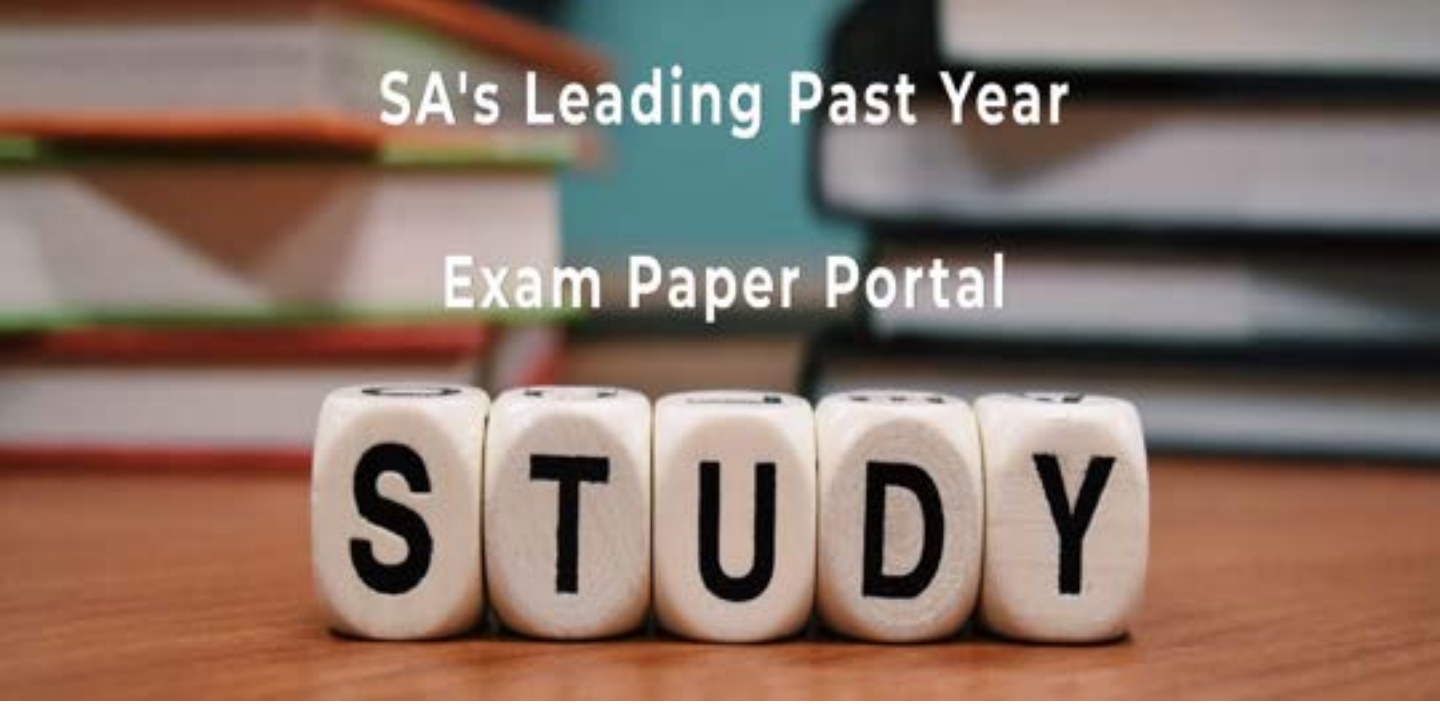

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GRADE 12

CIVIL TECHNOLOGY

NOVEMBER 2012

MEMORANDUM

MARKS: 200

This memorandum consists of 15 pages.

QUESTION 1: LO3 AS 1, 2, 4, 5, 7, 10

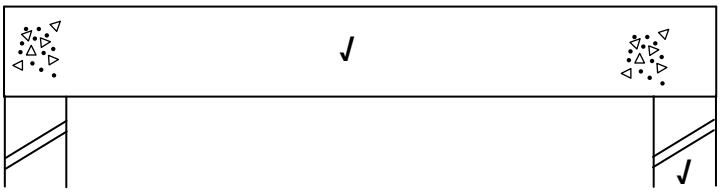
1.1

1.1.1	**D**	A flat plate with many spikes used in roof-truss construction ✓
1.1.2	**H**	Longest vertical member that determine the height of the roof truss ✓
1.1.3	**B**	A length of material used to conceal the gap between the wall and the ceiling ✓
1.1.4	**G**	Is used to cover the gap between the roof covering at the highest point of the roof ✓
1.1.5	**C**	Slope/angle/fall of the roof ✓

ONE '✓' FOR EACH CORRECT ANSWER. ***Do not*** penalise the candidate if he/she has written the description. (5)

1.2

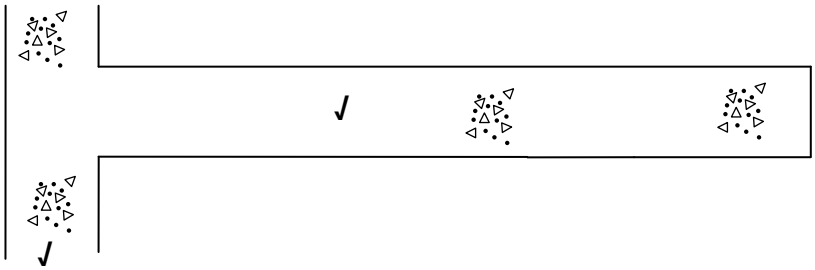
1.2.1



Simple supported slab

Note: If a candidate show columns as support, it will also be correct. (2)

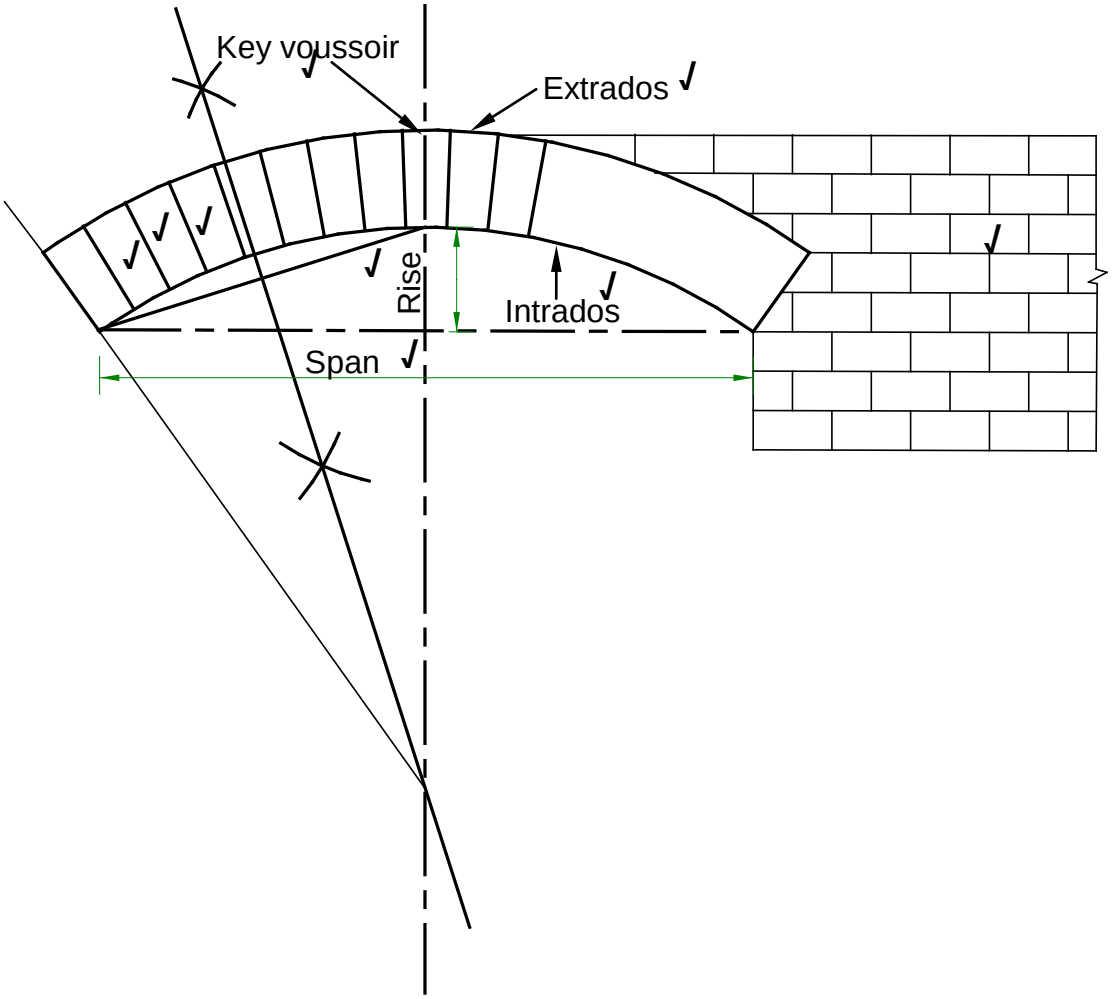
1.2.2



Cantilever slab

(2)

1.3



1 Mark to be given if voussoirs are vertical lines.

ASSESSMENT CRITERIA	MARKS	LEARNER'S MARK
Voussoirs	3	
Key voussoir label	1	
Brickwork	1	
Rise	1	
Span	1	
Intrados	1	
Extrados	1	
TOTAL	**9**	

(9)

1.4

1.4.1 A Eaves/Fascia/tilting batten/overhang ✓
1.4.2 B Rafter/Full truss ✓
1.4.3 C Ridge/ridge beam ✓
1.4.4 D Hip rafter ✓
1.4.5 E Half truss or common rafter ✓
1.4.6 F Jack rafter/Short rafter ✓
1.4.7 G Valley/valley gutter ✓ (7)

1.4.8 Gable roof ✓ (1)

1.4.9 1 400 mm or 1 350 mm ✓ (1)

1.5

1.5.1 Hemp or TFT tape (Teflon tape)/thread tape/yarn ✓ (1)
OR ANY OTHER ACCEPTABLE ANSWER (silicone not accepted)

1.5.2 Cover the threaded part of pipes with teflon tape or hemp in a clockwise direction. ✓
Screw in a straight socket (fitting) to the thread on one pipe using two monkey wrenches. ✓
Screw in the second pipe (threaded part) into the other side of the straight socket (fitting) using two monkey wrenches.
Tighten properly.
ANY TWO OF THE ABOVE (2)
[30]

QUESTION 2: LO3 AS3, 4, 5, 7

2.1

2.1.1
A Floor slab ✓
B concrete (symbol for concrete) ✓
C Reinforcing mesh/main bars ✓
D Shutter board/soffit board ✓
E Bearer/Joist ✓
F Prop/post/pole ✓
G Wedges ✓
H Sole plate ✓ (8)

2.1.2 Concrete is weak in tensile strength and the most ✓ tension in the floor slab will occur at the bottom due to bending and the reinforcing will serve no purpose when placed on the top. ✓ (2)

2.1.3 G – To assist with the alignment of formwork; ✓
to secure the prop in position;
to ease dismantling
ANY ONE OF THE ABOVE (1)

2.1.4 H – To prevent props from sagging; ✓
to distribute the load to the load-bearing surface
ANY ONE OF THE ABOVE (1)

2.2

2.2.1 Main bars – to act against the tensile forces. ✓✓ (2)

2.2.2 Stirrups/Binders ✓ (1)

2.3

CRITERIA	STRIP FOUNDATION	SHORT BORED PILES
Preparation of foundation	Trenches are dug by workers using shovels and picks or mechanical diggers ✓	Pile holes are drilled into the earth with an auger type bit or drill ✓
Concrete filling	Concrete is poured by hand using a wheelbarrow or by ready-mix ✓	Concrete is forced into the hole by gravitational forces ✓

(4)

2.4

2.4.1 1,788 m – 1,482 m ✓ or 1, 482 m – 1,788 m
= 0,306 m ✓ = -0,306 m (2)

2.4.2 1,788 m – 1,526 m or 1,526 m – 1,788 m ✓
= 0,262 m or – 0,262 m✓ (2)

2.4.3 Intermediate sight ✓ (1)

2.4.4 Rise ✓ (1)

2.5.1 and 2.5.2

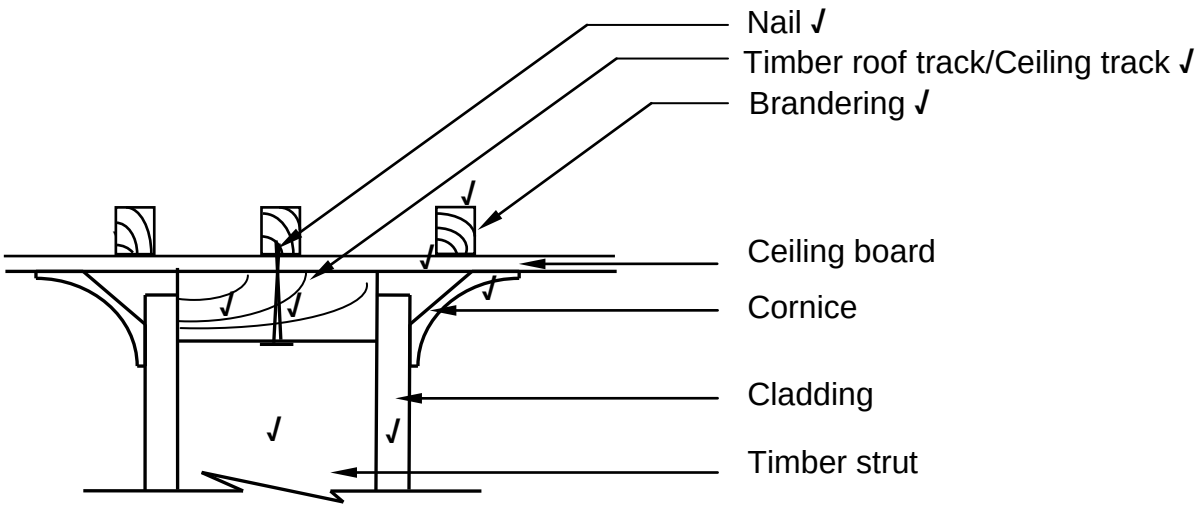


FIGURE 2.5

ASSESSMENT CRITERIA	**MARKS**
Brandering	1
Ceiling board	1
Top rail/Timber roof track/ceiling track	1
Nail/Screw	1
Timber strut vertical	1
Cladding	1
Cornice	1
Any three labels	3
Total	**10**

(10)

2.5.3 Gypsum board ✓
Chipboard/Veneered board ✓
Supawood/Medium-density fibre board
Hardboard/Masonite
Plywood
Shutter board
SA Pine

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

2.6 Check power tool cable for damage. ✓
Ensure that the power tool cable lies outside the working area. ✓
See that the power supply is properly earthed.
Don't work near water with power tool
Moving part, Must be kept away from the body.
Switch off power supply and disconnect the power tool when making adjustments.
Hold power tool securely and firmly when using it.
Remove all jewellery and loose clothing.
Use safety goggles to protect your eyes.
Report any defects immediately.

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

2.7 Square shape ✓ (1)
[40]

QUESTION 3: LO 3 AS 5, 8

3.1 3.1.1 B ✓ (1)

3.1.2 A ✓ (1)

3.1.3 C ✓ (1)

3.1.4 C ✓ (1)

3.1.5 B ✓ (1)

3.2

ADVANTAGES	DISADVANTAGES
Easily accessible ✓ Cheap ✓ Water supply is reliable ✓	Contamination from surface pollution. ✓ Although relatively reliable, it can dry up. ✓ Children can fall into the primitively dug well. ✓ Obtaining water from a cranked windlass can be slow

ANY OTHER ACCEPTABLE ANSWER (6)

3.3 3.3.1 A Rodding eye / cover ✓

B Pipe (110 mm) ✓

C Junction (45°) ✓ (3)

3.3.2 Direction D ✓ (1)

3.3.3 It is for cleaning purposes so that the cleaning rods can enter the sewer line ✓
For easy access to the main sewer pipe.

ANY ONE OF THE ABOVE (1)

3.3.4 Gives access to the drain pipes ✓
Prevents foul gasses from the sewerage system entering the atmosphere
Prevents rain water, dirt, dust entering the sewer line
For safety purposes

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

3.3.5 Cheaper than installing a manhole ✓
Smaller and look neater than a manhole ✓

ANY OTHER ACCEPTABLE ANSWER (2)

3.4

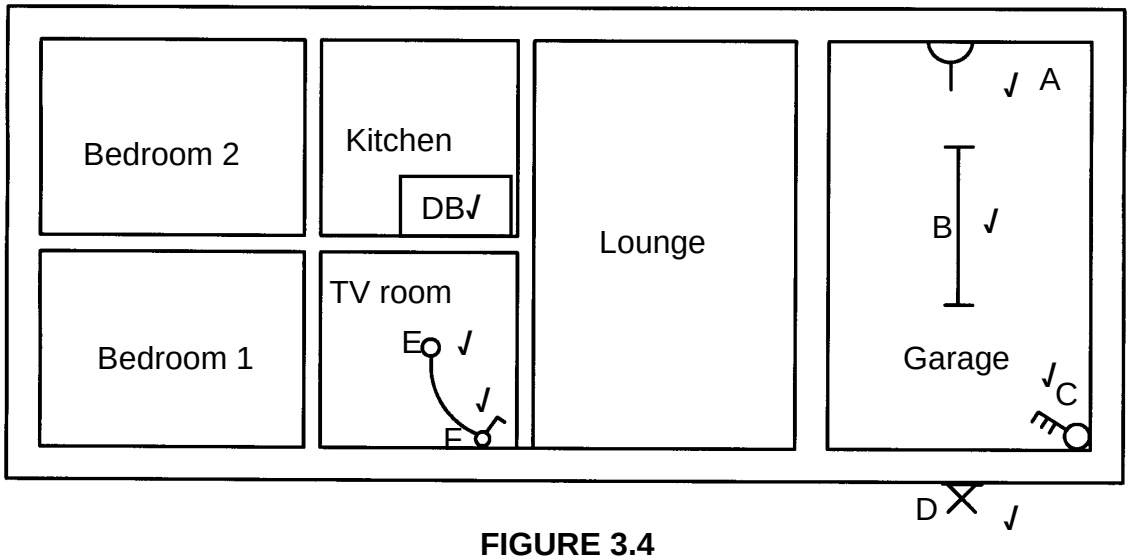


FIGURE 3.4 (7)

3.5 Septic tank ✓ – Bacterial action dissolve sewage and excess fluids soak into the ground by means of a french drain ✓
Conservancy tank ✓ – Sewage stored in a tank and pumped out when nearing full capacity ✓
Pit toilet

ANY OTHER ACCEPTABLE ANSWER (4)

[30]

QUESTION 4: LO3 AS 2, 3, 7, 8

4.1 4.1.1 FALSE ✓ (1)

4.1.2 TRUE ✓ (1)

4.1.3 TRUE ✓ (1)

4.1.4 FALSE ✓ (1)

4.1.5 TRUE ✓ (1)

4.1.6 TRUE ✓ (1)

4.2

4.2.1 Submersion of wood – Absorbs more preservatives ✓

ANY OTHER ACCEPTABLE ANSWER (1)

4.2.2 Full cell process – Preservative process is faster ✓

ANY OTHER ACCEPTABLE ANSWER (1)

4.3

A	B	C	D	
1/	6,0 m ✓	✓	Area of wall before deductions	
✓	2,7 m ✓	16,2 m²	6 000 mm x 2 700 mm	(4)
1/	1,2 m ✓	✓	Area of window 1	
✓	1,5 m	1,8 m²	1 200 mm x 1 500 mm	(3)
1/	1,2 m ✓	✓	Area of window 2	
✓	0,6 m	0,72 m²	1 200 mm x 600 mm	(3)
			Total area of wall, excluding windows	
			16,2 m² - 1,8 m² - 0,72 m²	
			= 13,68 m² ✓	(1)
	✓		Number of bricks	
1/ ✓	13,68 m²		110 bricks for 1 m² of 220 mm wall	
	110 ✓	1 504,8 ✓	1 505 bricks will be required	(4)
			5% wastage and breakages	
			1 505 bricks x 5%	
			75 or 76 bricks	
			Total number of bricks	
			1 505 bricks + 75 bricks ✓ or 1505 + 76	
			= 1 580 bricks ✓ = 1 581 bricks	
			or 1 505 x 1,05	
			= 1 580,25	
			= 1 580 bricks or 1 581 bricks	(2)

4.4

4.4.1 Breaking ✓ (1)

4.4.2 Angle iron ✓ (1)

4.4.3 Copper ✓ (1)

4.4.4 Galvanising ✓ (1)

4.4.5 Corrosive ✓ (1)

[30]

QUESTION 5: LO3 AS 5, 6

5.1.1 8 N ✓ (1)

5.1.2 20 N ✓ (1)

5.1.3 0 N ✓ (1)

5.1.4 3 m ✓✓ (2)

5.1.5 Upward forces = downward forces
✓ ✓
22,5 N + 15,5 N = 10 N + 8 N + 20 N
38 N = 38 N (2)

5.1.6 2 mm = 1 N ✓ (1)

5.1.7 SFa = 22,5 N ✓ (1)

5.1.8 ✓ ✓
SFb = 22,5 N – 10 N
= 12,5 N (Candidates must show steps) (2)

5.1.9 SFd = 22,5 N – 10 N – 8 N – 20 N ✓✓ or 12,5 – 8 – 20
= -15,5 N = -15,5 N (2)

5.1.10 SFe = 22,5 N – 10 N – 8 N – 20 N + 15,5 N ✓✓ or -15,5 N + 15,5
= 0 N = 0 N (2)

5.1.11 Yes ✓ (1)

5.2

5.2.1 Area of figure A1 = ½ b x h
= ½ x 60 x 60
= 30 x 60
= 1 800 mm²

Area of figure A2 = l x b
= 60 x 60
= 3 600 mm²

Total Area = 1 800 mm² + 3 600 mm²
= 5 400 mm²

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

✓✓ ✓✓ ✓✓ ✓✓

= $\frac{(1\,800 \times 80) + (3\,600 \times 30)\ mm^3}{5\,400\ mm^2}$ ✓

= $\frac{144\,000 + 108\,000\ mm^3}{5\,400\ mm^2}$ ✓

= $\frac{252\,000\ mm^3}{5\,400\ mm^2}$

= 46,67 ✓ mm ✓

OR

Take moments about A on Y-axis

✓✓ ✓✓ ✓✓ ✓✓

$5\,400\ mm^2 \times X = (1\,800 \times 80) + (3\,600 \times 30)\ mm^3$

$5\,400\ mm^2 \times X = 144\,000 + 108\,000\ mm^3$

$X = \frac{252\,000\ mm^3}{5\,400\ mm^2}$ ✓ ✓

= 46,67 ✓ mm ✓

OR

Part	AREA (A)	X	AREA OF X Ax
Triangle	1 800 mm² ✓✓	$\frac{h}{3} = \frac{60}{3} = 20 + 60 = 80$ ✓✓	144 000 mm³
Square	3 600 mm² ✓✓	$\frac{S}{2} = \frac{60}{2} = 30$ ✓✓	108 000 mm³
Σ	5 400 mm² ✓		252 000 mm³ ✓

$\frac{\Sigma AX}{\Sigma A}$

= $\frac{252\,000\ mm^3}{5\,400\ mm^2}$

= 46,67✓ mm ✓ (12)

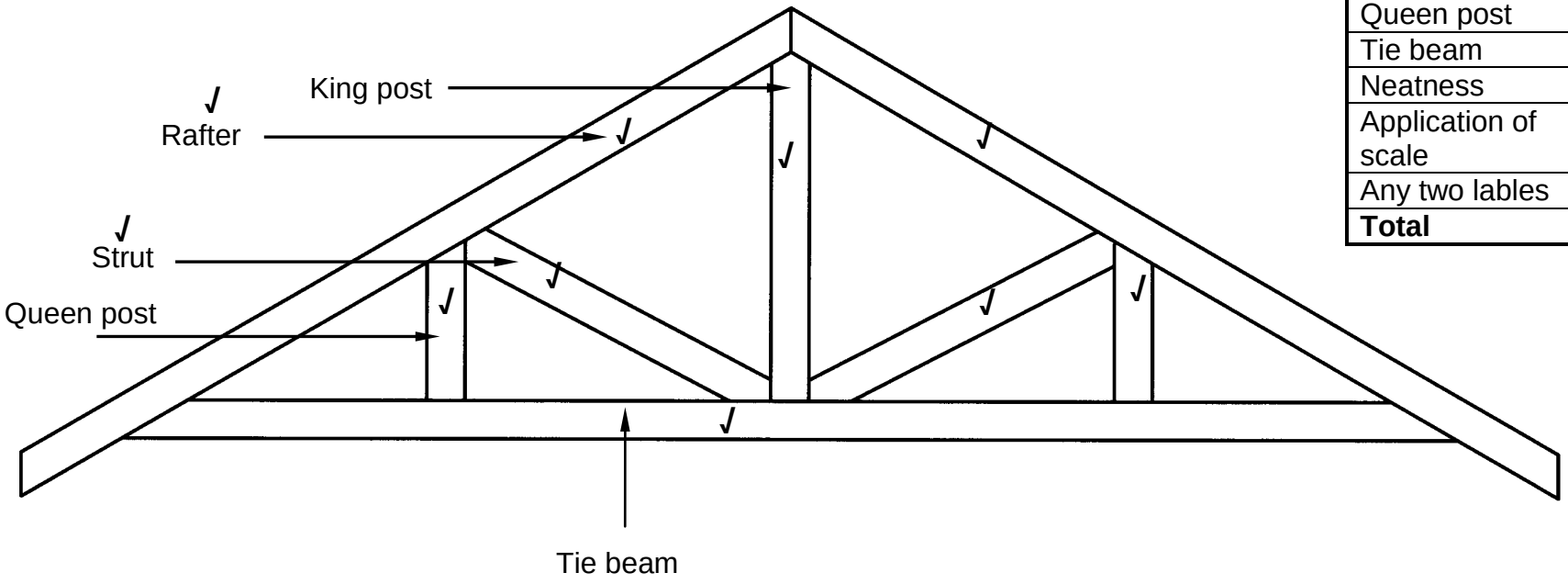
5.2.2 30✓ mm ✓ (2)

[30]

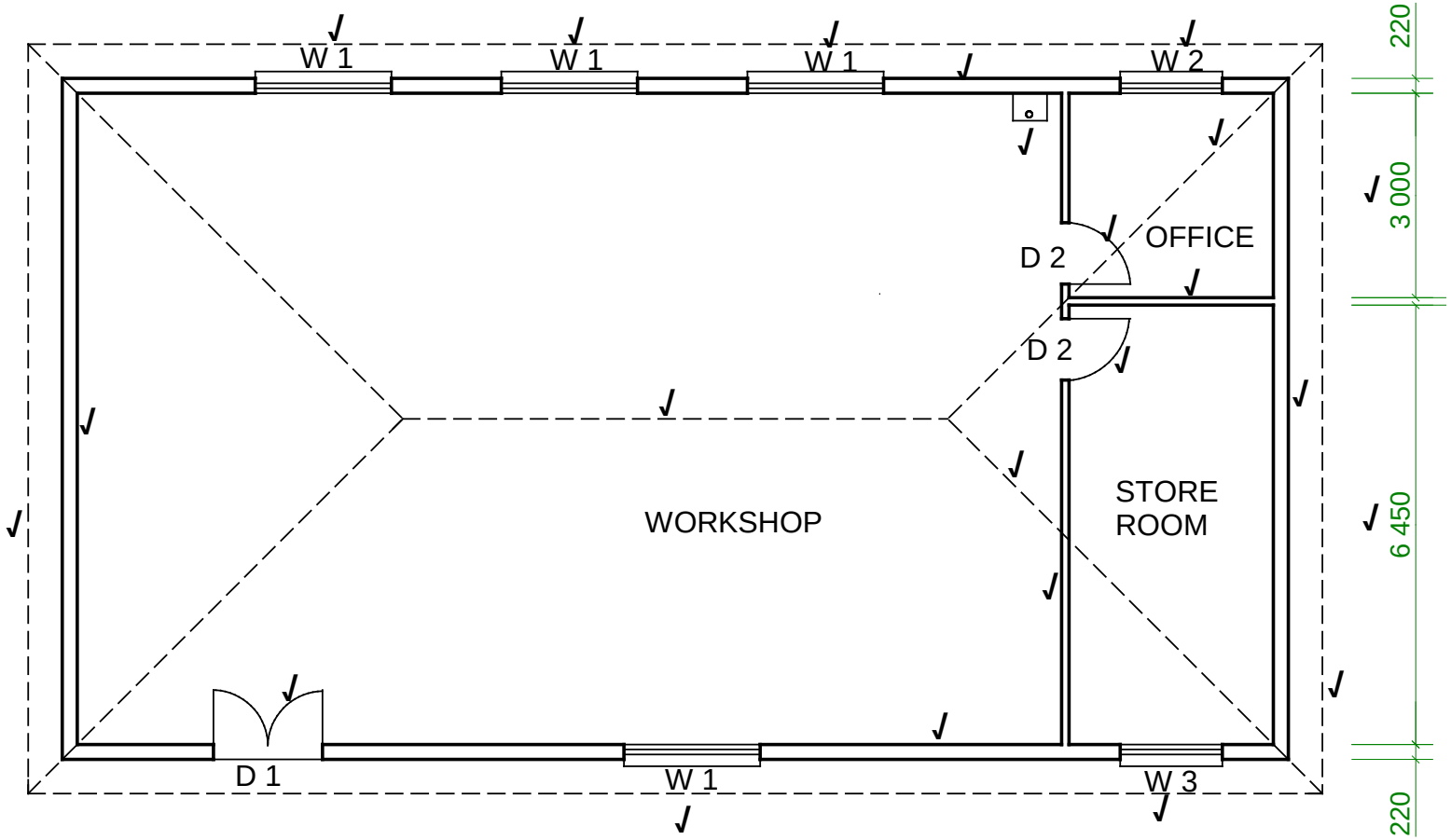
QUESTION 6: LO3 AS4, 5, 7, 8

ANSWER SHEET 6.1
QUESTION 6.1

Assessment criteria	Marks
Rafter	2
King post	1
Strut	2
Queen post	2
Tie beam	1
Neatness	2
Application of scale	3
Any two lables	2
Total	**15**



ANSWER SHEET 6.2
QUESTION 6.2



Assessment criteria	Marks
External walls	4
Internal walls	2
Windows	6
Doors	3
Roofline	4
WHB	1
Labelling	2
Any TWO dimensions	2
Neatness	1
Total	**25**

Door 1 can be a double door, sliding door or a roll up door

FLOOR PLAN ✓

SCALE 1 : 100 ✓

NOT TO SCALE