



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY

NOVEMBER 2016

MEMORANDUM

MARKS: 200

This memorandum consists of 16 pages.

QUESTION 1: CONSTRUCTION, SAFETY AND MATERIAL

1.1.1 The worker should have ensured that:

- the grinder and grinding blade/disc were inspected for defects before use. ✓
- the angle grinder is used for the intended purpose only. ✓
- correct blade is correctly fitted for the purpose.
- he/she is trained to use the machine correctly.
- do not force the tool.

(2)

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

- 1.1.2
- Hard hat/safety helmet ✓
 - Safety goggles/goggles ✓
 - Overall
 - Safety gloves/gloves

ANY TWO OF THE ABOVE

(2)

- 1.1.3 The machine makes a loud noise ✓ that will damage your hearing. ✓
It is the rule or regulation on a building site to protect the hearing of workers.

ANY OF THE ABOVE

(2)

- 1.1.4
- dust mask
 - face shield
 - ear protection/ear plugs/ear muffs
 - safety shoes ✓

ANY ONE OF THE ABOVE

(1)

- 1.2 1.2.1
- Water ✓
 - Patent sealer
 - Wet sand
 - Hessian
 - Canvas or protective covering
 - Plastic sheeting
 - Straw
 - Waterproof paper

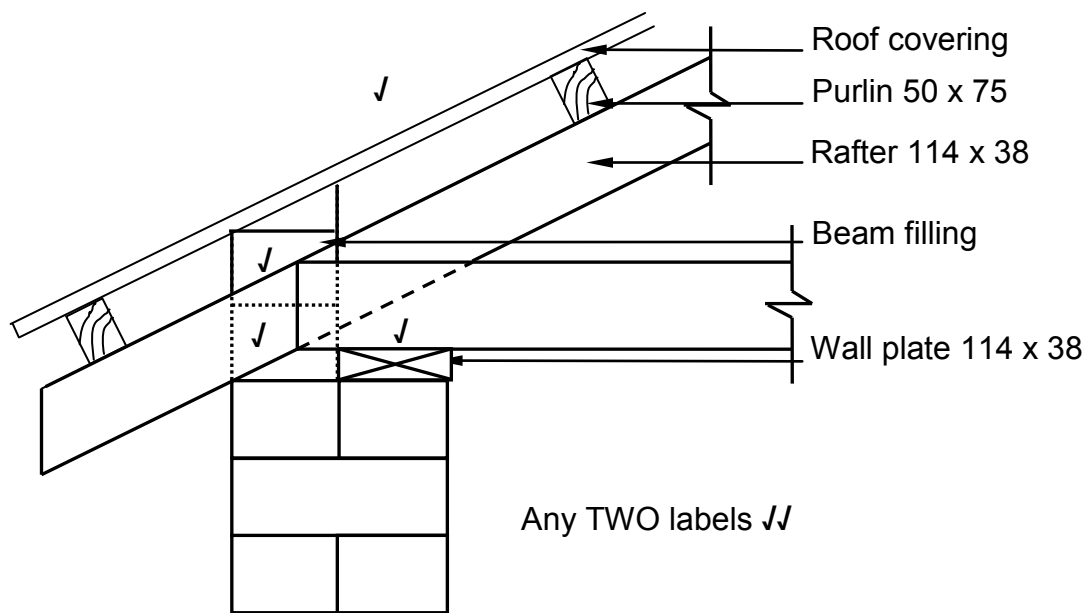
ANY ONE OF THE ABOVE

(1)

- 1.2.2 7 to 28 days ✓

(1)

1.3



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Roof covering correctly drawn	1	
Beam filling correctly drawn	2	
Wall plate correctly drawn	1	
Any TWO labels	2	
TOTAL	6	

(6)

Single line for roof covering is acceptable.

Wall plate in good proportion acceptable.

1.4

- More battens are used ✓
 - More roof trusses are used to carry weight of tiles ✓
 - Clay/concrete tile more expensive than corrugated iron sheeting
 - More labour intensive
 - Needs roof underlay
- ANY TWO OF THE ABOVE**

(2)

1.5

- Tiles /cladding/
 - Paint
- ANY ONE OF THE ABOVE**

(1)

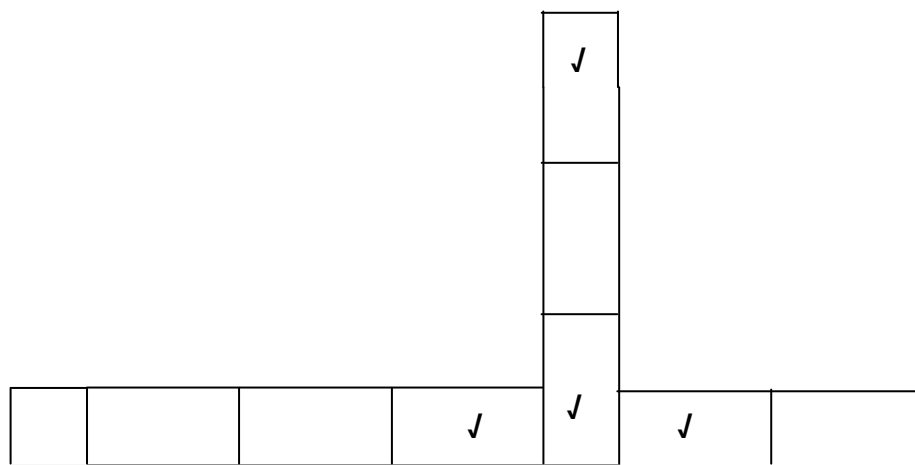
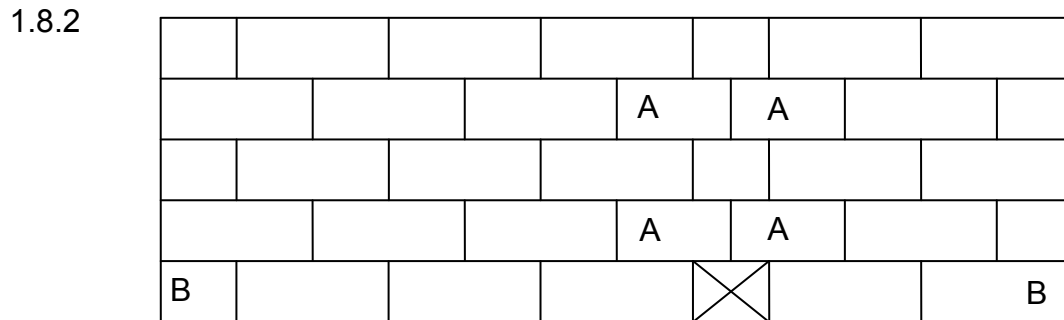
1.6

- Tiles last longer/easy to clean/ water resistant ✓
 - Paint does not last as long as tiles, easy to clean.
 - Tiles/paint gives attractive/decorative appearance.
 - Protect plaster.
- ANY ONE OF THE ABOVE**

(1)

- 1.7 1.7.1 Channel-iron/U beam ✓ (1)
- 1.7.2 Exposed steel is prone to rust if not treated. ✓ (1)
- 1.7.3 • Paint the metal. ✓
 • Can be galvanised.
 • Powder coating/ epoxy coating.
 • Can be covered with oil. (1)
 ANY ONE OF THE ABOVE
- 1.7.4 • Channel iron is used for bracing or as joists. ✓
 • Frame of steel structures/struts/roof structures (1)
 OR ANY OTHER ACCEBTABLE ANSWER

- 1.8 1.8.1
- Three quarter bat/brick
 - 165 mm x 110 mm. ✓
- ANY ONE OF THE ABOVE** (1)



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Stretcher course	2	
Header course	1	
Correctness of T-junction	1	
TOTAL	4	

(4)

- 1.9
- Cement fibre ceiling boards ✓
 - Match board ceiling boards
 - Steel ceilings
 - Gypsum boards
 - Knotty pine ceilings
 - PVC/plastic/polystyrene ceilings
- ANY ONE OF THE ABOVE** (1)

- 1.10
- To allow excess water or damp to escape ✓
 - keeping the inner wall dry
 - Ventilation
- ANY ONE OF THE ABOVE** (1)

[30]

QUESTION 2: ADVANCED CONSTRUCTION AND EQUIPMENT

- 2.1 2.1.1 D ✓ (1)
- 2.1.2 L ✓ (1)
- 2.1.3 J ✓ (1)
- 2.1.4 H ✓ (1)
- 2.1.5 K ✓ (1)
- 2.1.6 A ✓ (1)
- 2.1.7 M ✓ (1)
- 2.1.8 I ✓ (1)
- 2.1.9 G ✓ (1)
- 2.1.10 B ✓ (1)
- 2.2 2.2.1 Chalk line ✓
USE
 - To draw a straight line on a surface, by snapping the line. ✓
 - Lay out walls on foundation.
 - Some types can be used as a plumb bobs.
 - Draw long lines on floors. (2)**ANY TWO OF THE ABOVE**
- 2.2.2 Try square ✓
USE
 - Marking lines perpendicular to surfaces of materials. ✓
 - Testing squareness, straightness.
 - Calibrated blade can be used for measuring.
 - As a straight edge to test whether small surfaces are flat and straight. (2)**ANY TWO OF THE ABOVE**
- 2.2.3 Mitre square ✓
USE
 - The mitre can be used to check/end marks 45° angles. ✓
 - Test squareness of corners.
 - Test mitre angles/and mark them.
 - Marking lines perpendicular to surfaces are flat and straight.
 - Testing squareness, straightness of surfaces.
 - Calibrated blade can be used for measuring.
 - As a straight edge to test whether surfaces of materials. (2)**ANY TWO OF THE ABOVE**

- 2.2.4 Sliding bevel ✓
USE
- The blade is adjustable for setting out and testing of any angles. ✓
 - Draw inclined or oblique lines as well as for the testing of angles.
 - Draw angles other than 90°
 - Copying angles from one surface to another. (2)
- ANY TWO OF THE ABOVE**
- 2.3 2.3.1
- The tensile strength of the concrete is compromised. ✓
 - Weakens the structure/ structure will break easily/ collapse. ✓
 - Will not be able to resist heavy loads. (2)
- ANY TWO OF THE ABOVE**
- 2.3.2 To strengthen the concrete where it is the weakest against tensile strength. ✓ (1)
- 2.3.3 Stirrups strengthen concrete against shear forces. ✓
Shear forces are the greatest next to the support,
Stirrups resist shear stress. (1)
- 2.4 2.4.1 Slump test ✓ (1)
- 2.4.2 This test is used to test the workability of concrete/ consistency of the concrete ✓ (1)
- 2.4.3 For every new/fresh batch of concrete that is mixed ✓ (1)
- 2.5
- Cavity walls are to prevent the penetration of water into the wall as they have better water proofing qualities. ✓
 - Cavity walls help to protect the inner wall of a house against moisture. ✓
 - Cavity walls provide insulation against extreme temperatures and noise.
 - Avoid expensive external rendering.
 - Enable the use of cheaper or alternative materials for the inner construction. (2)
- ANY TWO OF THE ABOVE**
- 2.6 2.6.1 A – Compression force/pushing forces ✓
B – Tensile force/bending forces ✓
C – Lateral force ✓ (3)
- 2.7 2.7.1 Round/circular/cylindrical column formwork ✓ (1)
- 2.7.2 Hardboard/plywood/pvc/galvanised/metal sheets ✓ (1)
- 2.7.3 Bolt and nut/threaded rods with nuts/clamp ✓ (1)

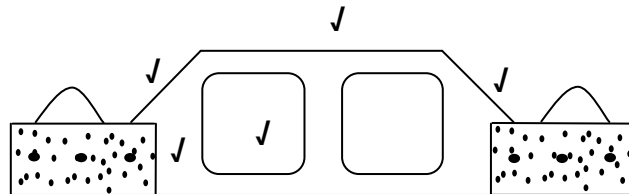
2.7.4 Apply form oil/emulsion oil/releasing agents to formwork ✓ (1)

2.8

- A rib and block floor is very quick to install ✓
- quicker than in situ concrete floor (1)

ANY ONE OF THE ABOVE

2.9



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Ribs	2	
Block	1	
Reinforcing on top of or in the rib	<input type="checkbox"/>	
Hollow in block	1	
TOTAL	5	

(5)
[40]

QUESTION 3: CIVIL SERVICES

3.1



✓



✓

P-trap

S-trap

Labelling not required

(2)

3.2

40/50 mm ✓

(1)

3.3

3.3.1

A Ventilation pipe/breather pipe/gas escape pipe ✓

(1)

B Inlet pipe/Inflow pipe/Influent ✓

(1)

C Settling chamber/Chamber 1 ✓

(1)

D Discharge chamber/Chamber 2 ✓

(1)

E Manhole cover/Manhole lid/Cover ✓

(1)

F Outlet pipe/Effluent ✓

(1)

3.3.2

The raw sewerage will be broken down by anaerobic/bacterial action. ✓

(1)

3.3.3

- G allows the liquids to flow from chamber C to chamber D. ✓
- Will also balance the liquid levels.

(1)

ANY ONE OF THE ABOVE

3.3.4

The liquids in D will flow out through F to a French drain. ✓

(1)

3.3.5

The level of the liquids will be the same. ✓

(1)

3.3.6

- The water coming from the bath or sink contains soap (chemicals) that is poisonous to the bacteria and will hinder the anaerobic/bacterial process. ✓
- It will fill up quicker if the french drain gets saturated.

(1)

ANY ONE OF THE ABOVE

3.4

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

(1)

3.5

If you direct storm water into a sewerage system:

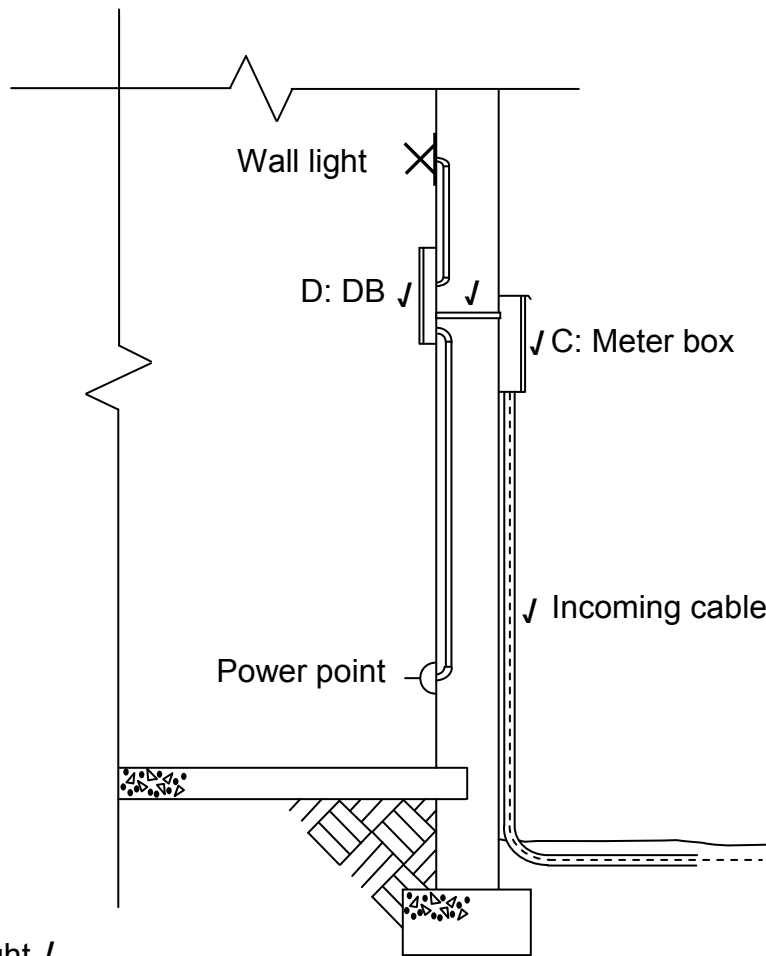
- the water will flood the reticulation plant. ✓
- raw sewerage will overflow into rivers and pollute water sources. ✓
- it is illegal to direct rain or storm water into a sewerage system.

(2)

ANY TWO OF THE ABOVE

- 3.6 Pressure control valves (pressure-reducing valves) are used to ensure that:
- a constant pressure is maintained in the water installation ✓
 - prevent pipes from bursting
 - the pressure rating is in accordance with the pressure rating of the geyser.
- ANY ONE OF THE ABOVE** (1)
- 3.7
- An elbow will be used to change the direction of a pipe ✓
 - A T-coupler will be used to split the water supply into two different flow directions/ to combine two different flow directions into one (shower). ✓
- ANY TWO OF THE ABOVE** (2)
- 3.8 Thermostat ✓ (1)
- 3.9 Gravity geyser/Low pressure geyser ✓ (1)
- 3.10 Black ✓
Absorbs the most heat ✓ (2)

3.11



A: Wall light ✓

B: Power point/Socket outlet/Switch Socket outlet/Plug ✓

(2)

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Incoming cable to meter box	1	
Incoming cable to DB	1	
Meter box	1	
Distribution board	1	
TOTAL	4	

(4)

ANY OTHER WAY OF INDICATING CONDUIT PIPES

[30]

QUESTION 4: QUANTITIES, MATERIALS AND JOINING

4.1	4.1.1	Door stile ✓	(1)
	4.1.2	50 mm/50 ✓	(1)
	4.1.3	600 ✓	(1)
	4.1.4	3 ✓	(1)
	4.1.5	693 mm/693 ✓	(1)
	4.1.6	1 907 mm/1 907 OR 1 904 mm/1 904 ✓	(1)
	4.1.7	20 mm/20 ✓	(1)
4.2	4.2.1	B ✓	(1)
	4.2.2	A ✓	(1)
	4.2.3	D ✓	(1)
	4.2.4	D ✓	(1)
	4.2.5	A ✓	(1)
	4.2.6	D ✓	(1)
	4.2.7	C ✓	(1)

4.3.1

A	B	C	D
			<u>Area to be plastered:</u>
			Length of ONE short wall: = 4 000 mm - 2(220 mm) = 3 560 mm ✓
			Length of ONE long wall = 8 000 mm - 2(220 mm) = 7 560 mm ✓
			Total length of one short and one long wall = 3 560 mm + 7 560 mm = 11 120 mm ✓
2/	11,12		Area of internal walls before deductions:
	<u>2,7 ✓</u>	60,05 m ² ✓	
1/	1,2		Area of window opening:
	<u>0,9 ✓</u>	1,08 m ² ✓	
1/	2,1		Area of door opening:
	<u>0,9 ✓</u>	1,89 m ² ✓	
			Total wall area to be plastered
			✓ ✓ ✓ 60,05 m ² – 1,08 m ² - 1,89 m ²
			= 57,08 m ² ✓ need to be plastered

(3)

(2)

(2)

(2)

(4)

4.3.2

			<u>Volume of plaster:</u>
1/	✓ 57,08 m ²		
	✓ <u>0,012 m</u>	0,68 m ³ ✓	

(3)

If candidates did not use the dimension paper/sheet 2 marks should be deducted

[30]

QUESTION 5: APPLIED MECHANICS

5.1

- | | | |
|-------|--|-----|
| 5.1.1 | 675 mm ² ✓ | (1) |
| 5.1.2 | 4 800 mm ² OR 4 400 mm ² ✓ | (1) |
| 5.1.3 | 400 mm ² ✓ | (1) |
| 5.1.4 | 5 075 mm ² ✓ | (1) |
| 5.1.5 | 30 mm ✓ | (1) |
| 5.1.6 | 95 mm ✓ ✓ | (2) |
| 5.1.7 | 40 mm ✓ | (1) |

When the wrong unit were used the learner will be penalised with ONE mark.

5.2

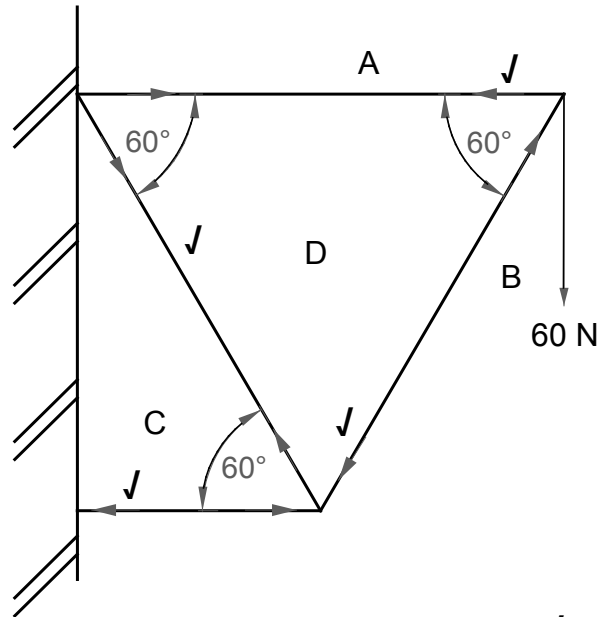


DIAGRAM A: SPACE DIAGRAM ✓

(4)

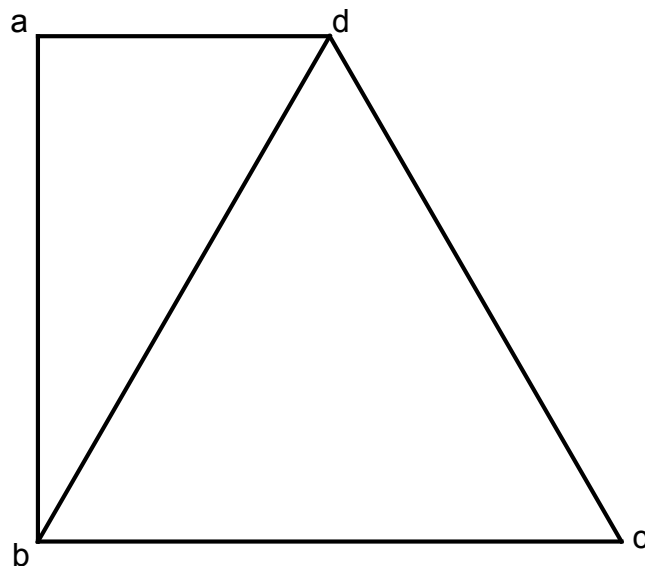


DIAGRAM B: VECTOR DIAGRAM/FORCE DIAGRAM ✓

(2)

NOT ACCORDING TO SCALE

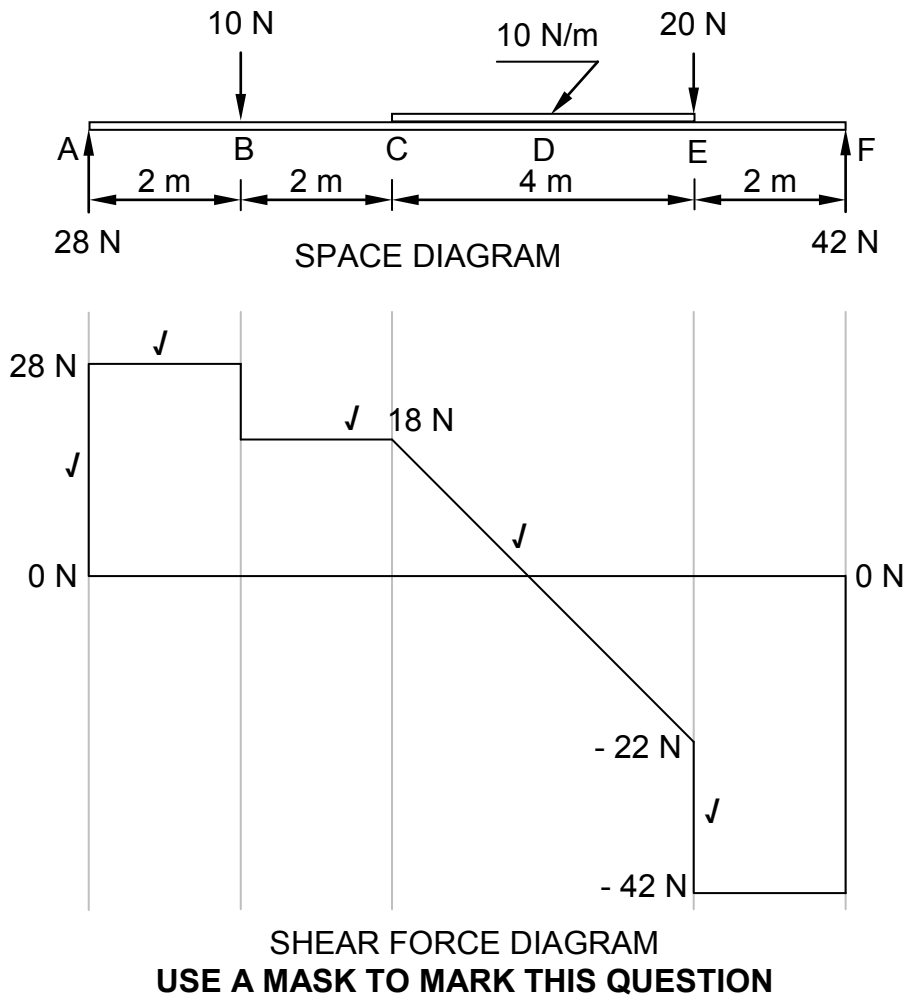
USE A MASK TO MARK THIS QUESTION

MEMBER	NATURE	MAGNITUDE
BC	Strut ✓ OR ---	65 N ✓ (Size to be determined as per vector diagram) OR 0 OR no force
CD	Tie ✓	-----
DA	Tie ✓	32 N ✓ (Size to be determined as per vector diagram)
BD	Strut ✓	-----

(6)

Tolerance of 1 N to either side

5.3.1



ASSESSMENT CRITERIA	MARKS	CANDIDATE'S MARK
Drawing correct	5	
Indicate all values of shear forces on drawing	1	
Correct application of scale	1	
TOTAL	7	

5.3.2 Calculated from the left:

$$\begin{aligned}
 BM_d &= (28 \times 6) - (10 \times 4) - (20 \times 1) \checkmark \\
 &= 168 - 40 - 20 \checkmark \\
 &= 108 \text{ Nm } \checkmark
 \end{aligned}$$

OR

Calculated from the right:

$$\begin{aligned}
 BM_d &= (42 \times 4) - (20 \times 2) - (20 \times 1) \\
 &= 168 - 40 - 20 \\
 &= 108 \text{ Nm}
 \end{aligned}$$

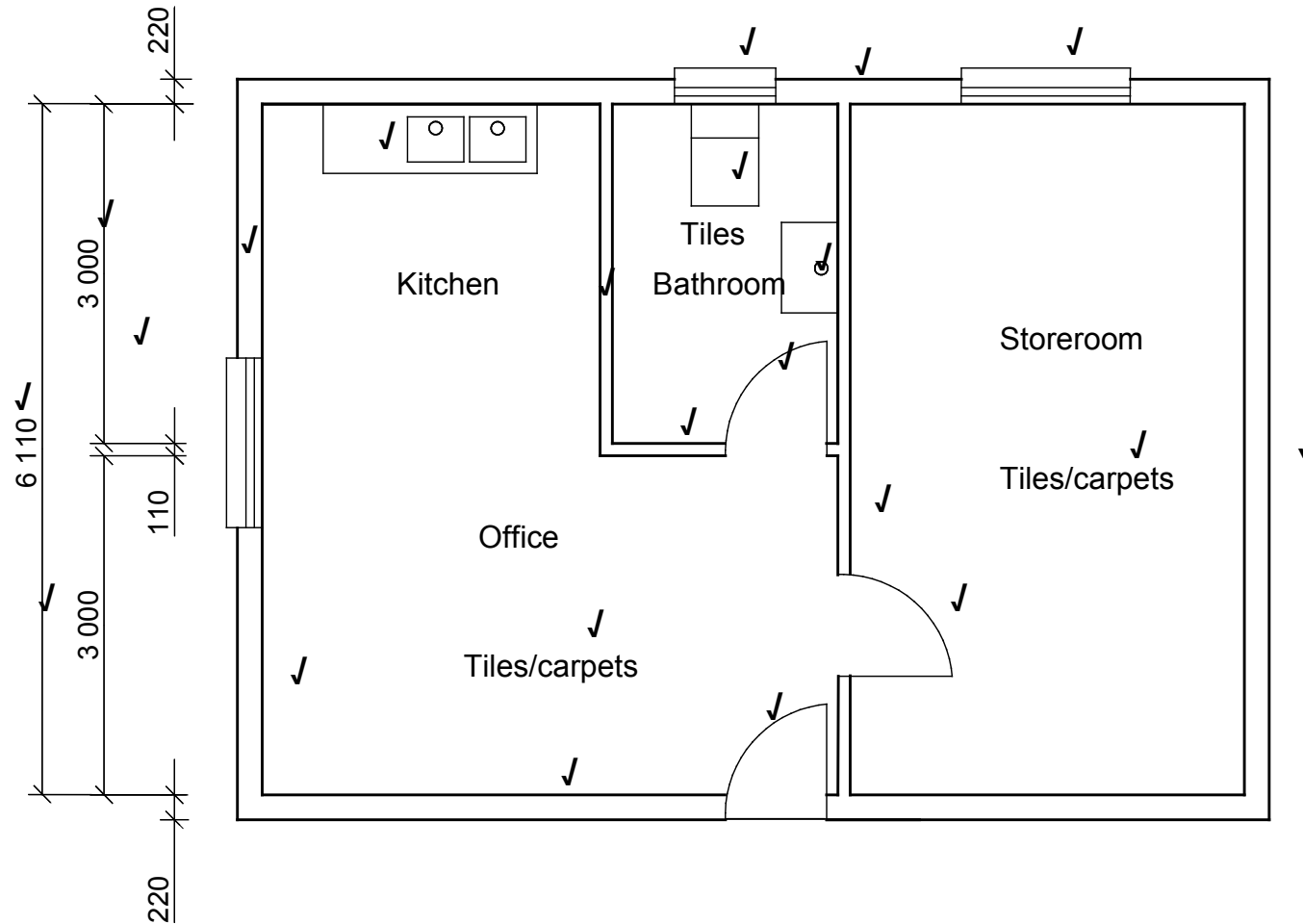
(3)
[30]

ANSWER SHEET 6.1

NO.	QUESTIONS	ANSWERS	MARKS
1	Name the scale used for the site plan.	1:200 ✓	1
2	State the colour that you will use to indicate the proposed dwelling on the site plan.	Red ✓	1
3	Identify number 1?	Rodding eye ✓	1
4	Identify the line at number 2?	Building line ✓	1
5	Identify number 3	Sewer pipe/drainpipe ✓	1
6	Determine the distance from the boundary line to the proposed dwelling on the right hand side of the building?	5 000 mm/5 m ✓	1
7	Identify number 4	Manhole ✓	1
8	Identify number 5	Municipal connection ✓	1
9	Draw the roofline of a hipped roof for the building indicated in the next column		4
10	Calculate the perimeter of the proposed dwelling.	64 000 mm/64 m ✓ ✓	2
11	What elevation will be closest to Long Street?	West elevation ✓	1
		TOTAL	15

QUESTION 6: GRAPHICS AND COMMUNICATION

ANSWER SHEET 6.2



ASSESSMENT CRITERIA	MARKS	LM
External Walls	4	
Internal Walls	3	
Windows	3	
Doors	3	
Wash basin	1	
Water closet	1	
Double bowl sink	1	
Dimensions	4	
Floor coverings	2	
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
ONE MARK SHOULD BE DEDUCTED IF JUNCTIONS AT WALLS ARE CLOSED
ONE MARK SHOULD BE DEDUCTED IF INTERNAL DOORS HAVE A WALL BETWEEN THE OPENING

Application of scale ✓✓✓

[40]
[200]