basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY: CONSTRUCTION

NOVEMBER 2025

MARKS: 200

TIME: 3 hours

This question paper consists of 16 pages and 7 answer sheets.

REQUIREMENTS:

1. Drawing instruments
2. A non-programmable calculator
3. ANSWER BOOK

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX questions.
2. Answer ALL the questions.
3. Read ALL the questions carefully.
4. Answer each question as a whole. Do NOT separate subsections of questions.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Start the answer to EACH question on a NEW page.
7. Do NOT write in the margins of the ANSWER BOOK.
8. You may use sketches to illustrate your answers.
9. Write ALL calculations and answers in the ANSWER BOOK or on the attached ANSWER SHEETS.
10. Use the mark allocation as a guide to the length of your answers.
11. Make drawings and sketches in pencil, fully dimensioned and neatly finished off with descriptive titles and notes to conform to the *SANS/SABS Code of Practice for Building Drawings.*
12. For the purpose of this question paper, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
13. Use your own discretion where dimensions and/or details have been omitted.
14. Answer QUESTIONS 2, 3.6, 4.10, 5.4, 5.5, 6.6 and 6.7 on the attached ANSWER SHEETS using drawing instruments, where necessary.
15. Write your CENTRE NUMBER and EXAMINATION NUMBER on every ANSWER SHEET and hand them in with your ANSWER BOOK, whether you have used them or not.
16. Drawings in the question paper are NOT to scale due to electronic transfer.
17. Google Images was used as the source of all photographs and pictures.
18. Write neatly and legibly.

QUESTION 1: OHSA, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)

Start this question on a NEW page.

1.1 Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 Plaster.

1.1.1 Every plank of a wooden scaffold platform must be at least (28 mm/38 mm) thick. (1)

1.1.2 Toe boards should be at least (150 mm/200 mm) high from the level of the scaffold platform. (1)

1.1.3 Steel scaffold standards with heavy platform loadings must not exceed (320 kg per m^2/160 kg per m^2). (1)

1.1.4 The framework of scaffolding must be constructed to have a safety factor of at least (two/three). (1)

1.1.5 Trestle scaffolds must not consist of more than (two/four) tiers. (1)

1.1.6 When using a builder's hoist (overhead/hand) protection must be provided to protect workers from falling objects. (1)

1.1.7 Ladders must not be extended above (two thirds/three quarters) of the extension length. (1)

1.1.8 A construction site must be cordoned off to prevent (unauthorised persons/building inspectors) from entering the site. (1)

1.1.9 Stairways that will not be a permanent part of the building must have landings of at least (760 x 560 mm/450 x 320 mm) for every 3,7 m vertical rise. (1)

1.1.10 The seller shall supply the user of any hazardous chemical substance with sufficient information to enable the user to take necessary measures regarding (safe stocktaking/health and safety). (1)

1.2 Which pictorial view below represents a bolt that will resist rotation?

A **B** **C** **D** (1)

1.3 Bolts are purchased according to different specifications. Name any TWO of these specifications. (2)

1.4 Powder coating is a coating that is applied to metals.

1.4.1 Explain the process of powder coating by referring to the material that is used and the method of application. (2)

1.4.2 Name ONE advantage of powder coating in terms of applying it to a metal. (1)

1.5 What should NOT be used to clean a multidetector? (1)

1.6 Name TWO materials that can be detected in a brick wall using the multidetector. (2)

1.7 What accessory of the dumpy level will be used to position a telescope on a centre point when horizontal measurements are taken? (1)
[20]

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)

Start this question on a NEW page.

FIGURE A and FIGURE B on the next page show drawings that appear on a building plan. Analyse the drawings and complete the table on ANSWER SHEET 2.

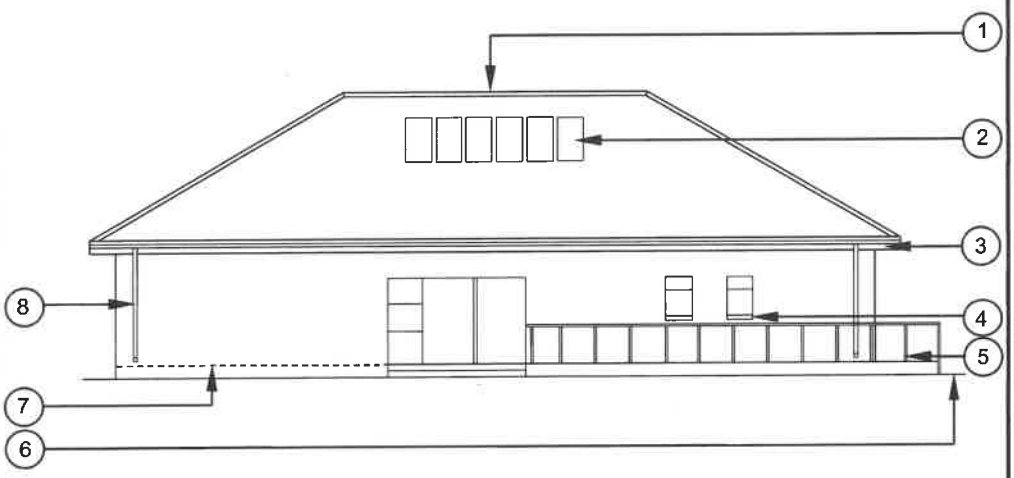


FIGURE A

NOTES:
Contractors must verify all dimensions and levels on site before commencing work.

Architects to be notified of any discrepancies immediately.

Guard rails on patio to be made of stainless steel.

Aluminium sliding door (2 400 x 2 000 mm)

Aluminium side panel with windows (600 x 2 000 mm)

Roof: Hipped roof

Lintels must be installed above every window.

Architect's signature .....

Client's signature .....

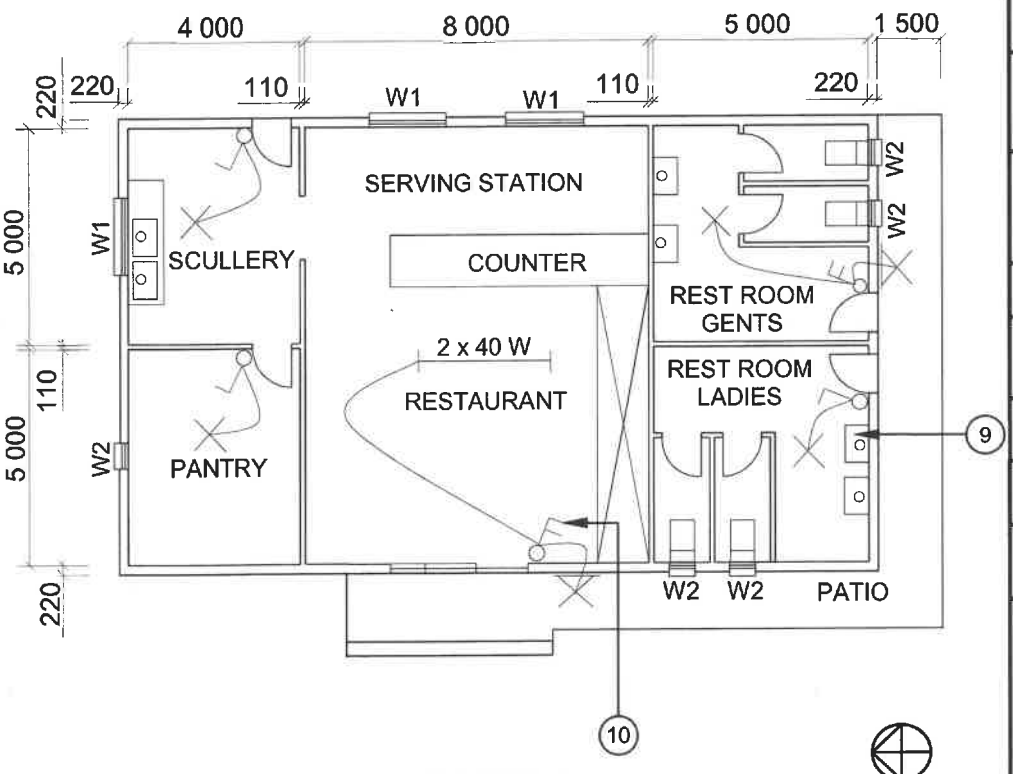
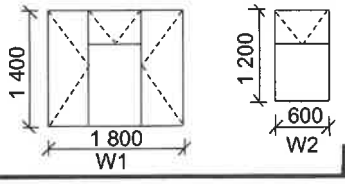


FIGURE B

REVISION 1	DATE: 24/05/2025	DRAWING OF ELECTRICAL FITTINGS
PRINTED BY: BUZZ PRINTERS		DATE OF PRINT: 26/05/2025
DRAWING TITLE: ELEVATION AND FLOOR PLAN		
PROJECT: PROPOSED BUILDING OF MR JD JONES ON PLOT 54, PROTEA STREET, CALEDON		
PROJECT NO.: GR 866-464		DRAWING NO.: 334P2
DATE: 20/04/2025	DRAWN: N CAR	CHECKED: C BENN
ELEVATION		SCALE 1 : 100
FLOOR PLAN		SCALE 1 : 100
REFERENCE CODE QP 5 – 2025		

WINDOW SCHEDULE



[40]

QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

Start this question on a NEW page.

3.1 State the maximum spacing between roof trusses for EACH of the following types of roof covering:

3.1.1 Fibre-cement tiles (1)

3.1.2 Corrugated iron sheets (1)

3.2 By means of two-dimensional drawings, differentiate between the two end shapes and sizes of the purlins used for corrugated iron roof sheeting. Indicate the dimensions on the drawings. (6)

3.3 Complete the following sentences by filling in the missing word(s). Write only the word(s) next to the question numbers (3.3.1 to 3.3.4) in the ANSWER BOOK.

3.3.1 When designing staircases, the minimum allowed pitch must be 25° and the maximum allowed pitch must be ...°. (1)

3.3.2 The formwork on the underside of a concrete staircase may be removed after ... days. (1)

3.3.3 The minimum recommended striking time of the formwork for the sides of stairs should be ... days. (1)

3.3.4 The recommended dimension for a riser in a public building is ... mm. (1)

3.4 Name the fastener that you will use to anchor a wall plate to a concrete wall when using galvanised straps. (1)

3.5 FIGURE 3.5 below shows a partial roof construction.

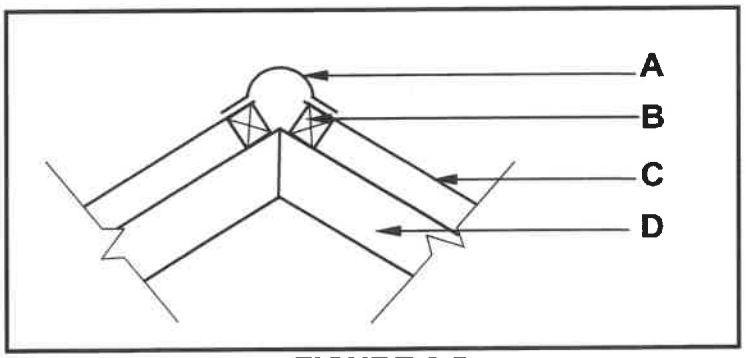


FIGURE 3.5

3.5.1 Identify parts **A** to **D**. (4)

3.5.2 Predict the consequence if part **A** is NOT installed. (1)

3.6 Use ANSWER SHEET 3.6 and draw to scale 1 : 20 just more than a half of a close-coupled roof truss.

The wall is indicated on the ANSWER SHEET.

Use the following specifications:

- The pitch of the roof is 30°.
- The overhang is 250 mm.
- The span of the roof is 4 000 mm.

(12)
[30]

QUESTION 4: EXCAVATIONS, FORMWORK, TOOLS, EQUIPMENT AND MATERIALS (SPECIFIC)

Start this question on a NEW page.

4.1 Give ONE word/term for each of the following descriptions by choosing a word(s)/term(s) from the list below. Write only the word/term next to the question numbers (4.1.1. to 4.1.5) in the ANSWER BOOK, e.g. 4.1.6 Holes.

steel; galvanised sheet metal; lead; medium carbon steel; copper; ductile cast iron; tin; brass; grey cast iron

4.1.1 A heavy and very soft metal (1)

4.1.2 The elasticity of this material makes it ideal for casting (1)

4.1.3 A material with a reduced welding ability (1)

4.1.4 A material with a yellowish colour (1)

4.1.5 A metal dipped in molten zinc (1)

4.2 Choose a description from COLUMN B that matches the item in COLUMN A. Write only the letter (A–I) next to the question numbers (4.2.1 to 4.2.6) in the ANSWER BOOK, e.g. 4.2.7 K.

COLUMN A		COLUMN B	
4.2.1	Fibreglass	A	stronger than solid timber and can be easily cut to shape on site
4.2.2	Steel shuttering	B	horizontal member carrying the load of the casted concrete
4.2.3	Plywood	C	is very light and easy to move where concrete has set
4.2.4	Laminated board	D	used to secure the brace to the prop
4.2.5	Wedge	E	used to secure cleats into place
4.2.6	Bearer/Head tree	F	will last longer than any other material used for the same purpose
		G	has less carrying capacity and warps when filled with concrete
		H	vertical member supporting the entire formwork
		I	excellent release properties and waterproofing due to the glue used during manufacturing

(6 x 1) (6)

4.3 You are contracted to excavate the foundation of a new storeroom next to the principal's office. What specifications, that are prescribed in the working drawings, will you have to consider before excavating any soil? (2)

4.4 Small foundations for houses are normally excavated by hand. State the other method that can be used for excavations for multistorey buildings. (1)

4.5 Name the type of shuttering in which poling boards are spaced further apart. (1)

4.6 Name TWO methods that can be used to level a site that is on a mountainous slope. (2)

4.7 FIGURE 4.7 below shows a picture of a structure filled with soil.

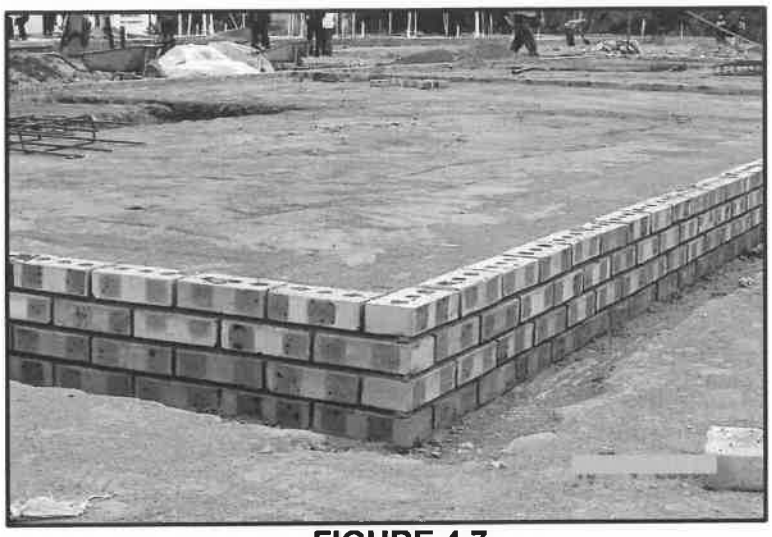


FIGURE 4.7

4.7.1 Name ONE machine that can be used to compact the soil. (1)

4.7.2 After compacting the soil in the picture above, you should ensure that the machine is taken care of. Name TWO ways how you will do this before storing the machine. (2)

4.7.3 Name the personal protective equipment you would use to protect your ears when using the machine named in QUESTION 4.7.1 and explain the possible consequences of ignoring such a safety measure. (2)

4.8 FIGURE 4.8 shows the apparatus used on a construction site to conduct a slump test.

FIGURE 4.8

4.8.1 Give TWO reasons why you would conduct the slump test on fresh concrete before pouring it. (2)

4.8.2 By means of labelled sketches, show ANY TWO possible outcomes of the test. (6)

4.9 Sketch a line diagram in the ANSWER BOOK that shows the difference between a *wedge* and *folding wedges*.

Print the correct title below EACH drawing. (4)

4.10 ANSWER SHEET 4.10 shows an incomplete drawing of the formwork for a concrete beam.

Draw the supporting members of the formwork from the head tree down to the sole plate. (6)
[40]

QUESTION 5: PLASTER AND SCREED, BRICKWORK AND GRAPHICS AS MEANS OF COMMUNICATION (SPECIFIC)

Start this question on a NEW page.

5.1 FIGURE 5.1 below shows a person finishing off a wall on the inside of a new building.

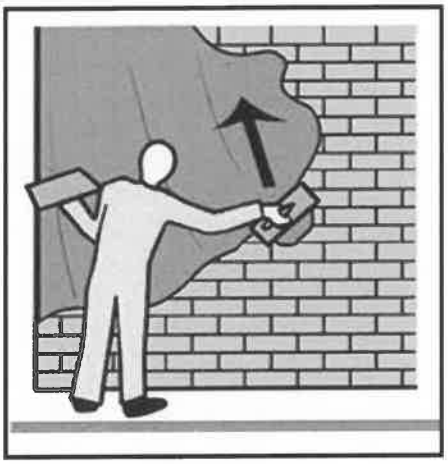


FIGURE 5.1

5.1.1 Name the process that the worker is busy with. (1)

5.1.2 Identify the TWO tools that the worker is using. (2)

5.1.3 Name ONE admixture that you will use to reduce cracking during the process above. (1)

5.2 The floor in the classroom is cracked. After repairing the floor, a screed must be applied to create a smooth finish.

5.2.1 Name TWO types of screeds that can be used. (2)

5.2.2 Explain how the absorptiveness (ability to absorb moisture) of the concrete to receive screed can be tested. (3)

5.3 In the ANSWER BOOK, sketch the difference between a *brick used for a gauged arch* and a *brick used for a rough arch*, as seen from the front view. (5)

5.4 ANSWER SHEET 5.4 shows a horizontal sectional view of part of a one-brick wall built with face brick that is plastered on the outside.

Complete the horizontal sectional view to illustrate how a steel door frame is attached to the wall. Show the hatching on the wall and the symbol for plaster. (7)

5.5 ANSWER SHEET 5.5 shows the incomplete drawing of a part of a vertical sectional view of a closed eave. Complete the drawing by adding the omitted members of the closed eave.

Use the following specifications:

- Corrugated iron roof covering
- Fibre-cement ceiling board is used to cover the eave.

(9)
[30]

QUESTION 6: REINFORCEMENT IN CONCRETE, FOUNDATIONS, CONCRETE FLOORS AND QUANTITIES (SPECIFIC)

Start this question on a NEW page.

6.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (6.1.1 to 6.1.5) in the ANSWER BOOK, e.g. 6.1.6 C.

6.1.1 The main purpose of reinforcement in concrete structures is to …

A increase the weight of the structure.
B provide resistance against tensile forces.
C reduce the curing time.
D Only A and C (1)

6.1.2 A force that acts on the top section of a loaded concrete beam:

A Tensile force
B Shear force
C Compressive force
D All the above-mentioned (1)

6.1.3 In reinforced concrete beams, stirrups are mainly used to resist …

A bending moments.
B shear forces.
C tensile forces.
D expansion forces. (1)

6.1.4 Which type of steel is commonly used for reinforcement in concrete structures?

A Mild steel
B Stainless steel
C High-tensile steel
D Only A and C (1)

6.1.5 Shear bars in a beam is also referred to as … bars.

A secondary
B bent
C cranked
D All the above-mentioned (1)

6.2 Name TWO types of pile foundations. (2)

6.3 You are required to install a beam on the second storey of a new building that is supported only on one side and will be used as the new balcony.

Name the beam you will install to support the weight. (1)

6.4 By means of TWO horizontal sectional sketches in the ANSWER BOOK, differentiate between a *square column with FOUR main bars* and a *round column with SIX main bars*. Indicate the stirrups and the minimum concrete cover of the columns that have already been casted. (6)

6.5 FIGURE 6.5 below shows a drawing of a rib and block floor.

Identify parts **A** to **E**.

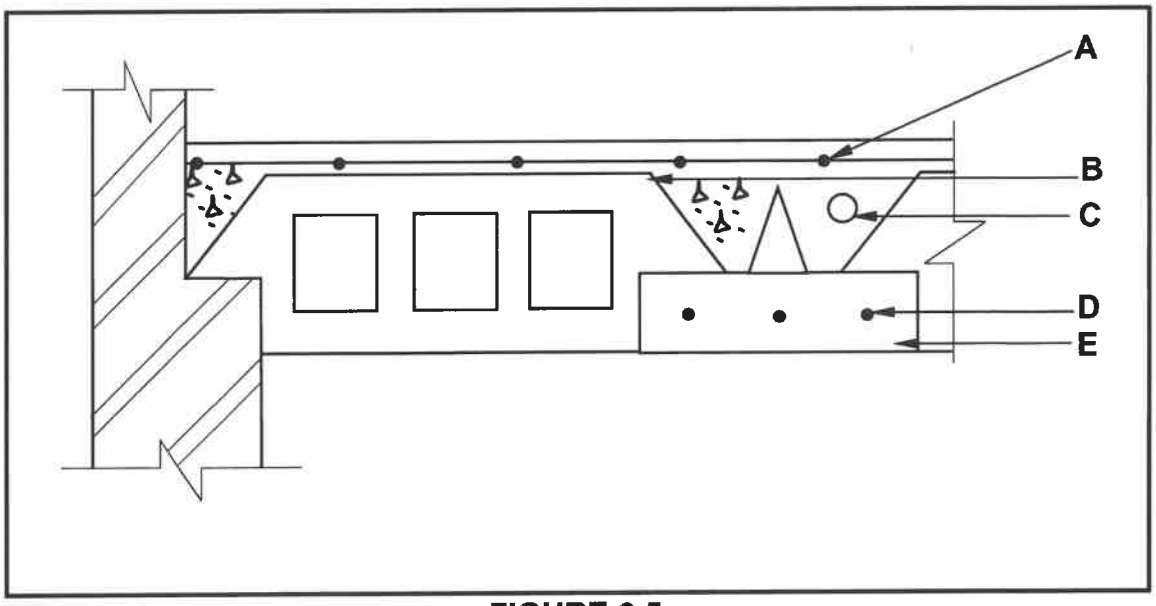


FIGURE 6.5 (5)

6.6 ANSWER SHEET 6.6 shows an incomplete reinforced concrete beam resting on a wall.

Complete the reinforcing for the concrete beam by drawing the omitted members. (8)

6.7 FIGURE 6.7 below shows the floor plan of a small tool room with a gable roof.

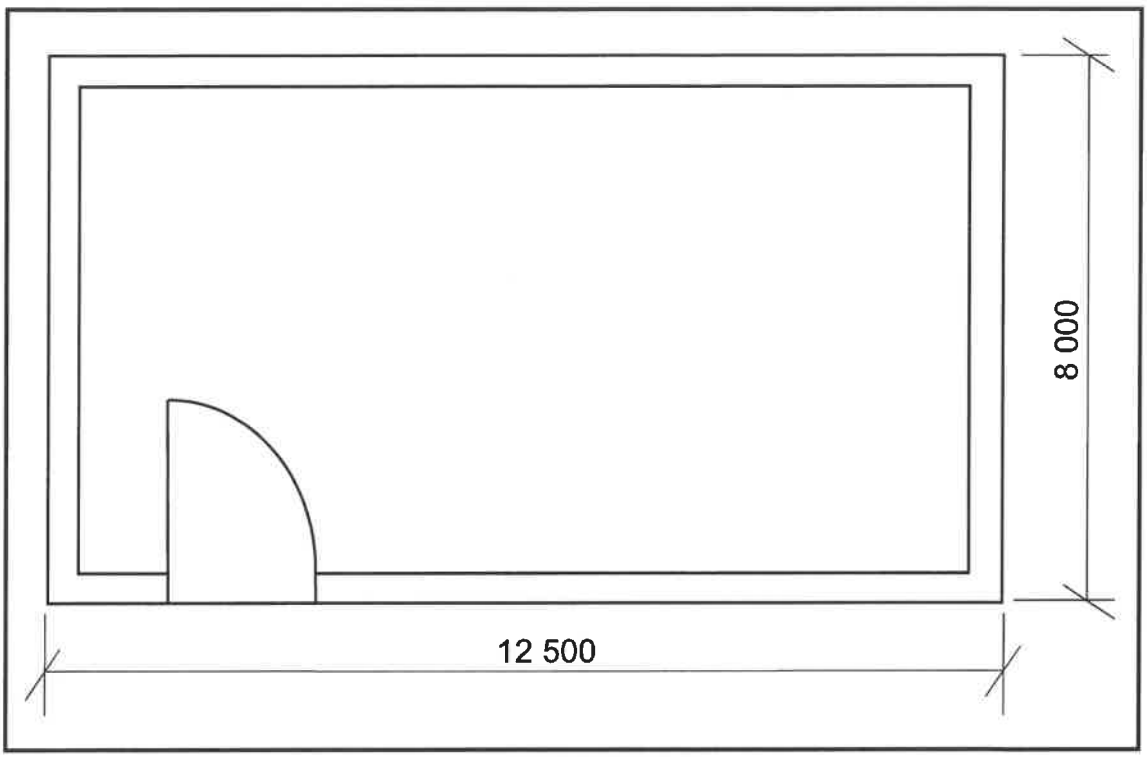


FIGURE 6.7

Use the following specifications:

- The superstructure is a one-brick wall.
- The centre-to-centre spacing between the roof trusses is 1 200 mm.
- The length of the rafter is 4 920 mm.
- The centre-to-centre spacing between the purlins is 1 130 mm.

Use the dimension paper on ANSWER SHEET 6.7 and calculate the following. Round off your answers to TWO decimal places.

6.7.1	The length of the wall plate	(4)
6.7.2	The number of roof trusses	(4)
6.7.3	The number of purlins	(4)
NOTE:	A mark will be awarded for the correct use of the dimension paper.	(1)
		[40]

TOTAL: 200

CENTRE NUMBER:							

EXAMINATION NUMBER:													

ANSWER SHEET 2

NO.	QUESTIONS	ANSWERS	MARKS
1.	What elevation is indicated by FIGURE **A**?		1
2.	Deduce, from the notes column, what type of roof is indicated by number **1**.		1
3.	What energy-generating components are installed on the roof, as indicated by number **2**?		1
4.	Identify number **3**.		1
5.	Identify number **4**.		1
6.	What material is recommended to be used to manufacture number **5**?		1
7.	Identify number **6**.		1
8.	Write down the abbreviation for number **7**.		1
9.	Identify the end shape used to manufacture number **8**.		1
10.	How many built-in cupboards are there in the building?		1
11.	What electrical installation has been omitted in the building?		1
12.	What type of material can be used to manufacture the fascia board in FIGURE **A**?		1
13.	How should the opening direction of the sliding door be indicated on the floor plan?		1
14.	Name ONE material that can be used to manufacture number **9**.		1
15.	Deduce, from the notes column, what must be installed above every window.		1

CENTRE NUMBER: | | | | | | | |

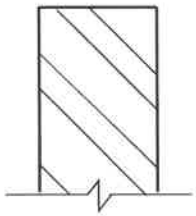
EXAMINATION NUMBER: | | | | | | | | | | | | | |

16.	How many external doors are visible on the southern side of the building?		1
17.	How many water closets are installed in the building?		1
18.	Identify number **10**.		1
19.	Deduce the thickness of the internal walls from FIGURE **B**.		1
20.	State the reference code of the proposed building.		1
21.	How many 1 200 x 600 mm windows are there in the building?		1
22.	Deduce, from the notes column, the dimensions of the aluminium side panel with windows.		2
23.	Draw the symbol for a grease trap.		3
24.	Draw the symbol for undisturbed earth.		3
25.	What sanitary fitting is installed in the scullery?		1
26.	Calculate the area of the scullery to be covered with floor tiles. The sink unit must be installed on top of the tiles. Give your answer in m^2.		3
27.	Calculate the total length of the wall on the northern side of the building. Show ALL calculations. The length must be indicated in metres.		7
		TOTAL:	**40**

CENTRE NUMBER:							

EXAMINATION NUMBER:													

ANSWER SHEET 3.6

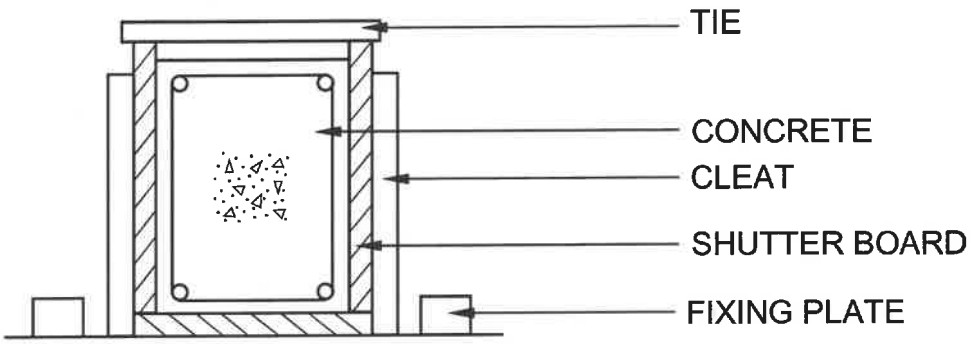


ASSESSMENT CRITERIA		
NO.	**MARK**	**CANDIDATE'S MARK**
1	1	
2	1	
3	4	
4	2	
5	1	
6	1	
7	2	
TOTAL:	**12**	

CENTRE NUMBER:							

EXAMINATION NUMBER:												

ANSWER SHEET 4.10

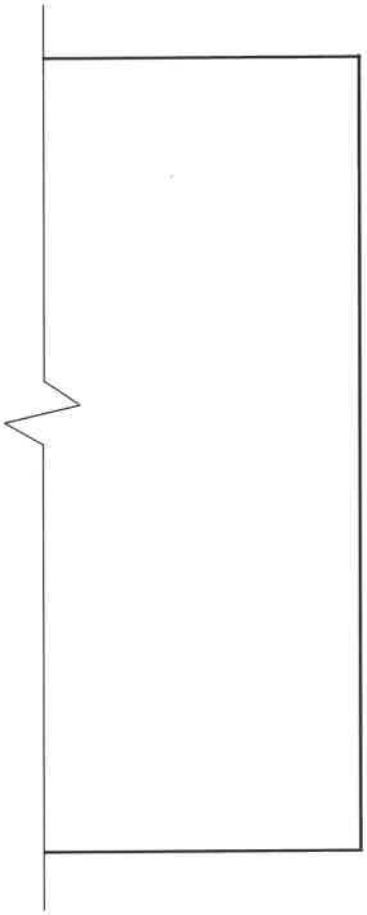


ASSESSMENT CRITERIA		
NO.	**MARK**	**CANDIDATE'S MARK**
1	1	
2	2	
3	1	
4	1	
5	1	
TOTAL:	**6**	

CENTRE NUMBER:							

EXAMINATION NUMBER:													

ANSWER SHEET 5.4

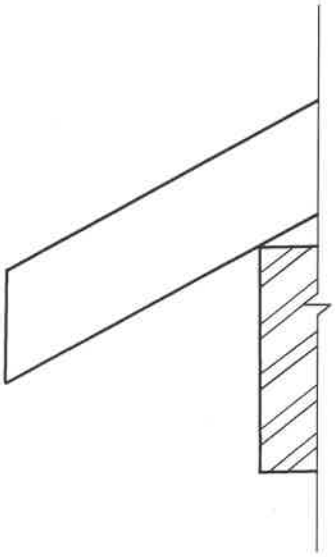


ASSESSMENT CRITERIA		
NO.	**MARK**	**CANDIDATE'S MARK**
1	2	
2	1	
3	3	
4	1	
TOTAL:	7	

CENTRE NUMBER:							

EXAMINATION NUMBER:													

ANSWER SHEET 5.5

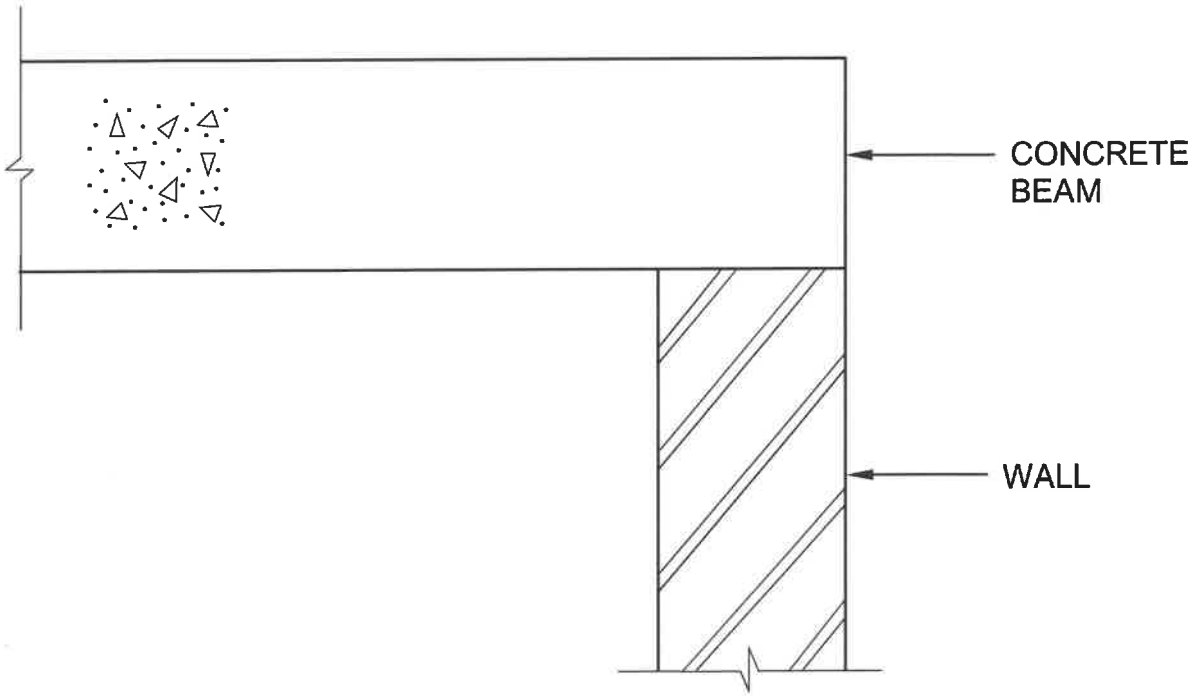


ASSESSMENT CRITERIA		
NO.	**MARK**	**CANDIDATE'S MARK**
1	2	
2	1	
3	1	
4	1	
5	1	
6	1	
7	1	
8	1	
TOTAL:	**9**	

CENTRE NUMBER:							

EXAMINATION NUMBER:													

ANSWER SHEET 6.6



ASSESSMENT CRITERIA		
NO.	**MARK**	**CANDIDATE'S MARK**
1	2	
2	2	
3	2	
4	1	
5	1	
TOTAL:	**8**	

CENTRE NUMBER:							

EXAMINATION NUMBER:													

ANSWER SHEET 6.7

DIMENSION PAPER

6.7.1

A	B	C	D

(4)

6.7.2

A	B	C	D

(4)

6.7.3

A	B	C	D
			Correct use of dimension paper

(4)
(1)
[40]