1: CONSTRUCTION, SAFETY AND MATERIAL**

- 1.1 1.1.1 A hard hat will:  
 • protect the worker from any head injury. ✓  
 • protect the worker from falling objects from above.  
**ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER** (1)
- 1.1.2 The worker can wear a dust mask/respiratory mask/gas mask/protective overall. ✓ (1)
- 1.1.3 If the worker does not use the safety equipment:  
 • His/Her eyes can be damaged by the dust ✓  
 • Debris can get into his/her eyes  
 • Any part of his/her body can be injured if he/she is not wearing a protective overall.  
 • Hearing can be damaged if ear protection is not used  
 • Dust can be inhaled  
**ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER** (1)
- 1.2 1.2.1 Ear muffs ✓ (1)
- 1.2.2 In a working area where machine and equipment makes loud noises/sounds. ✓  
**ANY OTHER ACCEPTABLE ANSWER** (1)
- 1.3 1.3.1 SA or Howe roof truss ✓ (1)
- 1.3.2 A – King post ✓  
 B – Queen post ✓  
 C – Rafter ✓ (3)
- 1.3.3 The slope/gradient of a roof truss used for a thatch roof must be 45° and the roof truss in FIGURE 1.3 has a slope of 30°. ✓  
**ANY ONE OF THE ABOVE** (1)
- 1.3.4 • Concrete tiles ✓  
 • Clay tiles  
 • Slate tiles  
**ANY ONE OR OTHER ACCEPTABLE ANSWER** (1)
- 1.4 DPC is used between the concrete floor and the wall between courses of brickwork. ✓  
 DPM is used under a concrete floor to cover the whole area of a room or a building or as roof underlay. ✓ (2)

1.5



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Correctness of elevations	2	
Labelling of views	1	
Correct dimension lines and	1	
Width of queen closer	1	
<b>TOTAL:</b>	<b>5</b>	

(5)

1.6 Galvanising is more expensive than painting but lasts longer than painting ✓  
**OR**

Painting is cheaper than galvanising and gives a wide variety of colours and surface finishing's.

**ANY ONE OF THE ABOVE**

(1)

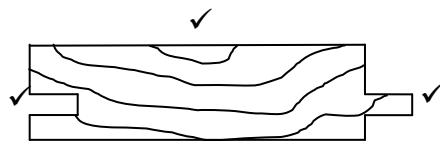
1.7

- Varnish ✓
- Oil
- Wax
- Coal tar creosote
- Paint
- Poisonous chemical salts (water and soluble salts)
- Organic compounds

**ANY ONE OF THE ABOVE**

(1)

1.8



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Tongue(can be in the middle)	1	
Groove(can be in the middle)	1	
Board	1	
<b>TOTAL:</b>	<b>3</b>	

(3)

1.9 Cement binds the ingredients of concrete together. ✓

(1)

1.10

- Mass concrete – is a volume of concrete that do not have any reinforcing ✓
- Reinforced concrete – is concrete that is reinforced with steel rods to strengthen the structure ✓

(2)

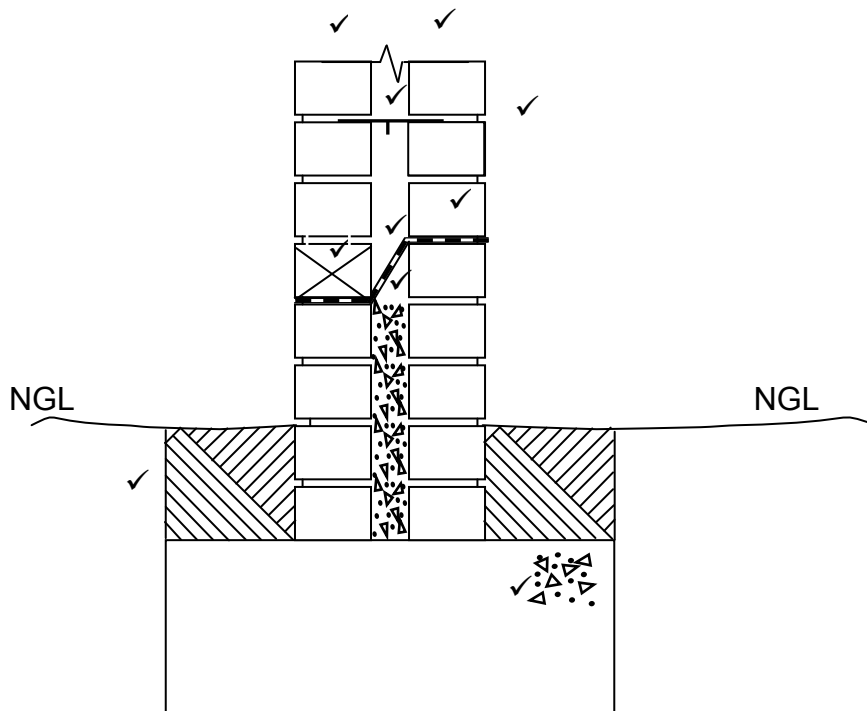
- 1.11
- Compacting by hand (rodding and spading) ✓
  - Compacting through vibration (Mechanical vibrator)
- ANY ONE OF THE ABOVE** (1)
- 1.12
- A slump test is used to test workability/consistency of concrete. ✓
  - A cube test is used to test compressive/crushing strength of concrete. ✓
- (2)
- 1.13
- Cover strip/H-strip/Decorative grid strips ✓
  - Jointing /ceiling tape/Gauze
  - Jointing compound (rhinolyte)
- ANY ONE OF THE ABOVE**



- 2.6 A – Compression force ✓  
B – Tensile force ✓

(2)

2.7



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
6 Courses of bricks above the two existing courses	2	
Mortar between brickwork	1	
Symbol for concrete in the cavity between the walls	1	
The symbol for concrete in the foundation	1	
The symbol for back filling on one side only	1	
The damp proof between the walls and the cavity	2	
The weep hole	1	
One wall tie	1	
<b>TOTAL:</b>	<b>10</b>	

(10)

- 2.8 Dry wall ✓

(1)

2.9 Disadvantages of drywalls:

- They are less soundproof than brickwork. ✓
- They are less fireproof than brickwork.
- Drywalls must be joined together or attached to existing walls, to ensure sturdiness.
- Drywalls cannot carry heavy loads.

**ANY ONE OF THE ABOVE**

(1)

- 2.10 2.10.1 A - Anchor bar ✓  
B - Shear bar ✓ (2)
- 2.10.2 Structural failure will occur ✓ (1)
- 2.10.3
  - To keep the main or anchor bars together. ✓
  - Helps to resist shear stress**ANY ONE OF THE ABOVE** (1)
- 2.11 A - Threaded rods and nuts ✓  
B – Laggings ✓  
C – Lining ✓  
D – Collar ✓  
E - Vertical clamps ✓ (5)
- 2.12 C, B, A (1)  
**[40]**

**QUESTION 3: CIVIL SERVICES**

- 3.1      3.1.1      E ✓      (1)
- 3.1.2      G ✓      (1)
- 3.1.3      D ✓      (1)
- 3.1.4      F ✓      (1)
- 3.1.5      C ✓      (1)
- 3.1.6      B ✓      (1)

- 3.2      A water trap is installed:
- under sinks ✓
  - baths
  - toilets
  - at a gully
  - at a shower
- ANY ONE OF THE ABOVE**      (1)

- 3.3      P trap or S trap or Bottle trap ✓      (1)

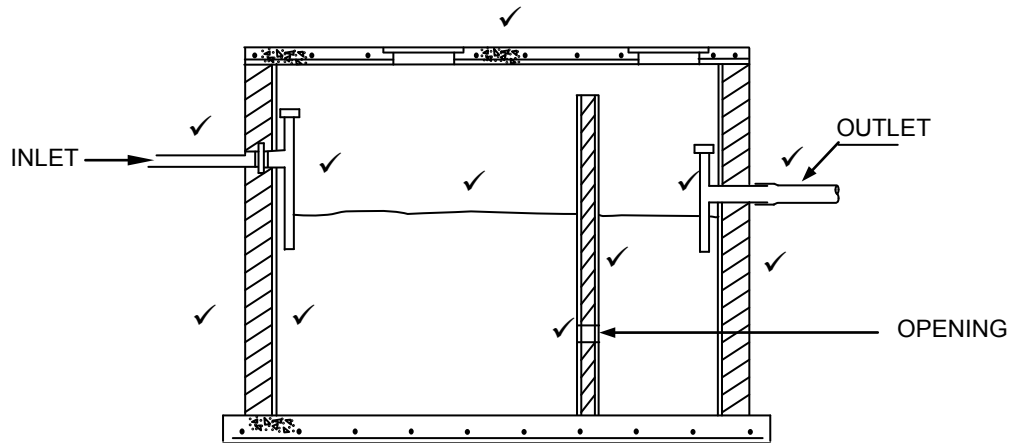
- 3.4      3.4.1       ✓✓      (2)

- 3.4.2       ✓✓      (2)

- 3.4.3       ✓✓      (2)



3.5



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
External walls with plaster and holes	3	
Inner wall with hole and plaster	2	
Inlet pipe with T-junction	2	
Outlet pipe with T-junction	2	
Liquid level	1	
Concrete cover with manholes	1	
<b>TOTAL:</b>	<b>11</b>	

(11)

3.6

- Boreholes ✓
- Wells
- Rain water
- Snow
- Rivers
- Desalination

**ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**

(1)

3.7

Storm water systems are used to carry storm water to rivers or low-lying dams. ✓

**OR ANY OTHER ACCEPTABLE ANSWER**

(1)

3.8

- Solar energy ✓
- Nuclear power
- Hydro electricity
- Wind
- Natural gas
- Generator
- Inverter

**ANY ONE OF THE ABOVE**

(1)

- 3.9
- Solar geysers are environmentally friendly. ✓
  - Solar geysers can be used in areas where no electricity is available.
  - Hot water is available at a very low cost once the installation cost has been covered.

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

- 3.10
- Using solar power as an alternative source of power. ✓
  - Using appliances only when necessary.
  - Using of low energy or LED light bulbs.
  - Switch of lights in rooms that are not in use.
  - Shower for shorter periods to prevent over use of geyser.
  - Boil only the required quantity of water for a purpose.
  - Use a geyser timer
  - Use of gas

**ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)**  
**[30]**

**QUESTION 4: QUANTITIES, MATERIALS AND JOINING**

4.1	4.1.1	B ✓	(1)
	4.1.2	C ✓	(1)
	4.1.3	D ✓	(1)
	4.1.4	A ✓	(1)
	4.1.5	C ✓	(1)
4.2	4.2.1	2 030/2 030 mm ✓	(1)
	4.2.2	1 ✓	(1)
	4.2.3	44/44 mm ✓	(1)
	4.2.4	813/813 mm ✓	(1)
	4.2.5	200/200 mm ✓	(1)
	4.2.6	32/32 mm ✓	(1)
	4.2.7	220/220 mm ✓	(1)

A	B	C	D
			Centre line: Superstructure
			2/ 7 000 mm = 14 000 mm ✓
			2/ 4 200 mm = 8 400 mm ✓
			TOTAL: = 22 400 mm
			Minus 4/ 220 = 880 mm ✓
			= 21 520 mm ✓ (4)
1/	21,52 ✓		Area of walls for superstructure
	<u>2,6</u> ✓	<u>55,95 m<sup>2</sup></u> ✓	(3)
1/	2.1 ✓		Area of side door
	<u>0,9</u> ✓	<u>1,89 m<sup>2</sup></u> ✓	(3)
1/	2,4 ✓		Area of garage door
	<u>2,1</u> ✓	<u>5,04 m<sup>2</sup></u> ✓	(3)
1/	1,5 ✓		Area of window
	<u>0,45</u> ✓	<u>0,68 m<sup>2</sup></u> ✓	(3)
			Total area of wall after deductions
			= 55,95 m <sup>2</sup> - 1,89 m <sup>2</sup> - 5,04 m <sup>2</sup> – 0,68 m <sup>2</sup> ✓
			= 48,34 m <sup>2</sup> ✓ (2)
			(18)

**[30]**

**QUESTION 5: APPLIED MECHANICS**

5.1

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

$$= \frac{(3\,600 \text{ mm}^2 \times 30 \text{ mm}) + (900 \text{ mm}^2 \times 70 \text{ mm})}{4\,500 \text{ mm}^2}$$

$$= \frac{108\,000 \text{ mm}^3 + 63\,000 \text{ mm}^3}{4\,500 \text{ mm}^2}$$

$$= \frac{171\,000 \text{ mm}^3}{4\,500 \text{ mm}^2}$$

$$= 38 \text{ mm}$$

**OR**

Part	Area	X	AX
1	60 mm x 60 mm = 3 600 mm <sup>2</sup> ✓	30 mm ✓	108 000 mm <sup>3</sup>
2	15 x 60 = 900 mm <sup>2</sup> ✓	70 mm ✓	63 000 mm <sup>3</sup>
Σ	4 500 mm <sup>2</sup> ✓		171 000 mm <sup>3</sup>

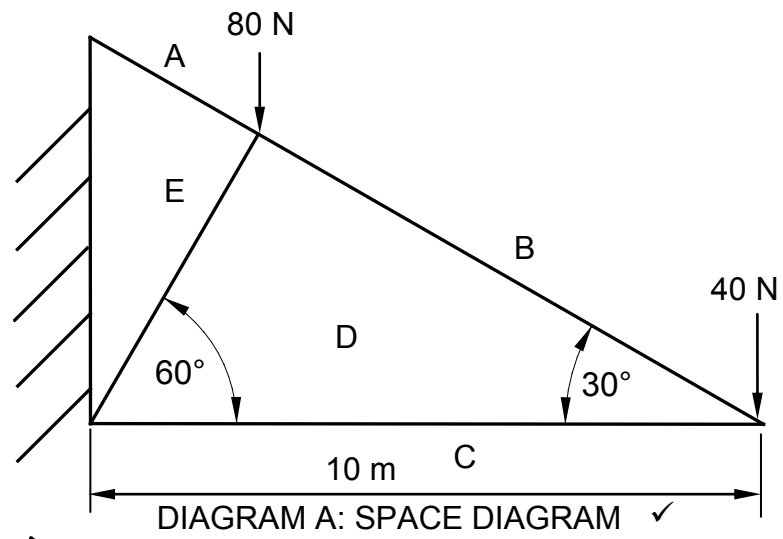
$$X = \frac{\sum Ax}{\sum A}$$

$$= \frac{171\,000 \text{ mm}^3}{4\,500 \text{ mm}^2}$$

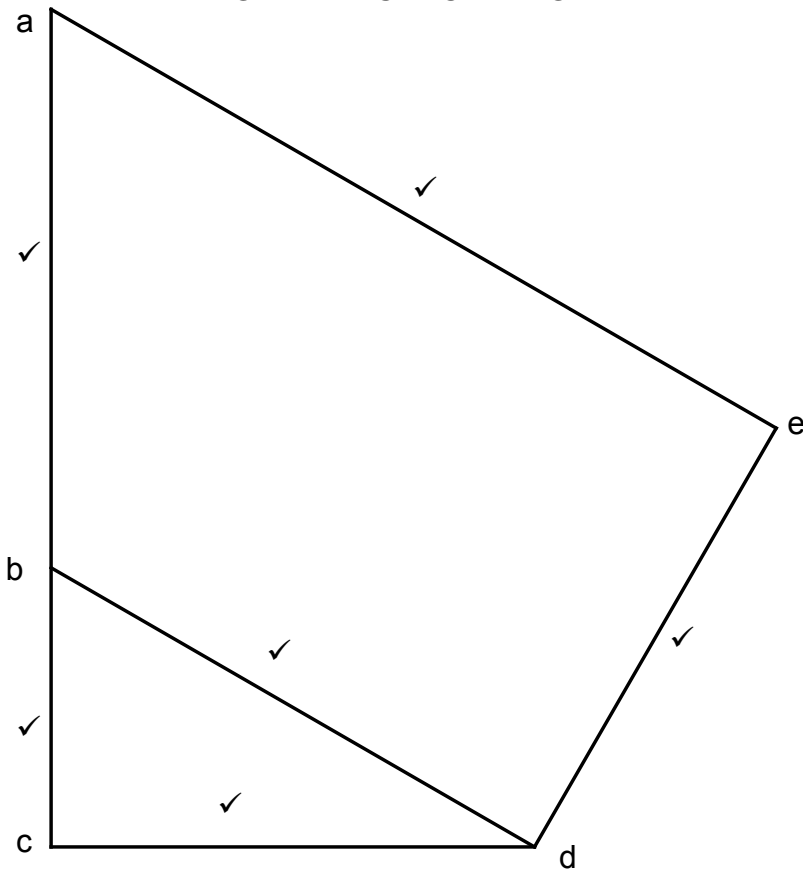
$$= 38 \text{ mm}$$

(9)

5.2



(1)



(6)

NOT ACCORDING TO SCALE

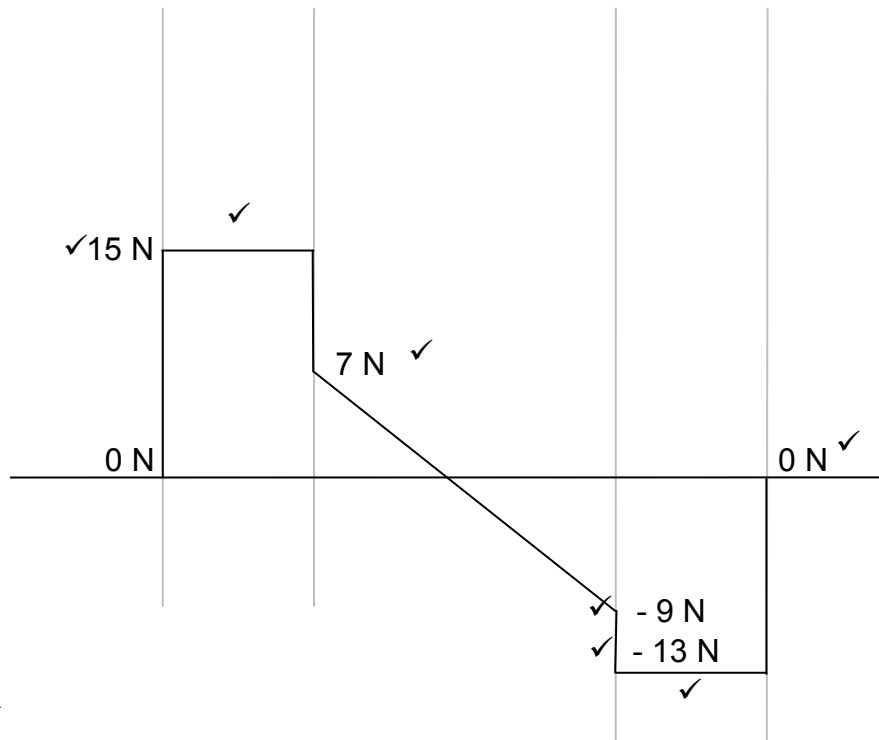
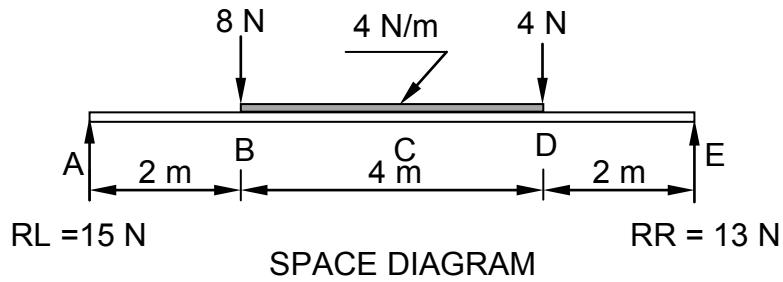
USE A MASK TO MARK THIS QUESTION

MEMBER	NATURE
AE	Tie ✓
BD	Tie ✓
CD	Strut
DE	Strut ✓

Tolerance of 1 N to either side.

(3)

- 5.3      5.3.1      16 N ✓      (1)
- 5.3.2      4 m ✓      (1)
- 5.3.3      6 m ✓      (1)
- 5.3.4



Correct shape ✓

(8)

**USE A MASK TO MARK THIS QUESTION**

ASSESSMENT CRITERIA	MARKS	CANDIDATE'S MARK
Correct shape of shear force diagram	1	
Value of shear forces correctly measured and indicated	5	
Horizontal lines indicated	2	
<b>TOTAL</b>	<b>8</b>	

If the drawing is not drawn to the correct scale, penalise the candidate with 1 mark.

**[30]**

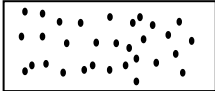
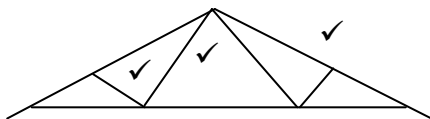
**QUESTION 6: GRAPHICS AND COMMUNICATION**CENTRE NUMBER: 

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EXAMINATION NUMBER: 

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**ANSWER SHEET 6.1**

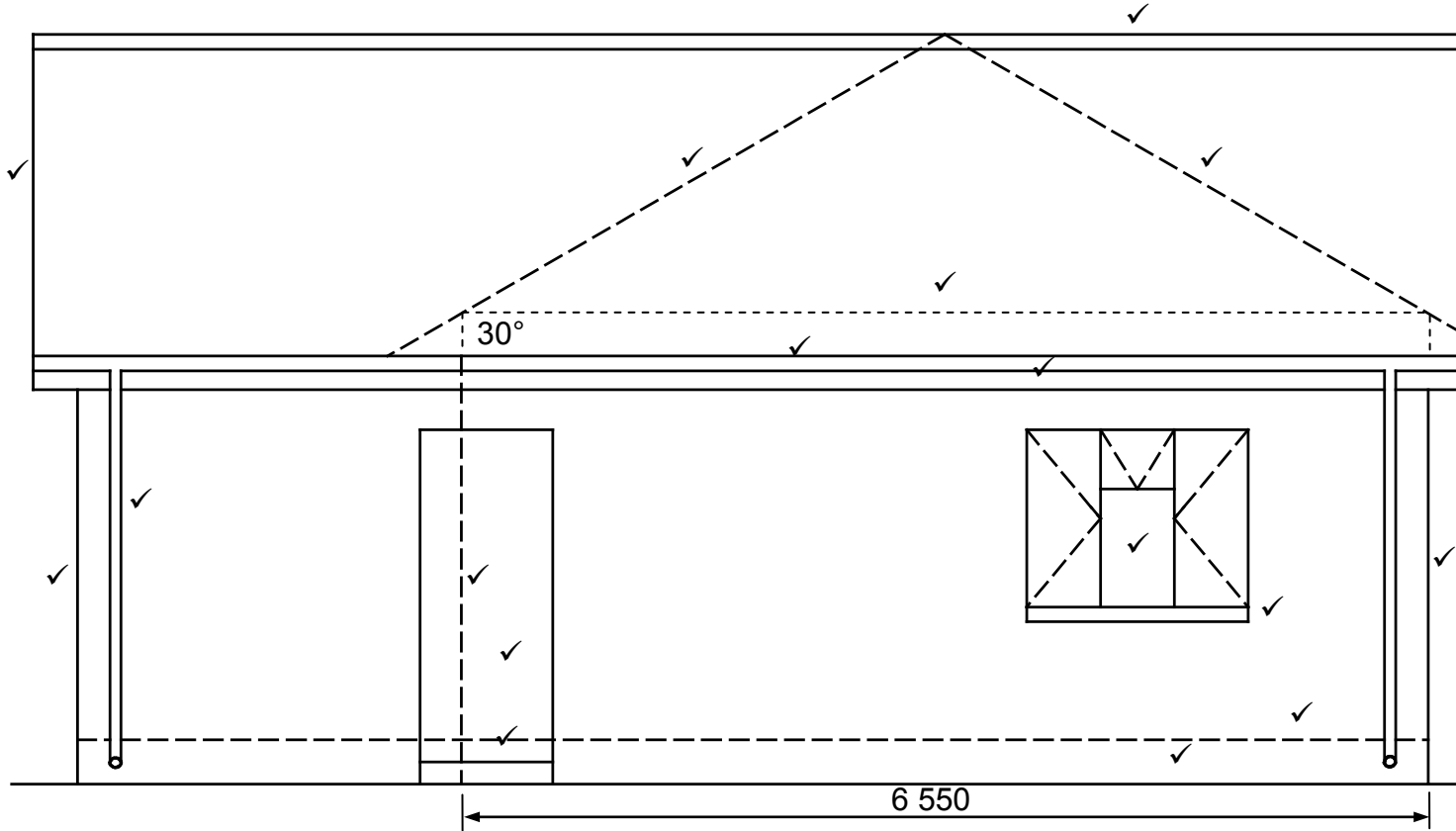
NO.	QUESTIONS	ANSWERS	MARKS
1	Identify the type of eave construction used in the drawing.	Open eave	1
2	State the minimum pitch (slope) of number 1, if galvanised roof sheeting is used.	5° - 10°	1
3	Identify number 2.	Tie-beam	1
4	State the standard dimension of number 3.	38 mm x 38 mm	1
5	State the purpose of number 4.	To cover the opening between the wall and the ceiling.	1
6	Name the timber that is shown on top of the external wall marked number 5.	Wall plate	1
7	Draw the drawing symbol for number 6 in the next column.		2
8	Explain the purpose of number 7.	To prevent dust, insects, rodents, wind and birds to enter the building	1
9	Name ONE material that can be used for number 8.	PVC, aluminium, galvanised sheet metal.	1
10	Identify number 9.	Fascia board	1
11	Identify number 10.	Down pipe	1
12	Draw a neat freehand line diagram of a Fink or W roof truss in the next column.		3
		<b>TOTAL:</b>	<b>15</b>



**CENTRE NUMBER:**

**EXAMINATION NUMBER:**

**ANSWER SHEET 6.2**



ASSESSMENT CRITERIA	MARKS	CANDIDATES MARK
External walls	2	
NGL (correctly drawn)	1	
FFL (correctly drawn)	1	
Window	1	
Window sill	1	
Door opening	1	
Step	1	
Fascia board	1	
Rain-water down pipe	1	
Roof (correctly drawn)	2	
Gutter	1	
Ridge capping	1	
Determining roof height	4	
Any FOUR labels	4	
Application of scale One or two incorrect = 3 Three or four incorrect = 2 More than five incorrect = 1 No measurement correct = 0	3	
<b>TOTAL</b>	<b>25</b>	

**NOT TO SCALE: USE A MASK TO MARK THIS QUESTION**

Application of scale ✓ ✓ ✓

Any four labels ✓ ✓ ✓ ✓