basic education

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°.✓

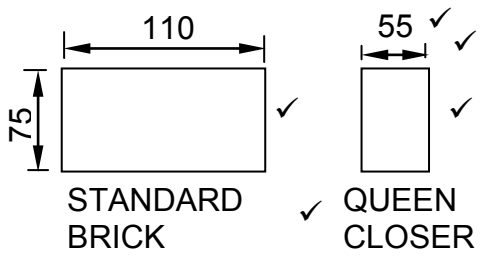
ANY ONE OF THE ABOVE (1)

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	
TOTAL:	**5**	

(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	
TOTAL:	**3**	

(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

QUESTION 2: ADVANCED CONSTRUCTION AND EQUIPMENT

2.1 2.1.1
- A – Steel capping ✓
- C – Steel tip ✓ (2)

2.1.2 Undisturbed earth ✓ (1)

2.1.3 A drop hammer ✓ (1)

2.1.4 Pre-cast concrete piles can be used when:
- The soil is not stable/soft ✓
- Water content of soil is high ✓
- There's a highwater table
- Subsoil is subject to movement
- Filling materials are not sufficiently compacted

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

2.2
- Bring the water level in the one side of 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 and make a mark next to the water level at this point. ✓ (2)

2.3
- Tape measure ✓
- Chalk line ✓
- Builders line ✓
- Builders square
- Straight edge
- Spirit level

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

2.4 2.4.1 Angle grinder ✓ (1)

2.4.2 Grinding/cutting disc ✓ (1)

2.4.3
- The safety guard protects the worker against sparks or debris from discs and materials. ✓
- The safety guard protects the body parts of the worker against the rotating blade.

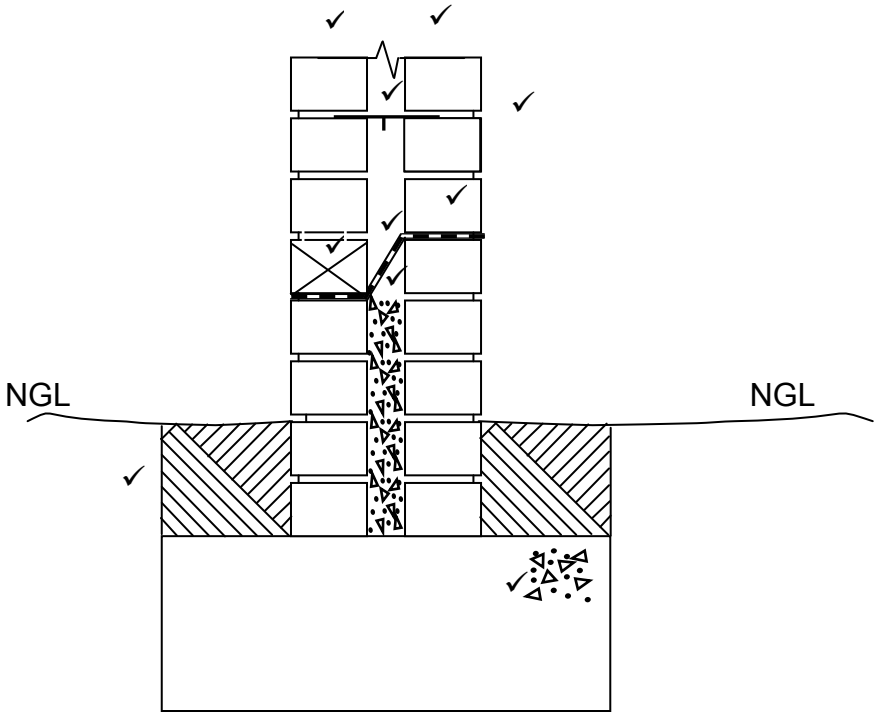
ANY ONE OF THE ABOVE (1)

2.5 2.5.1
- Centre/Turning piece/Profile ✓ (1)

2.5.2
- Key brick ✓ (1)

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	
TOTAL:	**10**	

(10)

2.8 Dry wall ✓ (1)

2.9 Disadvantages of drywalls:

- They are less soundproof than brickwork. ✓
- They are less fireproof that 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

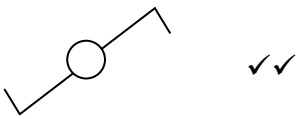
ANY ONE OF THE ABOVE (1)

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

3.4 3.4.1

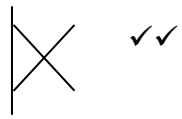
(2)

3.4.2



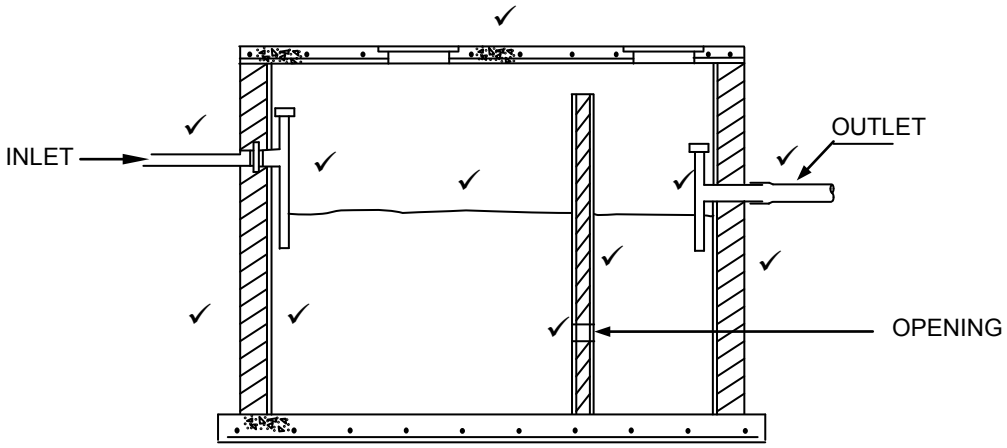
(2)

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	
TOTAL:	**11**	

(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
	2,6 ✓	55,95 m² ✓	(3)
1/	2.1 ✓		Area of side door
	0,9 ✓	1,89 m² ✓	(3)
1/	2,4 ✓		Area of garage door
	2,1 ✓	5,04 m²✓	(3)
1/	1,5 ✓		Area of window
	0,45 ✓	0,68 m²✓	(3)
			Total area of wall after deductions
			= 55,95 m²- 1,89 m² - 5,04 m² – 0,68 m² ✓
			= 48,34 m² ✓ (2)
			(18)

[30]

QUESTION 5: APPLIED MECHANICS

5.1

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

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

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

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

= 38 ✓ mm ✓

OR

Part	Area	X	AX
1	60 mm x 60 mm = 3 600 mm² ✓	30 mm ✓	108 000 mm³
2	15 x 60 = 900 mm² ✓	70 mm ✓	63 000 mm³
∑	4 500 mm² ✓		171 000 mm³

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

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

= 38 ✓ mm ✓ (9)

5.2

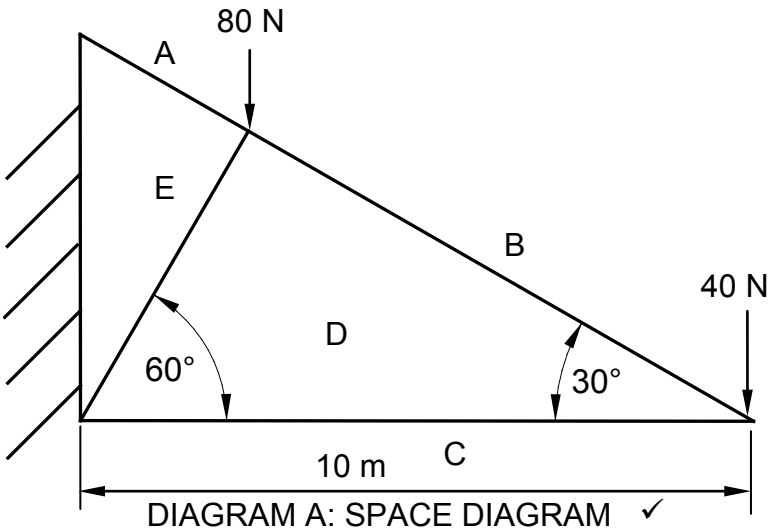
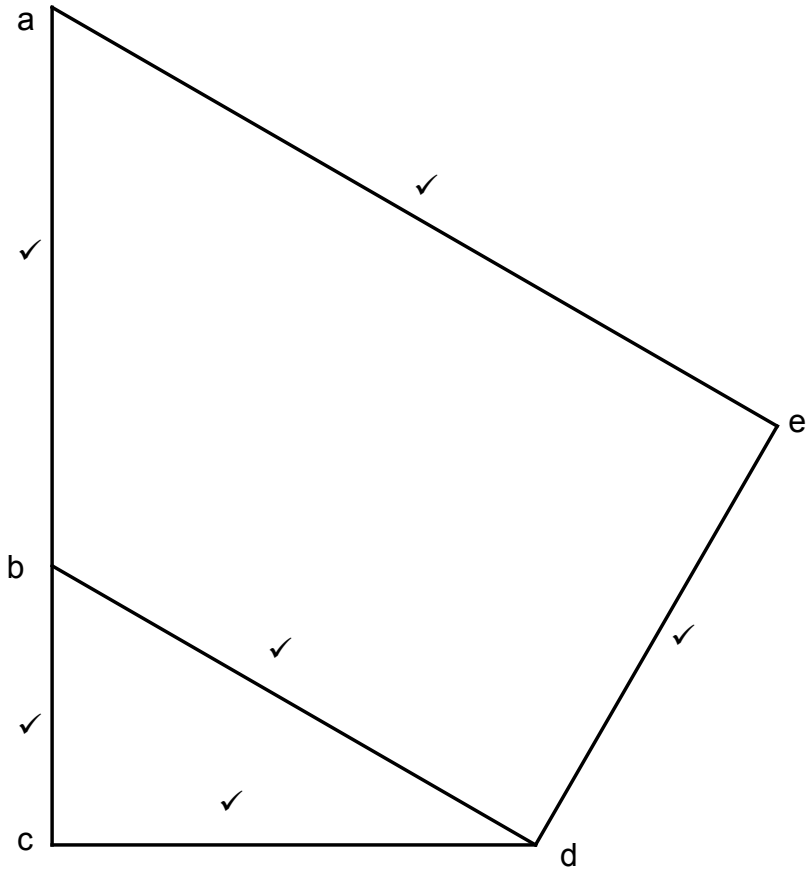


DIAGRAM A: SPACE DIAGRAM ✓ (1)



(6)

NOT ACCORDING TO SCALE

USE A MASK TO MARK THIS QUESTION

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

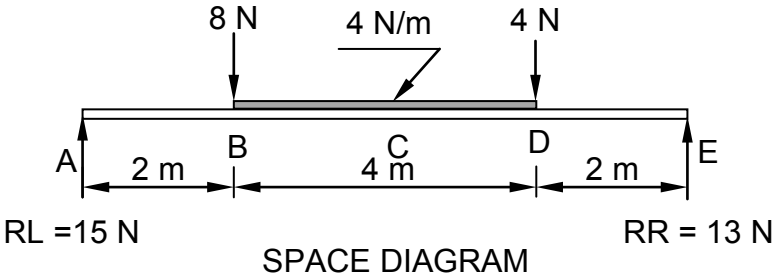
Tolerance of 1 N to either side. (3)

5.3 5.3.1 16 N ✓ (1)

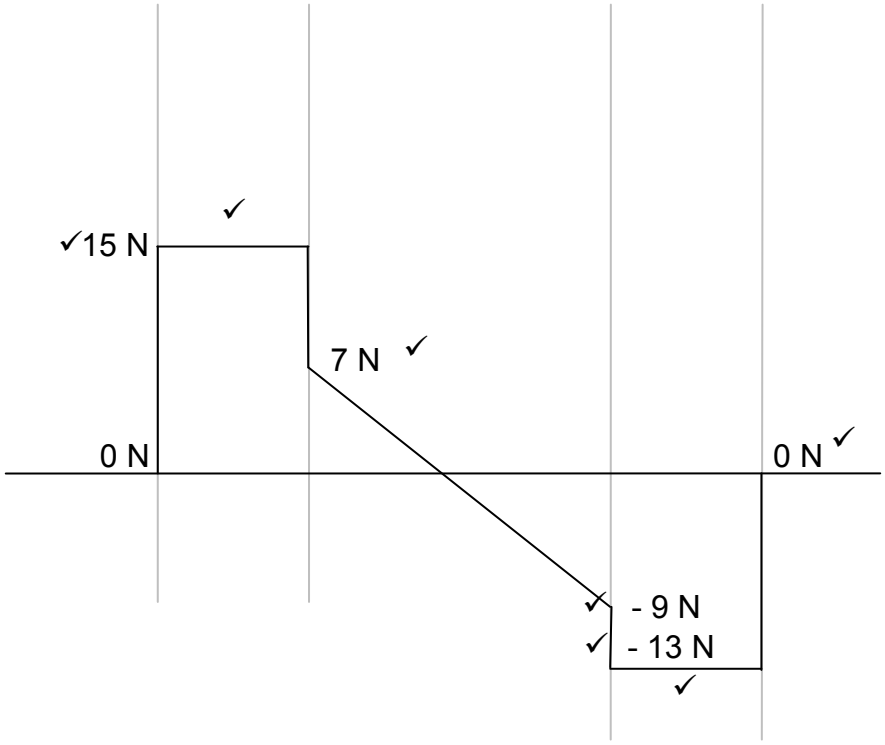
5.3.2 4 m ✓ (1)

5.3.3 6 m ✓ (1)

5.3.4



SPACE DIAGRAM



(8)

Correct shape ✓

SHEAR FORCE DIAGRAM

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	
TOTAL	**8**	

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

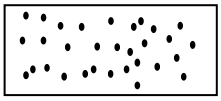
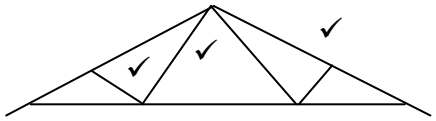
[30]

QUESTION 6: GRAPHICS AND COMMUNICATION

CENTRE NUMBER:								

EXAMINATION NUMBER:													

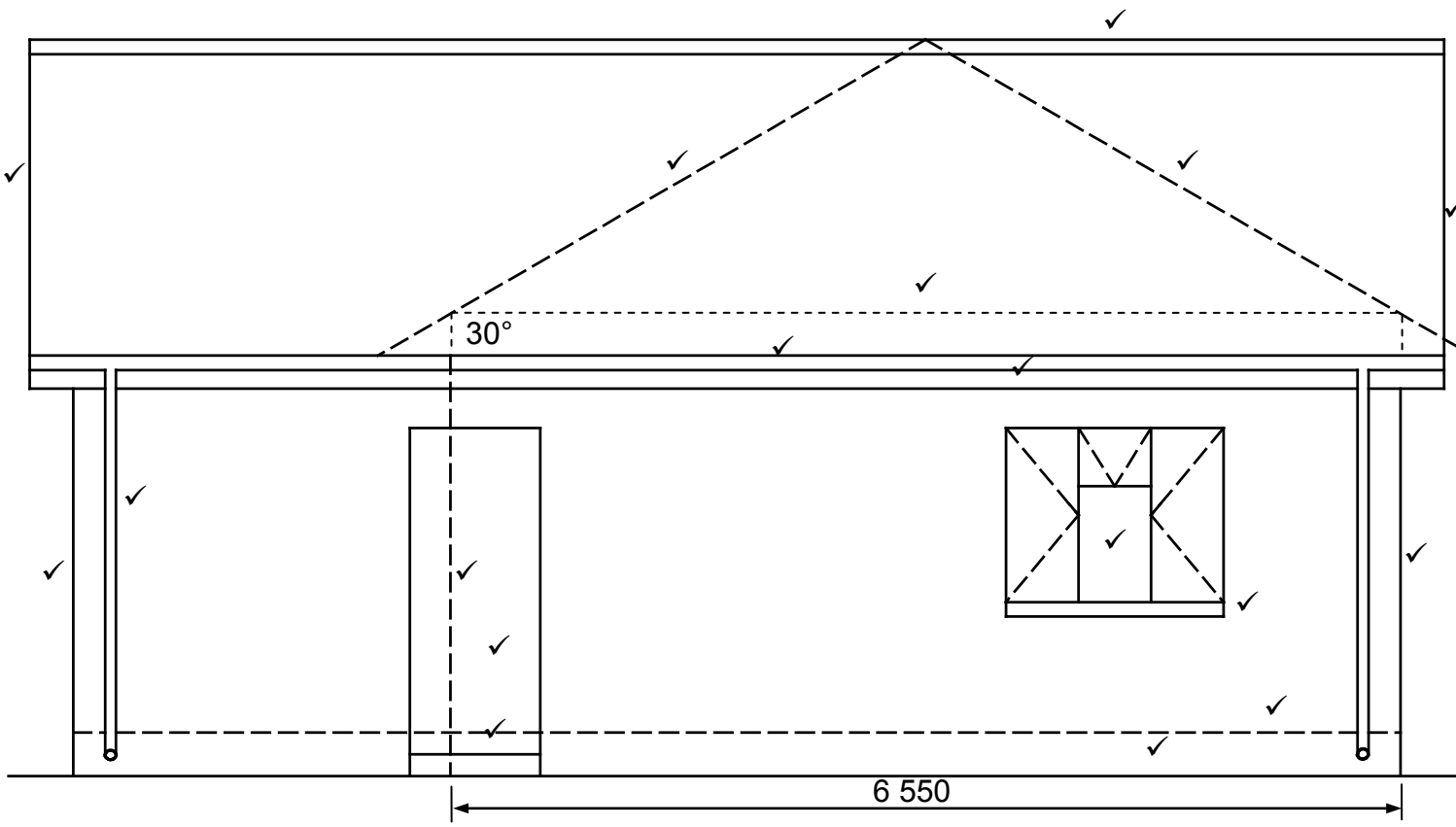
ANSWER SHEET 6.1

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
		TOTAL:	**15**

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	
TOTAL	**25**	

NOT TO SCALE: USE A MASK TO MARK THIS QUESTION

Application of scale ✓✓✓

Any four labels ✓✓ ✓✓