

(Handwritten mark)

(Handwritten signature)

(Handwritten signature)

(Handwritten signature)

This memorandum consists of 18 pages.

DEPARTMENT OF BASIC EDUCATION
2011-11-10
PRIVATE BAG X 110 PRETORIA 0001
PUBLIC EXAMINATIONS

MARKS: 200

CIVIL TECHNOLOGY
 NOVEMBER 2011
 MEMORANDUM

GRADE 12

NATIONAL SENIOR CERTIFICATE

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

basic education



Please turn over

[Handwritten signatures and initials]

ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS

(2)

- Apply continuous pressure to the wound with a handkerchief or cloth. ✓
- For a wound on a limb, lift one or both limbs higher than the body/heart. ✓
- Apply a pressure bandage or use pressure point if bleeding continues.
- Keep body warm and treat for shock until help arrive.

1.2

OR ANY OTHER ACCEPTABLE ANSWERS

(3)

- A – When using equipment like a angle grinder that makes a lot of noise. ✓
- B – When grinding or cutting material. ✓
- C – When working with material with sharp or rough edges/ when chipping slag after welding C- when working with: concrete/ hot material/ welding ✓

1.1.2

(3)

- A – Ear muffs/ Ear protection/ Ear plugs ✓
- B – Safety goggles/ Safety glasses/ Eye protection/ Safety goggles ✓
- C – Gloves ✓

1.1.1

1.1

QUESTION 1 LO 3 AS 1, 2, 4, 5, 7, 10

Handwritten signature and initials, including a circled '2011'.

COLUMN A		COLUMN B	
1.3.1	Sustainability	K✓	Preserving material in its original state
1.3.2	Pre-cast concrete	I✓	Concrete cast elsewhere and placed in position.
1.3.3	Slump test	G✓	Used to determine the workability of fresh concrete.
1.3.4	PVC	F✓	Conduit pipes is an example of this material
1.3.5	Cube test	B✓	Used to determine the compressive (crushing) strength of concrete
1.3.6	In-situ concrete	L✓	Fresh concrete cast in place
1.3.7	Dumpy level	C✓	A precision measuring instrument used to measure height and distance
1.3.8	Telescopic staff	E✓	An accessory used with a dumpy level
1.3.9	Hydration	J✓	A chemical reaction between water and cement
1.3.10	Compaction	H✓	Removal of air bubbles from concrete

(10)

Please turn over

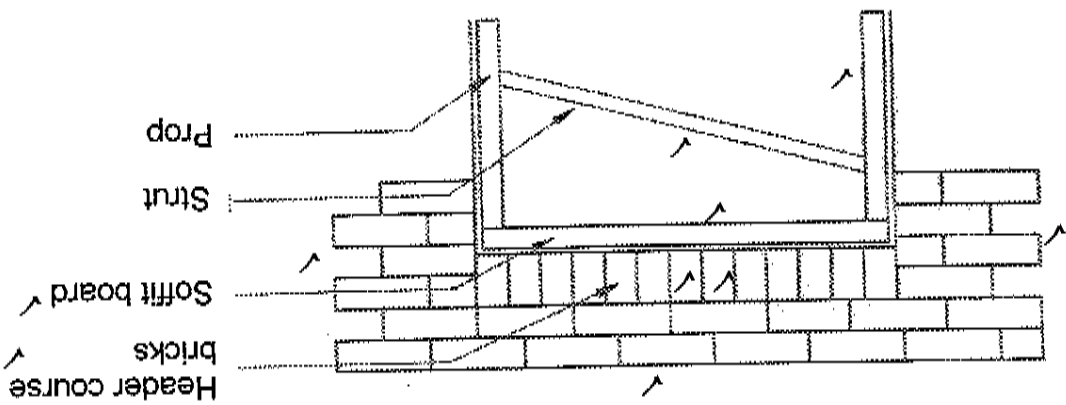
(Handwritten signature and initials)

- 1.6
- Longitudinal half lap/ longitudinal halving joint ✓
- ANY OTHER ACCEPTABLE ANSWER**
- (1) [30]
- 1.5
- Bricks are pressed and formed to the required shape (is done by the brick manufacturer) ✓
 - Bricks are sanded against a rough or fine toothed surface
 - Bricks are cut into desired shape by means of a special saw
 - Buy the brick
- ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**
- (1)

ASSESSMENT CRITERIA	MARK
Flat gauged arch brick header course	2
Two courses of brickwork above arch	1
Surrounding brickwork in stretcher bond	2
Soffit board	1
Props	1
Strut	1
Any two labels	2
TOTAL	10

(10)

FIGURE 1.4

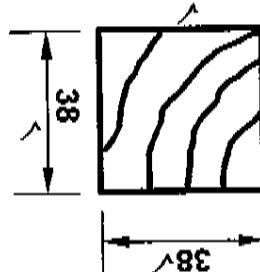


1.4

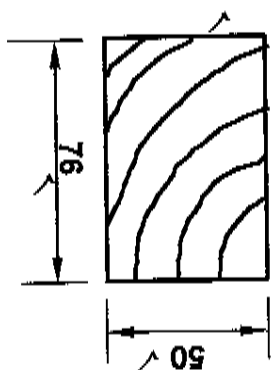
QUESTION 2 LO 3 AS 3, 4, 5, 7

2.1 REFER TO ANSWER SHEET 2.1.

2.2



Batten 38 mm x 38 mm/
50 mm x 38 mm tilting batten
For concrete roof tiles



Purlin 76 mm x 50 mm/
76 mm x 76 mm tilting purlin
for galvanised roof sheeting

If the candidate has drawn 2 sections through the roof showing a batten on one and a purlin on another, 1 mark for each sketch must be given. If he labels the drawing correctly with the size he gets 3 marks for each sketch.

2.3

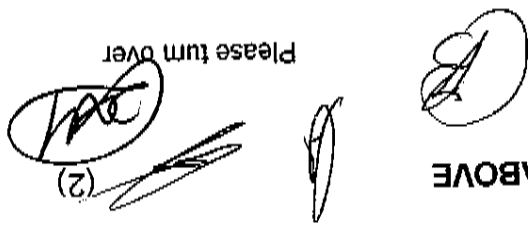
DRYWALL CONSTRUCTION	The erection of dry walls is a dry process ✓
	The partitions are adaptable and can be fitted in awkward places ✓
	Materials are portable/need less storage space than brickwork. ✓
	Partition stud/steel rail/standard partitions weigh less.
BRICK WALL CONSTRUCTION	Wet material such as mortar is to be used to join bricks ✓
	It is time consuming to cut bricks to accommodate awkward angles in a wall ✓
	Materials require a lot of storage space ✓
	Material is heavy

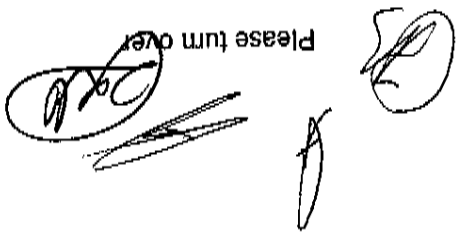
ANY SIX OF THE ABOVE (THREE IN EACH COLUMN) OR ANY OTHER ACCEPTABLE ANSWER IF THE COMPARISON CORRELATES

(6)

- Precast concrete piling ✓
- Continuous auger piling ✓
- Driven in steel piling
- Auger drill piling
- Displacement piling
- Sleeved piling
- Percussion piling

ANY TWO OF THE ABOVE





Please turn over

- Pipe scaffolds ✓ – builder/carpenter/glazier ✓
- Putlog scaffolds ✓ – high-rise buildings ✓
- Movable/mobile platforms – electrician/painter/repairing of ceiling boards
- Independent scaffolds – bricklaying/building gable ends
- Trestles – building walls of low height/installing gutters/painting
- Dependent scaffold – depends on building for support/allow for more working space on scaffold
- Truss-out scaffold – depends on building for support/allow for more working space on scaffold

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

(4) [40]

- The workmen to place the concrete must be ready ✓
- Ramps to take concrete to another level if necessary must be erected before the concrete arrives ✓
- The formwork to cast the concrete must be ready ✓
- All tools and equipment to place the concrete must be clean and ready
- The rate of placing and compacting the concrete must be done in such a way so as not to waste time

ANY THREE OR ANY OTHER ACCEPTABLE ANSWERS

(3)

- 2.5 ✓ ✓ 1,941 – 1,782 = 0,159 m ✓ OR 159 mm
- OR
- 1,782 – 1,941 = -0,159 mm
- 2.6 2.6.1 Back sight ✓
- 2.6.2 Intermediate sight ✓
- 2.6.3 Fore sight ✓

ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS

(2)

- On unstable soil or ground ✓
- Where the soil is loose ✓
- Non-cohesive soil
- Where there is soil movement
- Constantly wet areas

QUESTION 3 LO 3 AS 5, 8

3.1 3.11 A – Sink ✓
B – Gully ✓
C – P-trap ✓ or Gully trap
D – Inspection eye (IE) ✓ (4)

3.12 110 mm ✓ (1)

3.13 40 mm/50 mm ✓ (1)

3.14 To prevent foul gasses and smells from entering a building ✓
Forms a water seal (1)

ANSWER
ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE

3.15 Waste-water pipe ✓ (1)

3.16 Main sewer pipe ✓ (1)

3.17 Between 1 : 40 to 1 : 60 ✓ (1)

3.2

- Sewage from the house flows into the first chamber ✓
- Heavier sewage sinks to the bottom ✓
- Bacteria decompose the solid sewage into a liquid ✓
- The sludge remains at the bottom of the tank ✓
- The soluble sludge eventually flows into the second chamber ✓
- Only liquid flows from the outlet pipe of chamber two ✓
- This liquid flows into a French drain where it soaks into the ground ✓

LEARNERS SHOULD NOT BE PENALISED IF THEY PRESENT THE ANSWER IN ANY ORDER

(7)

3.3

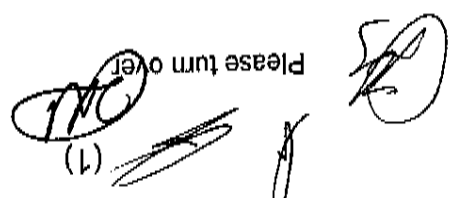
- No pollution or noise ✓
- Electricity supply is continuous ✓
- The system is easy to regulate
- Water is not used up (renewable energy)
- Water still flows downstream as before
- Hydro-electric power stations have very low operating cost
- The lifespan of a hydro-electric power station is much longer than nuclear and coal plants
- Hydro-electric power is the most energy efficient way of generating electricity. It can convert 90% of the available energy into electricity

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

(2)

3.4

- To water gardens and plants ✓
- Water can be provided in coastal areas with scarce water resources
- Salt water can be desalinated to be purer than normal fresh water
- Salt can be obtained in the process
- Unusable brackish water can also be desalinated
- Water becomes potable (drinkable)



ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

- Saves electricity. It can be up to 30 percent cheaper than electrical alternatives ✓
- Gas gives instant heat ✓
- Gas geysers provide constant hot water supply ✓
- Not affected by power failures
- Always a supply of hot water on hand
- The fumes of burned out gas of the geyser such as the water vapour and carbon dioxide are the same elements that humans exhale, which makes gas healthier than electrical heaters that dry out the air

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWERS.

3.6	3.6.1	Inspection eye ✓	(1)
	3.6.2	Rodding eye ✓	(1)
3.7	3.7.1	WC ✓	(1)
	3.7.2	B ✓	(1)
	3.7.3	S ✓	(1)
3.8	3.8.1	S-trap ✓	(1)
	3.8.2	P-trap ✓	(1)

[30]

Please turn over

QUESTION 4 LO 3 AS 2, 3, 7, 8

4.1 Refer to ANSWER SHEET 4.1 as the preferred method or alternatively use the method below.

4.1.1 Inside measurement of garage Length = 9 440 mm – 440 mm ✓
 Width = 6 440 mm – 440 mm ✓
 = 6 000 mm ✓

4.1.2 Total inside area of garage = length x breadth ✓
 = 9 000 mm x 6 000 mm ✓
 = 54 m² ✓

4.1.3 Area of one ceiling board = 3 000 mm x 1 200 mm ✓
 = 3,6 m² ✓

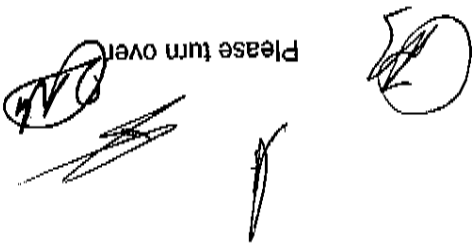
4.1.4 Number of ceiling boards = 54 m² ÷ 3,6 m² ✓
 = 15 ceiling boards ✓

4.1.5 Total length of cornice = 2 (9 000 mm) + 2 (6 000 mm) ✓
 = 18 000 mm + 12 000 mm ✓
 = 30 000 mm OR 30 m ✓

LEAD	MILD STEEL
Highly toxic ✓	Not toxic ✓
Blue grey metal ✓	Grey ✓
Heavy	Lighter
Rust free	Corrodes easily
Non-ferrous	ferrous
Conductor of electricity	Conductor of electricity

ANY FOUR OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

- 4.3 4.3.1 1 200 mm ✓ (1)
- 4.3.2 1 800 – (2 x 16 mm) = 1 768 mm ✓ (1)
- 4.3.3 1 800 – (2 x 16 mm) = 1 768 mm ✓ (1)
- 4.3.4 1 768 mm ✓ (1)
- 4.3.5 1 200 mm ✓ (1)
- 4.3.6 900 mm ✓ (1)



4.4

- Painting ✓
- Galvanising ✓
- Apply oil
- Powder coating

(2)

OR ANY OTHER ACCEPTABLE ANSWERS.

4.5

- Gypsum plaster ✓
- Clout nail/nail
- Silicone

(1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE

ANSWER

4.5.2

- Steel nails ✓
- Silicone

(1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE

ANSWER

4.5.3

- Panel pin ✓
- Silicone

(1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE

ANSWER

4.5.4

- Clout nails ✓
- Dry-wall screws

(1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE

ANSWER

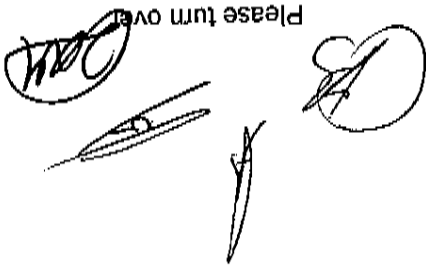
4.6

- Prevents timber from deterioration ✓
- Enhances its appearance ✓
- Prevents attacks from insects
- Protects timber from the elements (weather)

(2)
[30]

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER.

Please turn over



Please turn over

(8)

$$\frac{\Sigma Ax}{\Sigma A} = \frac{155\,000\text{ mm}^3}{4\,550\text{ mm}^2} = 34.07\text{ mm}$$

AREA (A)	X	Area of X (Ax)
Rectangle	$L = 80 = 40$	$128\,000\text{ mm}^3$
Triangle	$b = 30 = 10 + 10 + 20$	$+ 27\,000\text{ mm}^3$
Σ		$155\,000\text{ mm}^3$

OR

$$4\,550\text{ mm}^2 \times X = (3\,200 \times 40) + (1\,350 \times 20) = 128\,000 + 27\,000 = 155\,000\text{ mm}^3$$

$$X = \frac{155\,000\text{ mm}^3}{4\,550\text{ mm}^2} = 34.07\text{ mm}$$

Take moments about B

OR

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

$$= \frac{(3\,200 \times 40) + (1\,350 \times 20)}{4\,550} = \frac{128\,000 + 27\,000}{4\,550} = \frac{155\,000\text{ mm}^3}{4\,550\text{ mm}^2} = 34.07\text{ mm}$$

(1)

(1)

Area of triangle = $1\,350\text{ mm}^2$

Area of rectangle = $3\,200\text{ mm}^2$

5.1.3

5.1.2

5.1.1

5.1

QUESTION 5 LO 3 AS 5, 6

Please turn over

TOTAL: 200

[40]
(25)

6.2 REFER TO ANSWER SHEET 6.2

(15)

6.1 REFER TO ANSWER SHEET 6.1

QUESTION 6 LO 6 AS 4, 5, 7, 8

[30]
(6)

RL = 7,2 kN

5 RL = $(6 \text{ kN} \times 1 \text{ m}) + (4 \text{ kN} \times 2 \text{ m}) + (4 \text{ kN} \times 3 \text{ m}) + (2 \text{ kN} \times 5 \text{ m})$ ✓
 $= 6 \text{ kNm} + 8 \text{ kNm} + 12 \text{ kNm} + 10 \text{ kNm}$
 $= 36 \text{ kNm}$ or RL or $\frac{36 \text{ kNm}}{5 \text{ m}}$ ✓

5.3 Take moments about RR

(4)

5.2.3 REFER TO ANSWER SHEET 5.2

(1)

5.2.2 REFER TO ANSWER SHEET 5.2

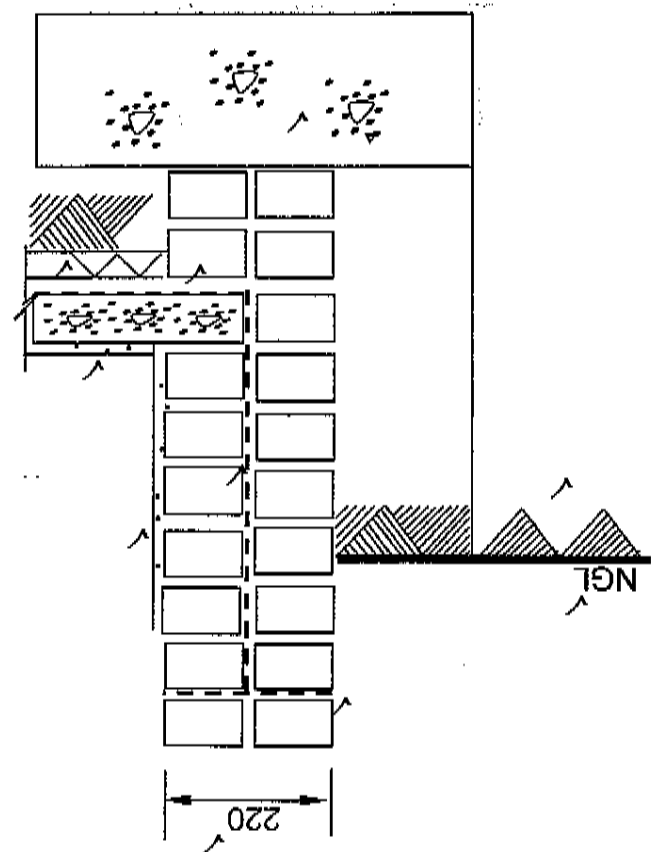
(9)

5.2 5.2.1 REFER TO ANSWER SHEET 5.2

Please turn over

(11)

MARK	ASSESSMENT CRITERIA
3	Position of DPC
1	Drawing symbol for screed
1	Plaster
1	Drawing symbol for undisturbed earth under natural ground level
1	Abbreviation for natural ground level
2	Drawing symbol for concrete
1	Drawing symbol for hardcore filling
1	Wall thickness
11	TOTAL



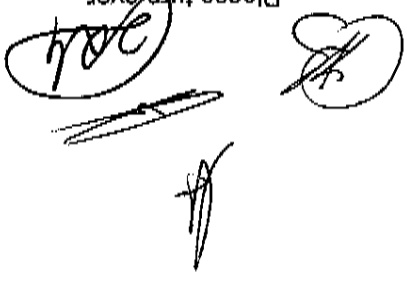
QUESTION 2.1

ANSWER SHEET 2.1

Civil Technology

NSC – Memorandum

Please turn over



(12)

A	B	C	D
			Inside length of garage = 9 440 - 2/220 = 9 440 - 440 = 9 000 mm ✓
			Inside width of garage = 6 440 - 2/220 = 6 440 - 440 = 6 000 mm ✓
			Inside area of garage
1/	9 ✓	54 m ² ✓	
1/	3,0 ✓	3,6 m ² ✓	Area of one ceiling board
1/3,6	54	15	Total number of ceiling boards required = 54 ✓ 3,6
			= 15 ceiling boards ✓
			Length of cornice required for the garage
2/	9	18 m ✓	Long sides
2/	6	12 m ✓	Short sides
			Total length required = 18 m + 12 m = 30 m ✓

QUESTION 4.1

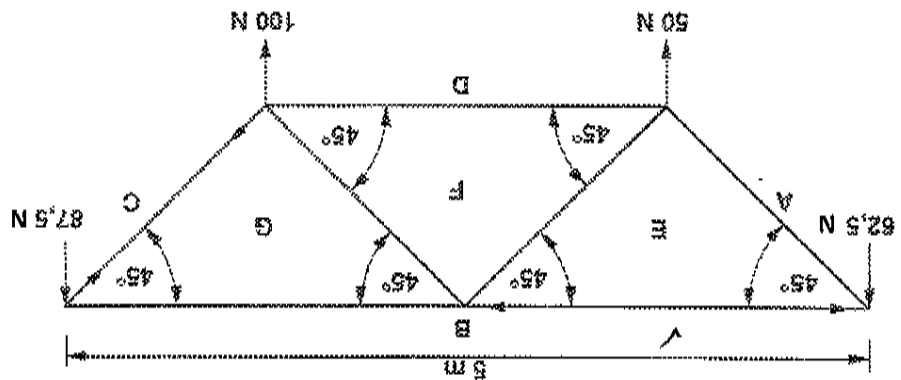
ANSWER SHEET 4.1

ANSWER SHEET 5.2

QUESTION 5.2.1

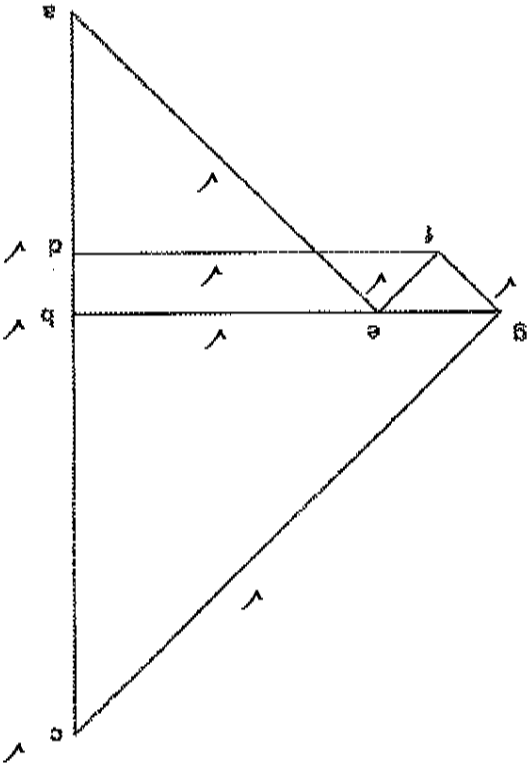
Space Diagram

5.2.1



(1)

(9)



QUESTION 5.2.2 AND QUESTION 5.2.3


MEMBER	NATURE	MAGNITUDE
AE	Tie ✓	88 N ✓
BE	Strut ✓	62 N
BG	Strut	88 N ✓
CG	Tie ✓	124 N

Allow a tolerance of 2 Newton on either side

(4)

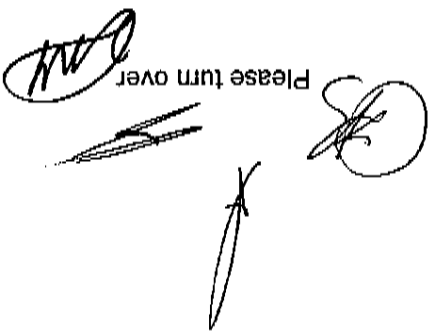
QUESTION 6.1

ANSWER SHEET 6.1

No.	QUESTIONS	ANSWERS	MARKS
1	Identify the type of roof covering (labelled 1)	Roof tile, e.g. clay tile	1
2	What type of material is the roof covering made of?	Clay/concrete/slate/cement fibre	1
3	Identify number 2.	Rafter	1
4	Identify number 3.	Strut	1
5	Identify number 4.	Tie-beam	1
6	Identify number 5.	Beam filling	1
7	What is wrong with the heights of the window and door?	It is not level/not at the same height.	1
8	Identify number 6.	Ceiling board	1
9	Study the internal wall on the concrete slab and identify ONE error.	There is no foundation for this wall.	1
10	What is the width of the internal wall if it is a half brick wall?	110 mm	1
11	Name ONE material that can be used to make this component indicated by number 7.	PVC/aluminium/cement fibre/galvanised	1
12	Identify number 8.	Window sill (External)	1
13	Identify number 9.	Wash hand basin	1
14	Draw a freehand symbol for a bath.		2

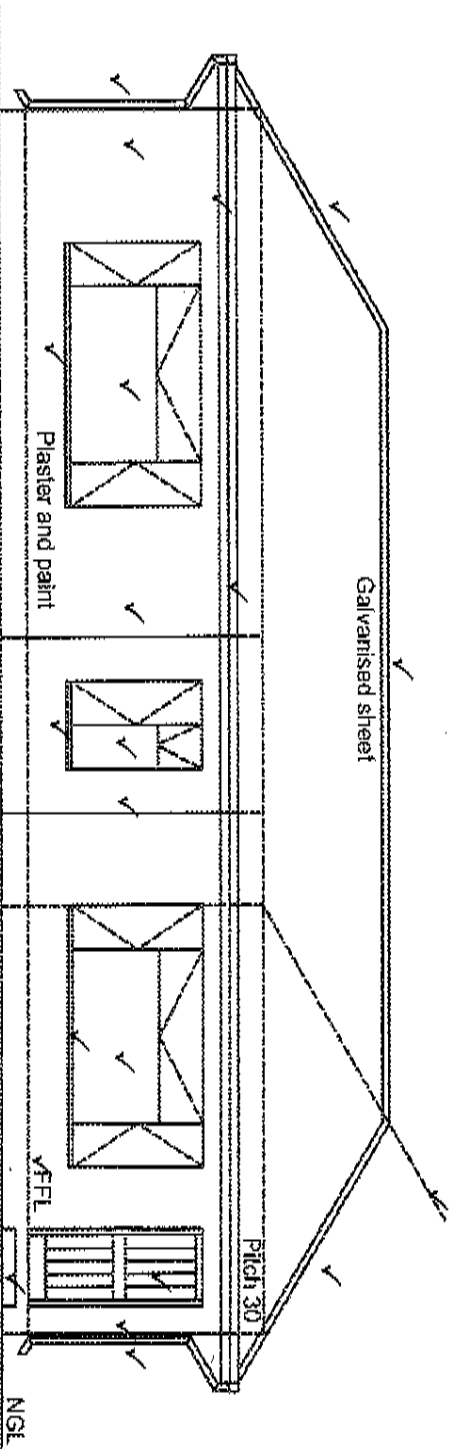
(15)

Please turn over



ANSWER SHEET 6.2

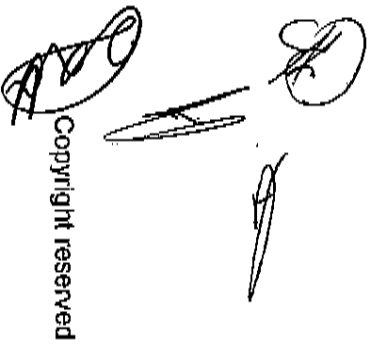
QUESTION 6.2

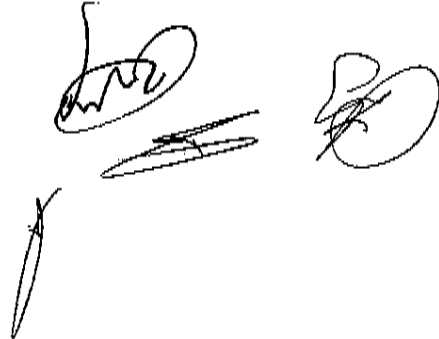


WEST ELEVATION ✓

SCALE 1 : 100 ✓

Accuracy / Neatness ✓ ✓





[40]

-1 mark for wrong elevation

3	Roof construction
1	Fascia boards
1	Gutters
2	Down pipe
3	Windows
1	Door
1	Step
4	Walls – height and lengths
3	Window sills
1	Determining roof height
20	TOTAL
	FFL (Finished floor level)
1	Scale (print)
1	West elevation (print)
3	TOTAL
2	Accuracy/neatness
2	TOTAL
25	GRAND TOTAL