



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

CIVIL TECHNOLOGY

FEBRUARY/MARCH 2009

MEMORANDUM

This memorandum consists of 19 pages.

QUESTION 1: CONSTRUCTION PROCESSES

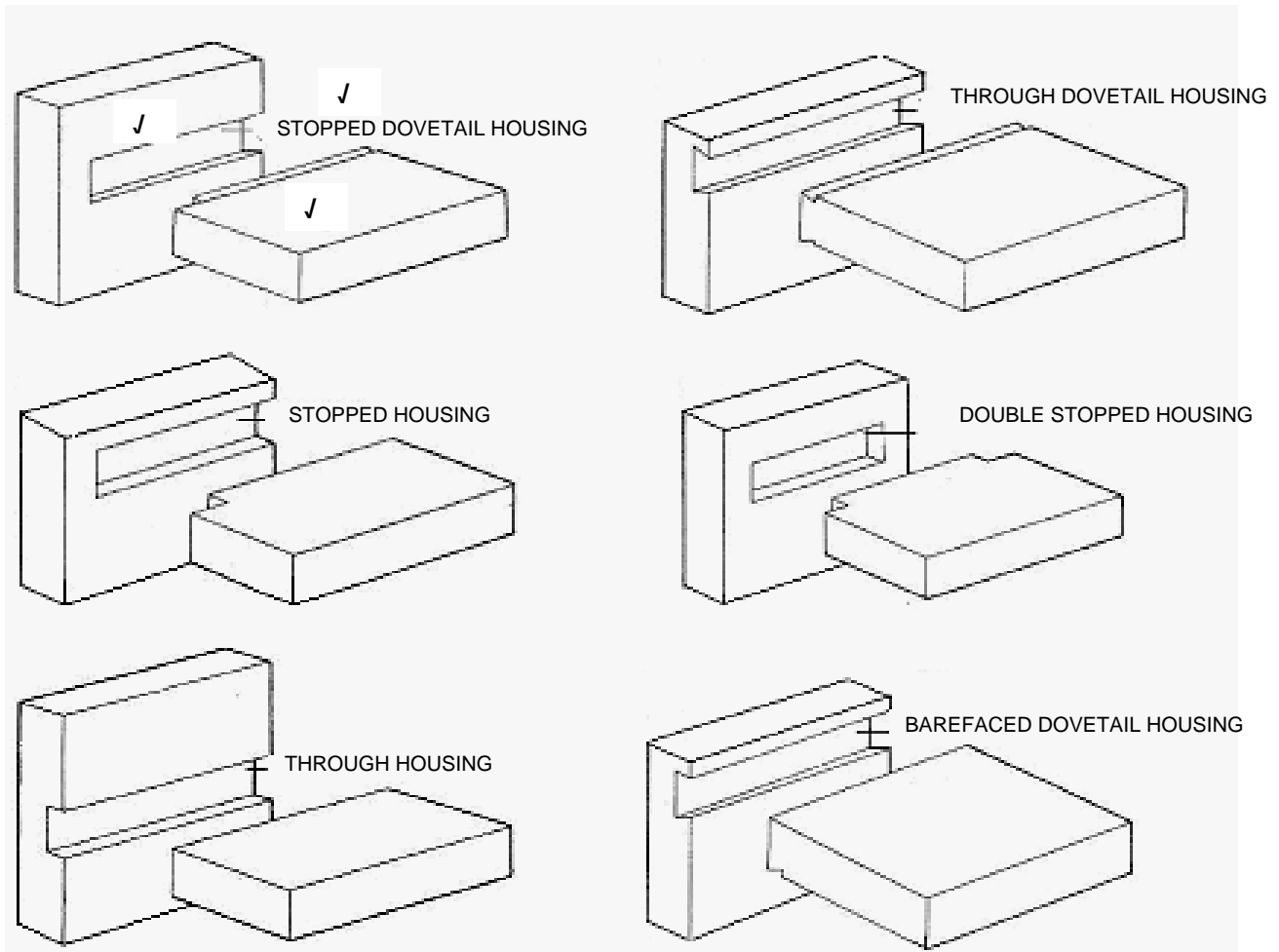
- 1.1 Galvanised wire/Galvanised steel band must be built into the brickwork before the wall reaches wall plate level. ✓ (1)
- 1.2 1.2.1 Galvanised wire/Galvanised steel band must be built into the brickwork at least 600 mm below wall plate level for a lightweight roof. ✓ (1)
- 1.2.2 Galvanised wire/Galvanised steel band must be built into the brickwork at least 300 mm below wall plate level for a heavyweight roof. ✓ (1)
- 1.3 Roofing screw ✓
Self cutting bolthead screw with bonded washer
Hook bolts (1)
- 1.4 Trusses that are correctly placed will remain vertically in place. ✓
The top and bottom of the rafters will be straight. ✓
The truss spacing will be constant at any point. ✓
The sections subjected to pressure will not bend. ✓ (4)
- 1.5 1.5.1 Purlin is 76 mm x 50 mm ✓ (1)
- 1.5.2 Battens is 38 mm x 38 mm ✓ (1)
- 1.6 Hard hat ✓
Gloves ✓
Safety boots ✓
Harness
Safety goggles
[ANY THREE OR OTHER ACCEPTABLE ANSWER] (3)
- 1.7 Bricklayer ✓
Plasterer ✓
Tiler ✓
Carpenter ✓
Joiner
Electrician
Plumber
Cabinet maker
[ANY FOUR OR OTHER ACCEPTABLE ANSWER] (4)

- 1.8 Air pollution ✓ - Because of blasting a lot of dust is sent into the air and carried away by the wind. ✓
- Noise pollution ✓ - During blasting loud noise is created and can have a negative impact on neighboring communities and animals. ✓
- Health risk - Due to the amount of dust caused by blasting, lung diseases and other illnesses like sinusitis and asthma etc. is a big risk.

[ANY TWO OR OTHER ACCEPTABLE ANSWER] (4)

- 1.9 1.9.1 ✓ It is a temporary structure used to support workmen, tools, and material as the building advances in height. ✓ (2)
- 1.9.2 Base plate ✓
Planks or other support inserted underneath the uprights of the scaffolds. (1)
- 1.9.3 Remove the base plate and insert castors/wheels. ✓ (1)
- 1.9.4 Independent/Putlog scaffold. ✓
Dependent scaffold. ✓ (2)

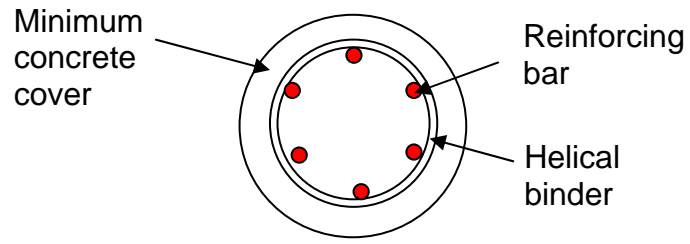
1.10



ONE mark for the Identification and TWO marks for the sketch
[ANY ONE OF THE ABOVE SIX OPTIONS]

(3)
[30]

2.6



Mark allocation:

Spacing & Correct number of bars – 2 marks

Drawing – 1 mark

Helical binder – 1 mark

Minimum concrete cover – 1 mark

Labels – 3 marks

(8)

2.7 **ANSWER SHEET 2.7**

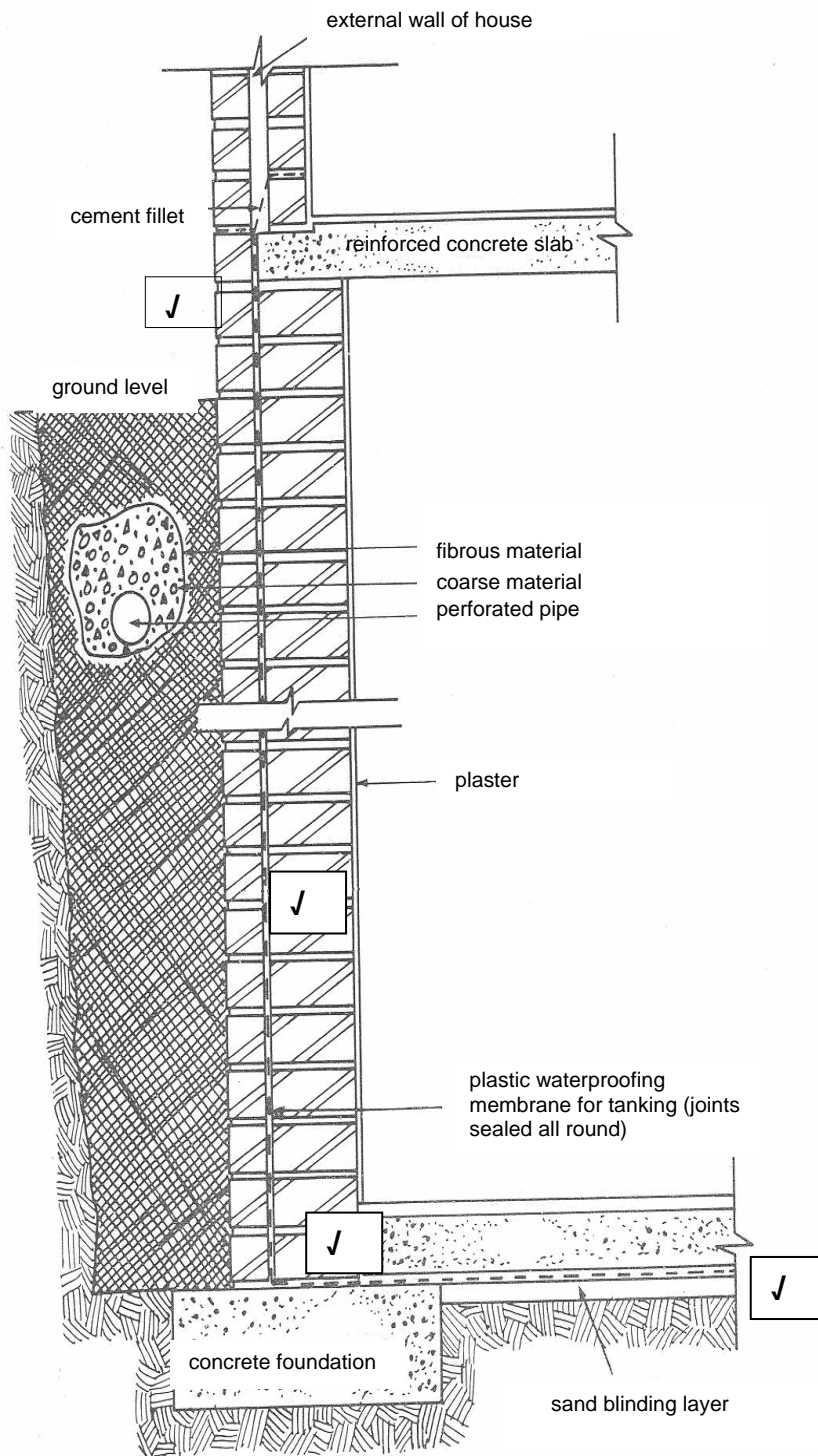
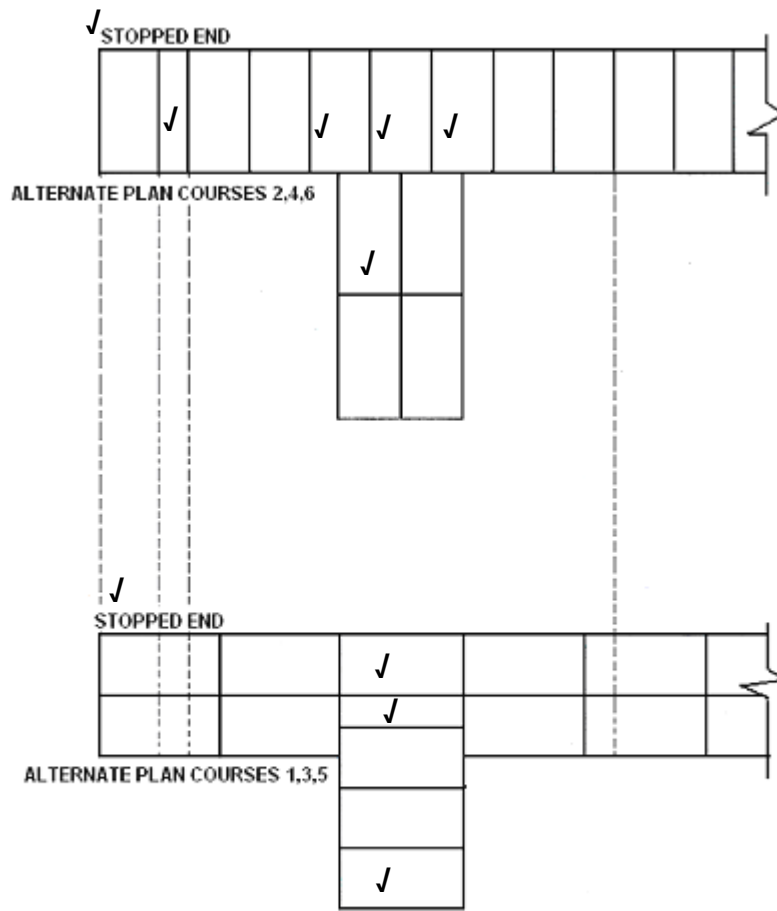


FIGURE 2.7

(4)

- ONE mark for horizontal DPC at floor level.
- ONE mark for vertical DPC within the wall.
- ONE mark for the DPC turning from vertical to horizontal just above the foundation, under the basin floor.
- ONE mark for the horizontal DPC under the basin floor.

2.8



ONE BRICK THICK "T" JUNCTION
IN ENGLISH BOND

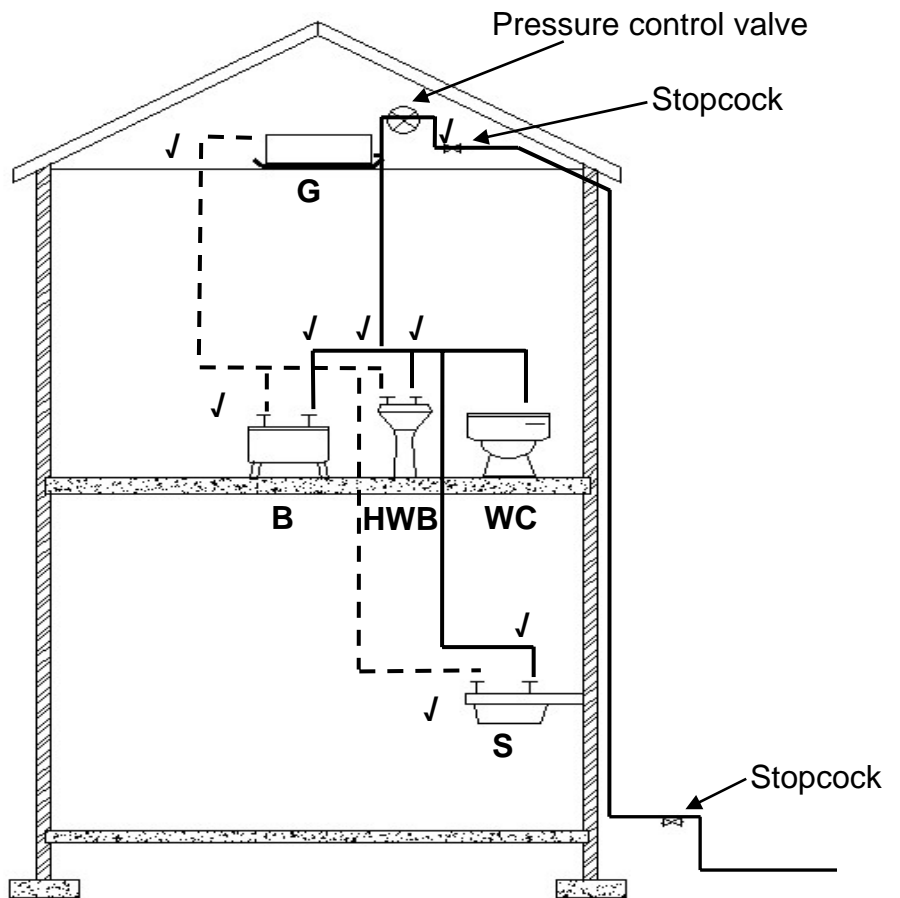
(10)
[40]

QUESTION 3: CIVIL SERVICES

- 3.1 3.1.1 A Waste water pipe (inlet) ✓
 B Cover/lid ✓
 C Drain pipe (outlet) ✓
 D Galvanised sieve ✓ (4)

- 3.1.2 The sieve must be regularly removed and cleared of vegetable and greasy materials, and returned to its place. ✓✓ (2)

- 3.2 3.2.1



- Cold-water inlet ✓
 Cold-water taps ✓✓✓
 Hot-water outlet ✓
 Hot-water taps ✓✓✓

FIGURE 3.2.1

- 3.2.2 ✓ To shut down the water supply to the building when maintenance needs to be done. ✓ (2)

- 3.3 3.3.1 Nuclear power is used to generate steam which will drive turbines that generate electricity. ✓ (1)
[ANY OTHER ACCEPTABLE ANSWER]
- 3.3.2 Yes ✓ (1)
- 3.4 ✓ ✓ (2)
Water is used to drive turbines that generate electricity.
[ANY OTHER ACCEPTABLE ANSWER]
- 3.5 3.5.1 Where municipal water borne sewage disposal system is non-existent. ✓ (2)
Where it is not possible to install a septic tank. ✓
- 3.5.2 The local municipality or other service provider must be informed to empty the tank. ✓ (4)
A vehicle with a tank and a motorised vacuum system is dispatched to the house. ✓
The hose is connected to the draw off valve, and the content in the conservancy tank is vacuum pumped into the tank of the vehicle. ✓
The waste is then transported to the nearest reticulation plant of the municipality, where it may be recycled. ✓
- 3.6 Chemicals from industry further upstream. ✓ (4)
Animals entering the river. ✓
Humans dumping waste into the river. ✓
Washing clothes in the river. ✓
Building latrines too close to the bank of the river.
[ANY FOUR OF THE ABOVE ALTERNATIVES]

[30]

$$\begin{aligned} 4.5.3 \quad \text{Number of bricks} &= \text{Area} \times \text{No. of bricks / m}^2 \quad \checkmark \\ &= 25 \text{ m}^2 \times 100 \text{ bricks / m}^2 \quad \checkmark \\ &= 2\,500 \text{ bricks} \quad \checkmark \end{aligned} \quad (3)$$

$$\begin{aligned} 4.5.4 \quad 1\,000 \text{ bricks cost R1}\,200,00 \\ \underline{1\,200} \\ 1\,000 &= 1,2 \quad \checkmark \\ 1 \text{ brick cost R1,20} &\times 2\,500 \text{ bricks} \quad \checkmark \\ 2\,500 \text{ bricks will cost R3}\,000,00 &\quad \checkmark \end{aligned}$$

Or

$$\begin{aligned} \underline{2\,500 \text{ bricks}} \\ 1\,000 \text{ bricks} &= 2,5 \end{aligned}$$

$$2,5 \times \text{R1}\,200 = \text{R}\,3\,000,00$$

Or

$$\text{One brick cost} = \frac{\text{R1}\,200,00}{1\,000} = \text{R1,20} \quad \checkmark$$

$$2\,500 \text{ bricks cost} = \text{R1,20} \times 2\,500 \quad \checkmark$$

$$= \text{R3}\,000,00 \quad \checkmark$$

(3)

ANSWER SHEET 4.5

A	B	C	D
			4.5.1
			Area of the door:
1 /	2		
	<u>1</u>	2 m ²	= 2 m ² ✓
			Area of the window:
1 /	2		
	<u>1.5</u>	3 m ²	= 3 m ² ✓
			Total area of the openings:
			Door = 2 m ²
			Window = 3 m ²
			Total = 5 m² ✓
			4.5.2
			Total area of brickwork:
1 /	10 ✓		
	<u>3</u> ✓	30 m ² ✓	= 30 m ² - 5 m ² ✓
			= 25 m ² ✓✓
			4.5.3
			No. of bricks required:
1 /	25 m ²		Number of bricks = Area X No. of bricks / m ² ✓
	<u>100</u> ✓	2 500	= 2 500 bricks ✓
			4.5.4
			Price of bricks
			One brick cost = $\frac{R1\ 200,00}{1\ 000} = R1,20$ ✓
			2 500 bricks cost = R1,20 x 2 500 ✓
			= R3 000,00 ✓

QUESTION 5: APPLIED MECHANICS

- 5.1 5.1.1 UDL is the load that is spread evenly over the whole or part of a beam. ✓ (1)

THE METHODS BELOW OR ANY OTHER IS ALSO ACCEPTABLE

- 5.1.2 Moments around RL

$$\begin{aligned} RR \times 8 &= P \times 4 \\ 48 \times 8 &= 4P \\ 384 &= 4P \\ \frac{384}{4} &= P \\ 96 \text{ N} &= P \end{aligned}$$

$$\begin{aligned} \text{UDL over 8 m} \\ \frac{96}{8} \\ = 12 \text{ N/m } \checkmark\checkmark \end{aligned}$$

P is used as the UDL (Converted to point load as used in calculation.)

TWO marks given for the method of solving of the problem. //
ONE mark for the answer
ONE mark for the unit (4)

OR

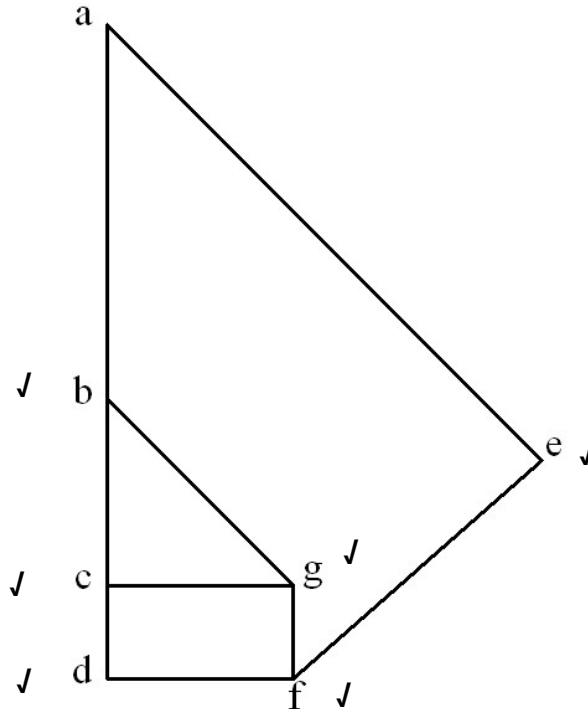
- 5.1.2 Upward forces = Downward forces
 $2 \times 48 = \text{Downward forces}$
 $96 = 96$

Over 8 m distance

$$\begin{aligned} \text{UDL} &= \frac{\text{N}}{\text{Distance}} \\ &= \frac{96}{8} \\ &= 12 \text{ N/m } \checkmark\checkmark \end{aligned}$$

TWO marks given for the method of solving of the problem. //
ONE mark for the answer
ONE mark for the unit

5.2 5.2.1



FORCE DIAGRAM

SCALE 10 mm = 1 kN

(Not to scale)

(6)

5.2.2

MEMBER	MAGNITUDE	NATURE
AE	12.8 kN ✓	Tie ✓
BG	5.6 kN ✓	Tie ✓
CG	3.9 kN ✓	Strut ✓
DF	3.9 kN ✓	Strut ✓
EF	7.2 kN ✓	Strut ✓
FG	2 kN ✓	Tie ✓

(12)

A tolerance of 0,2 kN will be allowed to either side.

5.3 Area of rectangle = $l \times b$
 $= 60 \text{ mm} \times 40 \text{ mm}$
 $= 2\,400 \text{ mm}^2 \checkmark$

Position of centroid of rectangle from A-B = $30 \text{ mm} \checkmark$

Area of square hole = side \times side
 $= 10 \text{ mm} \times 10 \text{ mm}$
 $= 100 \text{ mm}^2 \checkmark$

Position of centroid of square from A-B = $15 \text{ mm} \checkmark$

Position of centroid = $\frac{(A_1 \times d) - (A_2 \times d)}{\text{Total area}}$

$$= \frac{(2\,400 \times 30) - (100 \times 15) \text{ mm}^2}{2\,300 \text{ mm}^2} \checkmark$$

$$= \frac{72\,000 - 1\,500 \text{ mm}^2}{2\,300 \text{ mm}^2} \checkmark$$

$$= \frac{70\,500 \text{ mm}^2}{2\,300 \text{ mm}^2}$$

$$= 30,65 \text{ mm}$$

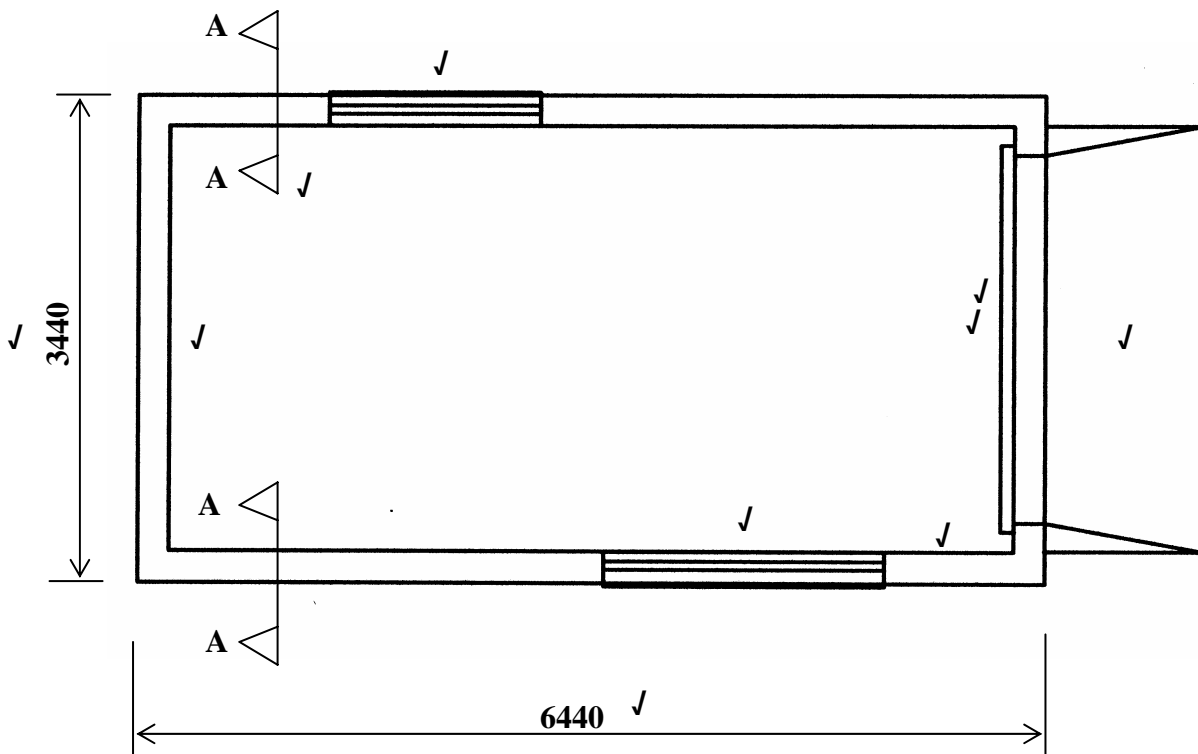
$$= 30,7 \text{ mm} \checkmark \text{ from line A-B}$$

(7)
[30]

QUESTION 6: GRAPHICS AND COMMUNICATION

ANSWER SHEET 6.1

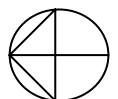
QUESTION 6.1



FLOOR PLAN

SCALE 1:1

Dimension – Width	1
Length	1
Windows	2
Walls - Length	2
Width	1
Sectional Plane	1
Garage door	2
Total	10

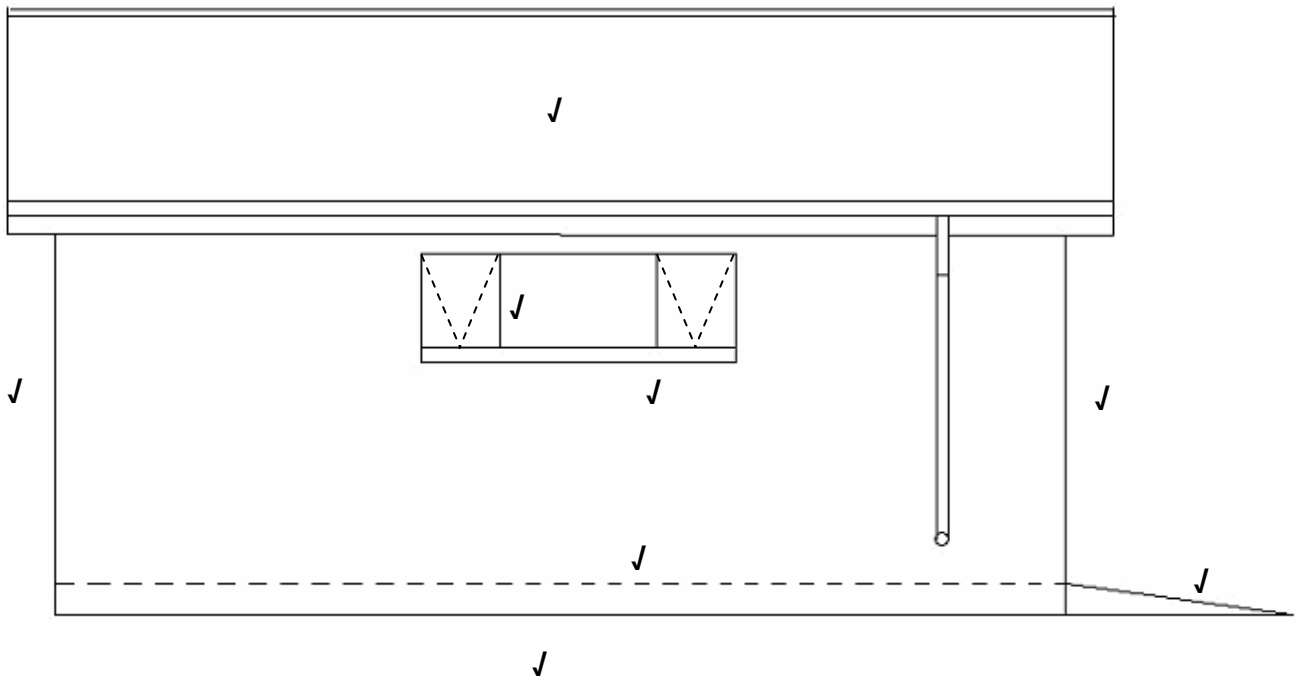


(NOT TO SCALE)

(10)

ANSWER SHEET 6.2

QUESTION 6.2



WEST ELEVATION **SCALE 1:100**

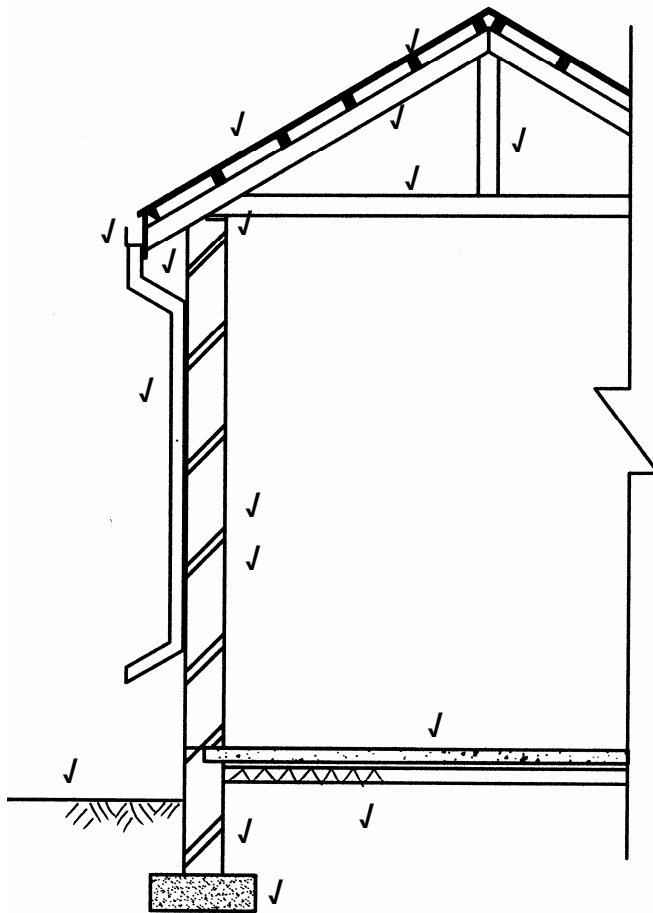
Length	1
Height	2
Window	1
Window sill	1
Floor line	1
Ramp	1
Roof	1
West elevation	1
Scale	1
Total	10

(NOT TO SCALE)

(10)

ANSWER SHEET 6.3

QUESTION 6.3



SECTION A – A ✓

SCALE 1:100 ✓

Accuracy	1	✓
Correct scale	1	✓
Corrugated iron sheeting	1	
Purlins	1	
Rafter, King Post, Tie Beam	3	
Roof overhang	1	
Gutter & Down-pipe	2	
Wall plate	1	
Walls	2	
Concrete floor, Hardcore filling	2	
Natural Ground Level (NGL)	1	
Foundation Wall, Footing	2	
Title & Scale	2	
Total	20	

(NOT TO SCALE)

(20)
[40]

TOTAL: 200