



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

CIVIL TECHNOLOGY: CIVIL SERVICES

MAY/JUNE 2024

MARKS: 200

TIME: 3 hours

This question paper consists of 16 pages and 4 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, 3.9, 4.5 and 5.6 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 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.12) in the ANSWER BOOK, e.g. 1.1.13 D.

1.1.1 Water-based paint ...

- A can be applied to wet wood.
- B allows moisture to penetrate surfaces.
- C takes days to dry.
- D gives an elastic and flexible finish.

(1)

1.1.2 Zinc can be applied to metals to

- A increase the thickness of the metal.
- B add strength to the original metal.
- C prevent rust.
- D All the above-mentioned

(1)

1.1.3 ... improves the engineering and mechanical properties of metal.

- A Curing
- B Electroplating
- C Galvanising
- D Painting

(1)

1.1.4 Toe boards are attached to a scaffold platform to ...

- A fix the scaffold platform to it.
- B stabilise the scaffold.
- C prevent tools from falling off.
- D prevent workers from falling off.

(1)

1.1.5 The maximum height for a trestle scaffold:

- A 6 m
- B 3 m
- C 8 m
- D 10 m

(1)

1.1.6 Suspended scaffolds can be made of ...

- A fibreglass.
- B steel.
- C graphite.
- D fibre cement.

(1)

- 1.1.7 A ... can be used to dispose of waste material.
- A conveyer belt and chute
 - B ladder
 - C scaffold
 - D None of the above-mentioned (1)
- 1.1.8 Properties that define a builder's hoist:
- A It is a lifting device
 - B The type of power
 - C The size of the cables
 - D Only A and B (1)
- 1.1.9 Workers must not use ... stairways that will be a temporary part of the structure when carrying materials.
- A straight
 - B timber
 - C spiral
 - D half landing (1)
- 1.1.10 Stairways must not be installed more than ... degrees from the horizontal.
- A 50
 - B 30
 - C 40
 - D 75 (1)
- 1.1.11 When a ladder is placed against a wall, the angle must be at a ratio of ...
- A 1 : 3
 - B 1 : 4
 - C 1 : 5
 - D 1 : 6 (1)
- 1.1.12 A/An ... ladder must never be used near electrical cables.
- A aluminium
 - B timber
 - C synthetic
 - D fibreglass (1)-

- 1.2 You have been tasked to install a bathroom cabinet against a wall.
- 1.2.1 Name the joining fixture you will use to secure the cabinet. (1)
- 1.2.2 Motivate why you will use this joining fixture. (2)
- 1.2.3 Explain how you will install the cabinet with pre-drilled holes by using the joining fixture in QUESTION 1.2.1. The positions of the holes have been marked on the wall. (3)
- 1.3 You have been asked by a contractor to install a shower in a bathroom.
- 1.3.1 Name the tool to detect existing water pipes in the wall. (1)
- 1.3.2 Name the tool to ensure that the top of the cubicle is level. (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.

QUESTION 3: CONSTRUCTION ASSOCIATED WITH CIVIL SERVICES, OHSA AND QUANTITIES (SPECIFIC)

Start this question on a NEW page.

- 3.1 Change the underlined word(s) in the following to make the statements correct. Write the appropriate word(s) next to the question numbers (3.1.1 to 3.1.5) in the ANSWER BOOK.
- 3.1.1 The slope at which a 225 mm diameter pipe should be laid is 1 : 60. (1)
- 3.1.2 The recommended thickness of layers for backfilling is 400 mm. (1)
- 3.1.3 The OSS specifies that all excavation work should be carried out under supervision. (1)
- 3.1.4 At excavations, green warning signals must be visible at all times. (1)
- 3.1.5 Where soil is moderately firm, the vertical members of shoring should be placed very close together. (1)
- 3.2 Explain the process of soil compaction. (2)
- 3.3 Describe TWO precautionary measures that will allow a worker to work in an excavated trench. (2)

- 3.4 FIGURE 3.4 below shows part of the layout of a water supply to be used in the bathroom.

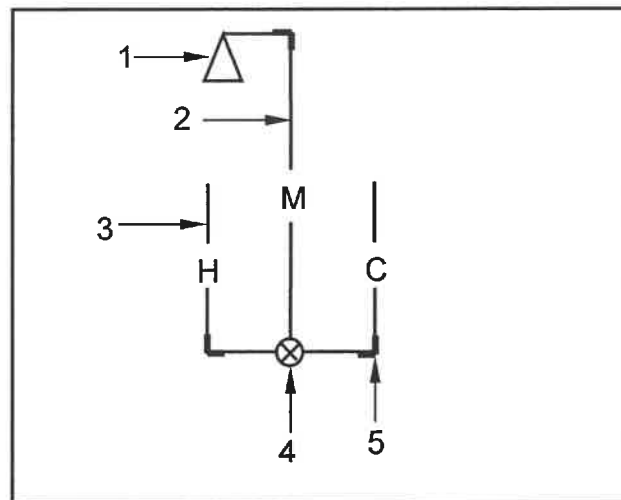


FIGURE 3.4

Use the information above and take off the quantities of materials needed as indicated in the table below. Write only the answer next to the question numbers (3.4.1 to 3.4.8) in the ANSWER BOOK, e.g. 3.4.9 Basin.

ITEM	NAME OF MEMBER	MATERIAL	DIAMETER
1	3.4.1	3.4.2	—
2	Pipe carrying mixed (temperature) water	3.4.3	3.4.4
3	3.4.5	copper	—
4	3.4.6	3.4.7	—
5	3.4.8	copper	—

(8)

- 3.5 FIGURE 3.5 shows a drain pipe. Calculate the fall of the drainpipe between point A and B if the slope is 1 : 60.

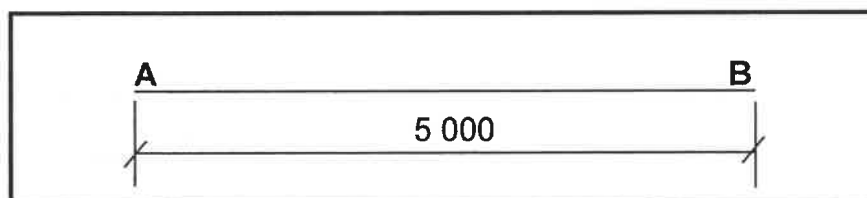


FIGURE 3.5

(4)

- 3.6 Name TWO tools that are used to set out the fall for a trench over a short distance. (2)
- 3.7 Name ONE member that forms part of a temporary structure that is used to prevent excavations from caving in. (1)
- 3.8 Name ONE location where a manhole must be installed. (1)
- 3.9 ANSWER SHEET 3.9 shows the first course of the front view of a one-brick wall built in stretcher bond. Project and draw from the front view the top view of the consecutive brick course. (5)

[30]

QUESTION 4: COLD- AND HOT-WATER SUPPLY, TOOLS, EQUIPMENT AND MATERIALS (SPECIFIC)

Start this question on a NEW page.

4.1 FIGURE 4.1 below shows a tap.



FIGURE 4.1

4.1.1 Identify the tap. (1)

4.1.2 Explain the purpose of this type of tap. (1)

4.1.3 Name ONE place where you will find this tap. (1)

4.1.4 Draw an orthographic side view of a demand pillar tap. (4)

4.2 FIGURE 4.2 below shows the drain installation for a bathroom with a washbasin.

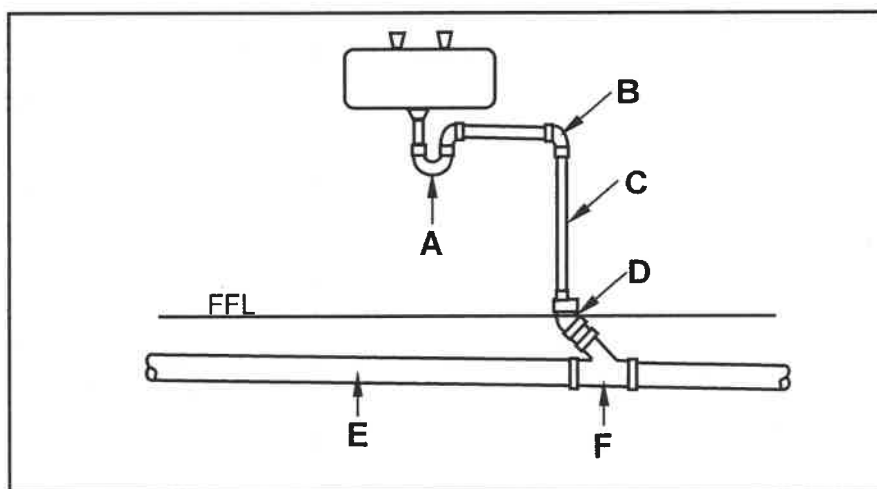


FIGURE 4.2

4.2.1 Identify A, B and C. (3)

4.2.2 Name the diameter for D. (1)

4.2.3 Describe the function of E. (1)

4.2.4 Describe the function of fitting F. (1)

4.3 Pipe fittings are used in drainage.

4.3.1 Draw in the ANSWER BOOK a neat two-dimensional sketch of a plain T-waste junction. (3)

4.3.2 Name ONE diameter that the fitting mentioned in QUESTION 4.3.1 is available in. (1)

4.3.3 Name ONE specific place where you will install the fitting mentioned in QUESTION 4.3.1 in a drainage system. (1)

4.4 FIGURE 4.4 below shows a valve used in cold-water supply systems.

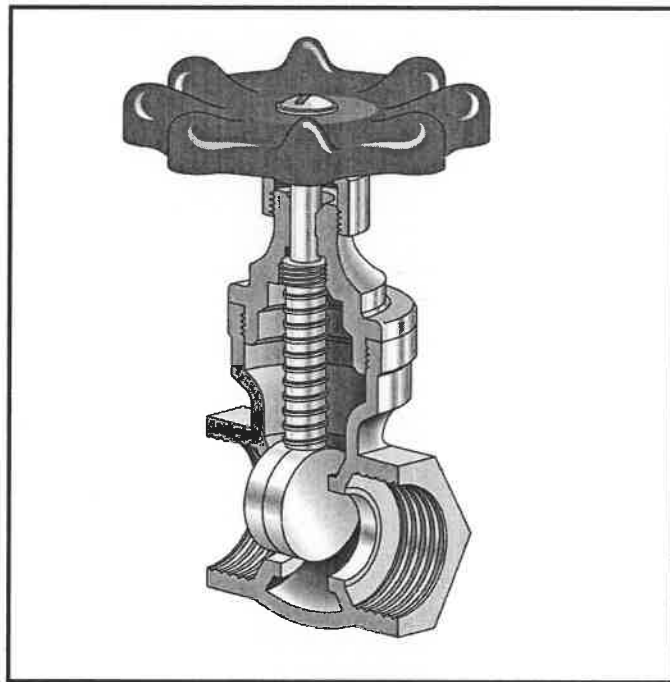


FIGURE 4.4

4.4.1 Identify the valve. (1)

4.4.2 What is the handle called that opens or closes the water flow? (1)

4.4.3 Explain TWO consequences that will happen to the tapering gate if the non-rising spindle is turned clockwise. (2)

4.5 Use ANSWER SHEET 4.5 and complete the drawing of a solar geyser by doing the following:

4.5.1 Show, by means of arrows, the direction of the flow of water through the collector panels. (4)

4.5.2 Draw the hot-water outlet to the house. (1)

4.5.3 Label the inlet and outlet on the solar panel. (2)

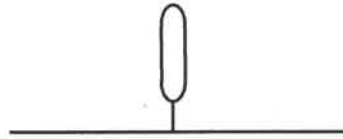
4.6 Name the approved SANS symbols shown below.

4.6.1



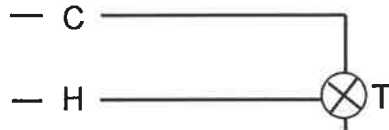
(1)

4.6.2



(1)

4.6.3



(1)

4.6.4



(1)

4.7 Explain how to clean the drain-cleaning rods after it was used to unclog a drain. (2)

4.8 When do you need to clean the bearing bracket of a centrifugal pump? (1)

4.9 Why is zinc a highly reactive metal? (1)

4.10 Explain TWO consequences if zinc is selectively removed from an alloy through dezincification. (2)

4.11 Name the colour of rust on galvanized parts when dezincification has taken place. (1)

[40]

QUESTION 5: GRAPHICS AS MEANS OF COMMUNICATION, ROOF WORK AND STORM WATER (SPECIFIC)

Start this question on a NEW page.

- 5.1 Describe the process of installing a PVC gutter with a gutter outlet to the fascia board of a roof. (5)
- 5.2 Name the distance that the spacing of gutter brackets must not exceed. (1)
- 5.3 Name the type of solder used to solder the seam for a galvanised mild steel gutter. (1)
- 5.4 Explain ONE consequence of installing a storm-water soakaway less than 5 metres from a building. (1)
- 5.5 A concrete surface channel is used to route storm water to rivers and dams. Draw a neat pictorial drawing of a pre-fabricated concrete surface channel in the ANSWER BOOK. (4)
- 5.6 ANSWER SHEET 5.6 shows a drawing of a frustum for a lamp shade. Use the drawing and information on ANSWER SHEET 5.6 and draw the development of the cone. Show ALL construction lines and start the development at point A. (18)
- [30]**

QUESTION 6: SEWERAGE, SANITARY FITMENTS AND JOINING (SPECIFIC)

Start this question on a NEW page.

- 6.1 Choose a description from COLUMN B that matches the item in COLUMN A. Write only the letter (A–I) next to the question numbers (6.1.1 to 6.1.5) in the ANSWER BOOK, e.g. 6.1.6 J.

COLUMN A		COLUMN B	
6.1.1	Chlorine	A	property of solder
6.1.2	900 mm	B	the recommended height for mounting a washbasin
6.1.3	Ductile and low melting point	C	chemical added to treat water at a purification plant
6.1.4	Sal-ammoniac	D	property of copper
6.1.5	800 mm	E	the recommended height for mounting a sink
		F	substance used to clean a soldering iron after it has been heated
		G	chemical used to clean a soldered joint
		H	property of flux
		I	the recommended height for mounting shower taps

(5 x 1) (5)

- 6.2 Distinguish between *PVC pipes* and *cast-iron pipes* in terms of weight. (2)

- 6.3 You are required to join the soil water pipe from the water closet to the sewage pipe on the outside of the wall with a 90° bend with inspection eye.

- 6.3.1 Draw, in your ANSWER BOOK, a neat two-dimensional sketch of the 90° bend with inspection eye. (4)

- 6.3.2 Name the diameter of the pipe fitting. (1)

6.4 FIGURE 6.4 below shows the installation of a washbasin.

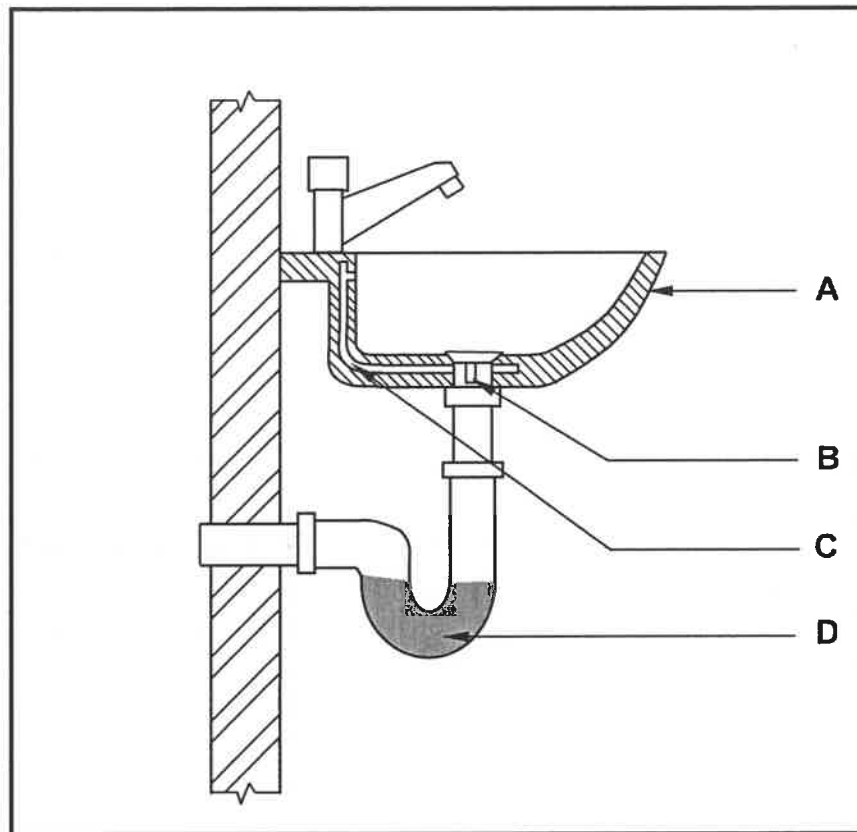


FIGURE 6.4

- | | | |
|-------|--|-----|
| 6.4.1 | Name ONE material that is used to manufacture A. | (1) |
| 6.4.2 | Identify B. | (1) |
| 6.4.3 | Name ONE device that can be used to seal the water inside the washbasin. | (1) |
| 6.4.4 | Describe the purpose of C. | (1) |
| 6.4.5 | Explain the purpose of D. | (1) |

- 6.5 FIGURE 6.5 below shows the isometric view of a box made from 0,5 mm galvanised sheet metal.

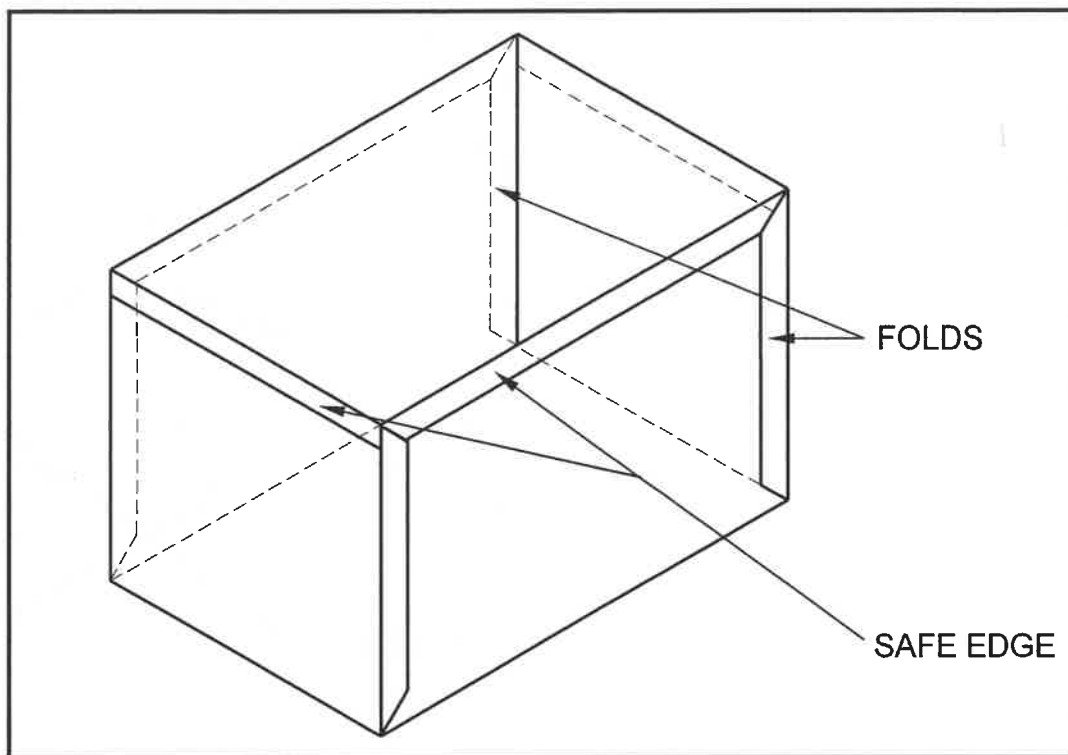


FIGURE 6.5

- 6.5.1 What determines the allowance for sheet metal joints? (1)
- 6.5.2 How many millimetres should be added to the allowance if tin snips are used for cutting the sheet metal? (1)
- 6.5.3 On which side of the scribed line should you cut when cutting out a pattern on sheet metal? (1)
- 6.5.4 Name TWO types of joining methods that will be suitable to join the seams. (2)
- 6.6 Describe the process of installing a bracket onto a masonry wall with a chemical anchor into a pre-drilled hole. (3)
- 6.7 Draw, in the ANSWER BOOK, a neat sketch of the sectional top view of a draw-off valve for a vacuum tank that is located against the kerb of the road. Show the outlet pipe and the construction of the housing for the valve in the drawing. (8)

6.8 FIGURE 6.8 below shows the incomplete drainage plan of a building.

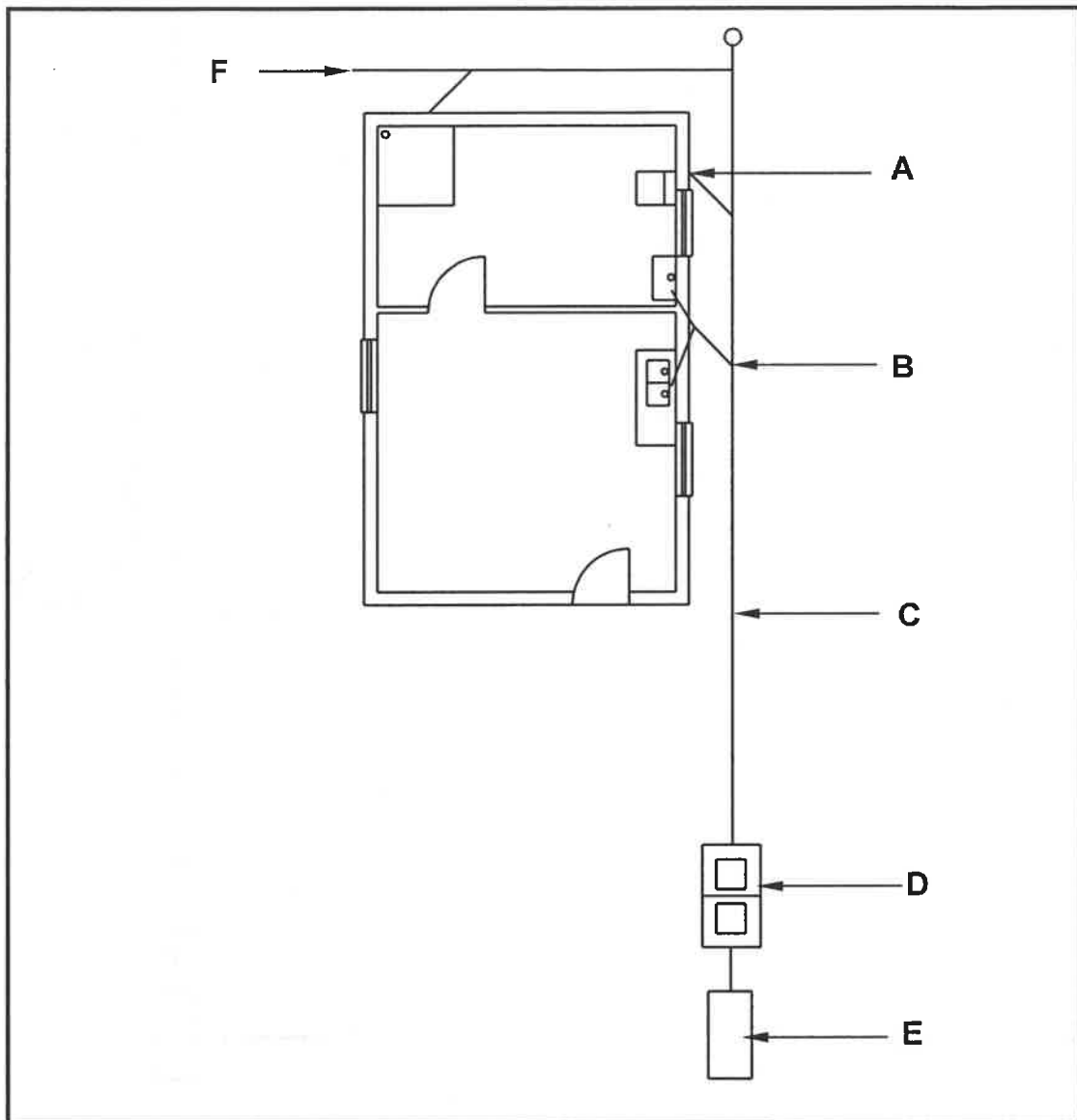


FIGURE 6.8

- | | | |
|-------|---|-------------|
| 6.8.1 | Name the components that are omitted at A and B . | (2) |
| 6.8.2 | Draw the correct symbol for pipe C . | (1) |
| 6.8.3 | Name the TWO chambers in D . | (2) |
| 6.8.4 | Identify component E . | (1) |
| 6.8.5 | Name the component that has to be installed at F . | (1) |
| | | [40] |

TOTAL: 200

CENTRE NUMBER:

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EXAMINATION NUMBER:

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ANSWER SHEET 2

NO.	QUESTIONS	ANSWERS	MARKS
1.	Name the type of building that is illustrated by FIGURE A.		1
2.	Deduce from the building plan the elevation on which the sink is located.		1
3.	Identify number 1.		1
4.	Why are balusters installed at number 2?		1
5.	What type of material was specified for number 3?		1
6.	Recommend ONE suitable material for number 4.		1
7.	Who is the owner of the proposed dwelling?		1
8.	Identify the number that indicates the downpipe.		1
9.	Name ONE other sanitary fixture, besides a washbasin, that can be installed in the bathroom.		1
10.	Identify number 7.		1
11.	Describe the purpose of number 8.		1
12.	How many fluorescent tubes are indicated in the building?		1
13.	Name the street in which the new building will be erected.		1

CENTRE NUMBER:

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EXAMINATION NUMBER:

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14.	What type of finish was specified for the walls?		1
15.	Deduce from the building plan why it was revised.		1
16.	What must be installed to gain access to the first and second floor?		1
17.	Deduce from the building plan who must sign off the building plan.		2
18.	What are the prescribed dimensions for the balusters?		1
19.	How many hinged window openings are indicated on window 2 in the window schedule?		1
20.	Provide a reason for installing solar panels on the roof.		1
21.	The interior door frames are covered with plywood. Draw the symbol for plywood.		2
22.	Draw the symbol for a wall mounted urinal.		2
23.	Describe the top end shape of the baluster.		1

CENTRE NUMBER:

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EXAMINATION NUMBER:

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24	Calculate the total height of the building from the finished floor level up to the top of the roof. Give your answer in m.		7
25	Calculate the area of the external wall of the second floor from the top of the floor up to roof height in the west elevation in FIGURE A. Show ALL calculations. Give your answer in m ² .		7
		TOTAL:	40

CENTRE NUMBER:							
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EXAMINATION NUMBER:													
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ANSWER SHEET 3.9

TOP VIEW

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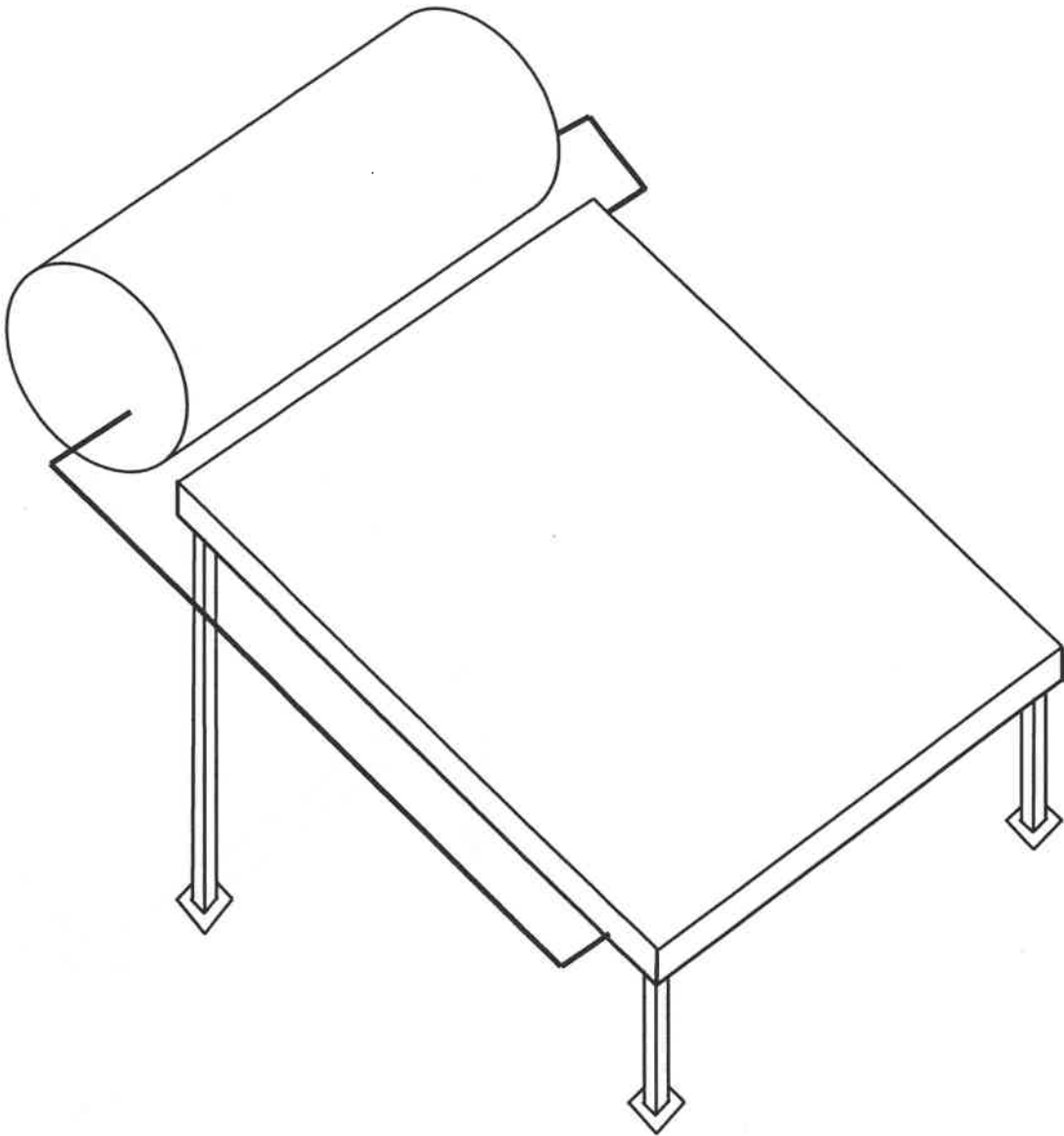
FRONT VIEW

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

CENTRE NUMBER:

EXAMINATION NUMBER:

ANSWER SHEET 4.5



ASSESSMENT CRITERIA		
NO.	MARK	CM
1	4	
2	1	
3	2	
TOTAL:	7	

CENTRE NUMBER:

EXAMINATION NUMBER:

ANSWER SHEET 5.6

ASSESSMENT CRITERIA		
NO.	MARK	CM
1	2	
2	2	
3	1	
4	3	
5	7	
6	1	
7	2	
TOTAL:	18	

