



Province of the
EASTERN CAPE
EDUCATION

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NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2026

CIVIL TECHNOLOGY: CIVIL SERVICES

MARKS: 200

TIME: 3 hours

This question paper consists of 16 pages, including 1 answer sheet.

REQUIREMENTS:

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

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX questions: TWO questions are generic and FOUR questions are subject specific.
2. Answer ALL the questions.
3. Answer each question as a whole. Do NOT separate subsections of questions.
4. Start the answer to EACH question on a NEW page.
5. Do NOT write in the margins of the ANSWER BOOK.
6. You may use sketches to illustrate your answers.
7. Write ALL calculations and answers in the ANSWER BOOK or on the attached ANSWER SHEETS.
8. Use the mark allocation as a guide to the length of your answers.
9. 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*.
10. For the purpose of this question paper, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
11. Use your own discretion where dimensions and/or details have been omitted.
12. Answer QUESTION 6.1 on the attached ANSWER SHEET using drawing instruments where necessary.
13. Write your NAME on every ANSWER SHEET and hand them in with your ANSWER BOOK, whether you have answered the question or not.
14. Due to electronic transfer, drawings in the question paper are NOT to scale.

QUESTION 1: SAFETY, MATERIALS AND TOOLS (GENERIC)

Start this question on a NEW page.

- 1.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–H) next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, for example. 1.1.8 I.

COLUMN A	COLUMN B
1.1.1 Stairways	A Not to be used in the proximity of electric wires.
1.1.2 Scaffold	B To cover iron or steel with a layer of zinc to prevent it from rusting
1.1.3 Powder coating	C Prevent vertical stands from sinking into the ground
1.1.4 Safety net	D Should be provided with toe board to prevent objects from falling off
1.1.5 Sole plate	E Allow workers to climb up and down the ladder
1.1.6 Galvanising	F Finish is suitable for heavy wear and tear applications
1.1.7 Rungs	G Slippery conditions must be corrected
	H Prevents falling objects from injuring workers

(7 x 1) (7)

- 1.2 Describe any TWO safety precautions that must be adhered to when working on a builder's hoist. (2 x 1) (2)
- 1.3 Explain the purpose of painting. (2)
- 1.4 Explain the effect of curing with regard to the strength of concrete. (1)
- 1.5 What is the maximum height of a trestle scaffolding? (1)
- 1.6 Describe any TWO aspects that scaffolding must adhered to before it is used. (2 x 1) (2)
- 1.7 Why should non-skid material be fitted at the bottom end of the stiles of a ladder? (1)
- 1.8 Name any ONE method that can be used to prevent corrosion of metals. (1 x 1) (1)

1.9 FIGURE 1.9 below shows a tool that is used in the building construction industry.



FIGURE 1.9

- 1.9.1 Identify tool **A**. (1)
- 1.9.2 How would you care for this tool if it is subjected to extreme temperature changes? (1)
- 1.9.3 Explain why the batteries should be removed from the tool if it is not going to be used for a long time. (1)
- [20]**

QUESTION 2: GRAPHICS AND JOINING (GENERIC)

Start this question on a NEW page.

2.1 Give the abbreviations for the following:

2.1.1 Natural ground level (1)

2.1.2 Finished floor level (1)

2.1.3 Damp proof course (1)

2.1.4 Toilet (1)

2.1.5 Bathtub (1)

2.2 Identify the electrical symbols that is shown from QUESTIONS 2.2.1 to 2.2.5.

2.2.1  (1)

2.2.2  (1)

2.2.3  (1)

2.2.4  (1)

2.2.5  (1)

2.3 Draw the following material symbols:

2.3.1 Concrete (2)

2.3.2 Facebrick (2)

2.3.3 Undisturbed earth (2)

2.3.4 Metal (2)

2.3.5 Plaster (2)

2.4 Name any FIVE details that appear in a site plan. (5 x 1) (5)

2.5 Identify the bolt heads illustrated in figures A to C.

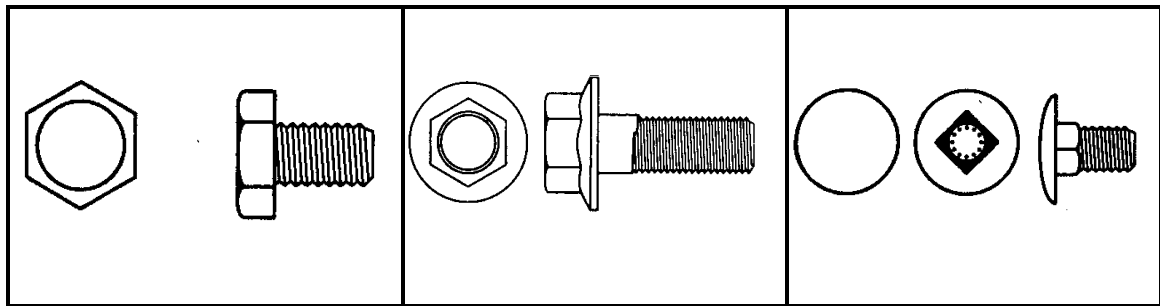


FIGURE A

FIGURE B

FIGURE C

(3 x 1) (3)

2.6 Name any FOUR details that must be mentioned when purchasing bolts.

(4 x 1) (4)

2.7 Rawl bolts are expanding sheet anchor fasteners. Briefly explain the operation of rawl bolts.

(3 x 1) (3)

2.8 FIGURE 2.8 shows the anchor shield of a rawl bolt in the hole and accessory A placed in position. Answer the following questions regarding the attachment in FIGURE 2.8.

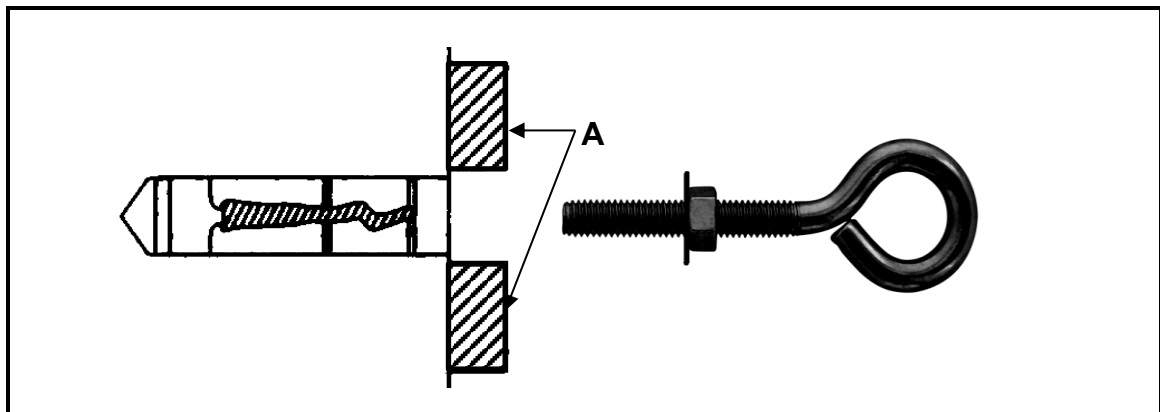


FIGURE 2.8

2.8.1 Briefly explain why the attachment of fixture A will not be effective.

(2)

2.8.2 When an eye is used, should the nut or the eye be tightened for the attachment?

(1)

2.8.3 Name any TWO good mechanical properties of rawl bolts.

(2 x 1) (2)

[40]

TOTAL SECTION A: 60

QUESTION 3: SAFETY, MATERIAL AND CONSTRUCTION (SPECIFIC)

Start this question on a NEW page.

- 3.1 Name TWO hazards to which workers are exposed when working in confined spaces such as manholes. (2 x 1) (2)
- 3.2 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question number (3.2.1 to 3.2.4) in the ANSWER BOOK.
- 3.2.1 A mask is sufficient protection against inhalation of dust. (1)
- 3.2.2 A suction fan is essential when workers in manholes may be exposed to hazardous gases. (1)
- 3.2.3 Any person entering a manhole must wear a safety harness. (1)
- 3.2.4 When a safety harness is used in a manhole, it must be securely attached to a pole. (1)
- 3.3 Briefly motivate why the area around an open manhole must be secured. (1)
- 3.4 Describe the following safety requirements that must be applied for securing openings in construction work:
- 3.4.1 Stairs and floors without railings (1)
- 3.4.2 When working on upper levels in windy conditions (1)
- 3.5 Explain the use of a safety net when doing construction work. (2)
- 3.6 Name any TWO characteristics of a competent person when doing construction work. (2 x 1) (2)
- 3.7 What property of zinc causes it to be a highly reactive metal? (1)
- 3.8 How is dezincification of brass objects identified? (1)
- 3.9 Identify the correct facts in the following descriptions.
- 3.9.1 Copper-zinc alloys containing more than **15% / 25%** zinc are **not susceptible / susceptible** to dezincification. (2 x 1) (2)
- 3.9.2 Dezincification is a process that selectively **adds / removes** the more active **copper / zinc** from an alloy in **aqueous / saline** solution. (3 x 1) (3)
- 3.9.3 The dezincification process leaves behind a **porous / solid**, copper-rich metal with **high / low** mechanical strength. (2 x 1) (2)
- 3.10 Describe the purpose of electrolytic cleaning. (2)

- 3.11 What is used to seal the precast parts of a manhole when it is installed? (1)
- 3.12 At what gradient are the following pipe sizes laid?
- 3.12.1 Ø 100 mm sewer pipe (1)
- 3.12.2 Ø 150 mm sewer pipe (1)
- 3.13 Answer the following questions regarding the structure in FIGURE 3.13.

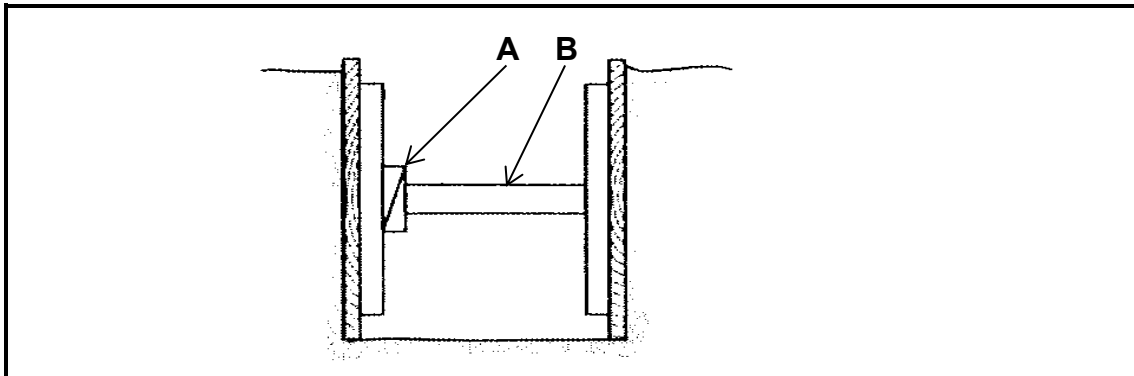


FIGURE 3.13

- 3.13.1 What is the structure in excavations called? (1)
- 3.13.2 Name parts **A** and **B** (2 x 1) (2)
- [30]**

QUESTION 4: COLD WATER SUPPLY, WARM WATER SUPPLY AND TOOLS (SPECIFIC)

Start this question on a **NEW** page.

4.1 Answer the following questions regarding the tap in FIGURE 4.1.

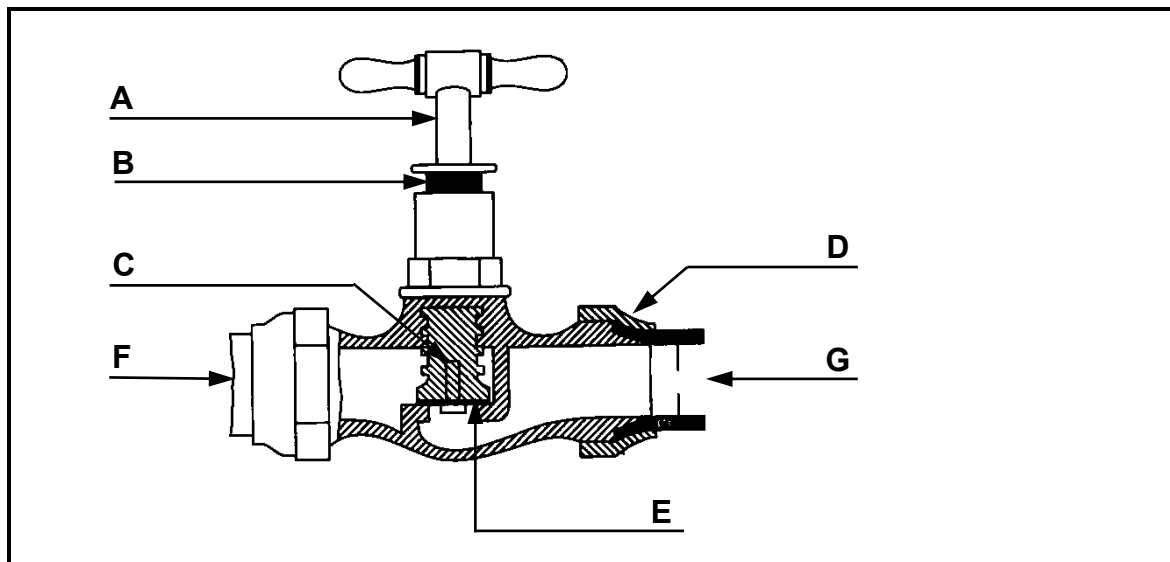


FIGURE 4.1

- 4.1.1 What is this type of tap called? (1)
- 4.1.2 What is the purpose of the tap? (1)
- 4.1.3 Name the parts **A** to **E**. (5 x 1) (5)
- 4.1.4 Which number, **F** or **G**, indicates the direction of water flow? (1)
- 4.1.5 Name any **TWO** positions where this type of tap can be installed. (2 x 1) (2)
- 4.2 What is the purpose of the aerator device that is installed in the end of a tap? (1)
- 4.3 Make a neat line sketch of a P-trap. Also indicate the water level. (3)
- 4.4 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question numbers (4.4.1 to 4.4.4) in the ANSWER BOOK.
- 4.4.1 The diameter size of waste water pipes is 60 mm. (1)
- 4.4.2 Soil water bends are manufactured at an angle of 140°. (1)
- 4.4.3 PVC soil water pipes are joined with socket and spigot joints. (1)
- 4.4.4 Sewage refers to water that has been contaminated by human waste. (1)

4.5 Answer the following questions regarding the soil water bend in FIGURE 4.5.

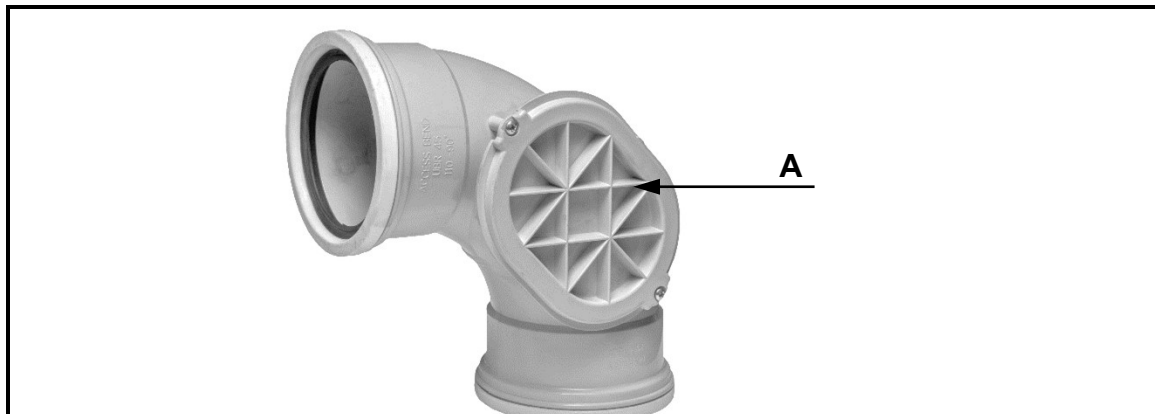


FIGURE 4.5

- 4.5.1 What is the diameter of the pipe? (1)
- 4.5.2 At what angle is this fitting? (1)
- 4.5.3 What is part **A** called? (1)
- 4.5.4 What is the purpose of part **A**? (1)

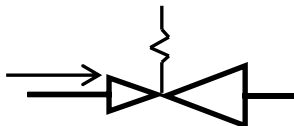
4.6 Identify the following symbols used in hot water systems.

4.6.1



(1)

4.6.2



(1)

4.6.3



(1)

- 4.7 Briefly explain why the hot water outlet is at the top of a geyser. (2)
- 4.8 Briefly motivate the purpose of the shut-off valve at the cold water inlet of a geyser. (2)
- 4.9 Describe the following regulations that apply to geysers.
- 4.9.1 The position of the electrical isolator switch. (2)
- 4.9.2 The weight of the geyser when installed. (2)

4.10 Identify the correct fact regarding heat pumps.

4.10.1 Heat pumps work like a **geyser / air conditioner**, but in reverse. (1)

4.10.2 The **refrigerant / heating medium** is compressed. (1)

4.10.3 Heat pumps consist of **one / two** units. (1)

4.10.4 Heat pumps can heat water to above **60° / 80°**. (1)

4.11 Briefly motivate why drain-cleaning rods must be cleaned well after use. (1)

4.12 Answer the following questions regarding the tool in FIGURE 4.12.



FIGURE 4.12

4.12.1 Name this tool. (1)

4.12.2 State the use of this tool. (1)

[40]

QUESTION 5: DRAINAGE AND QUANTITIES (SPECIFIC)

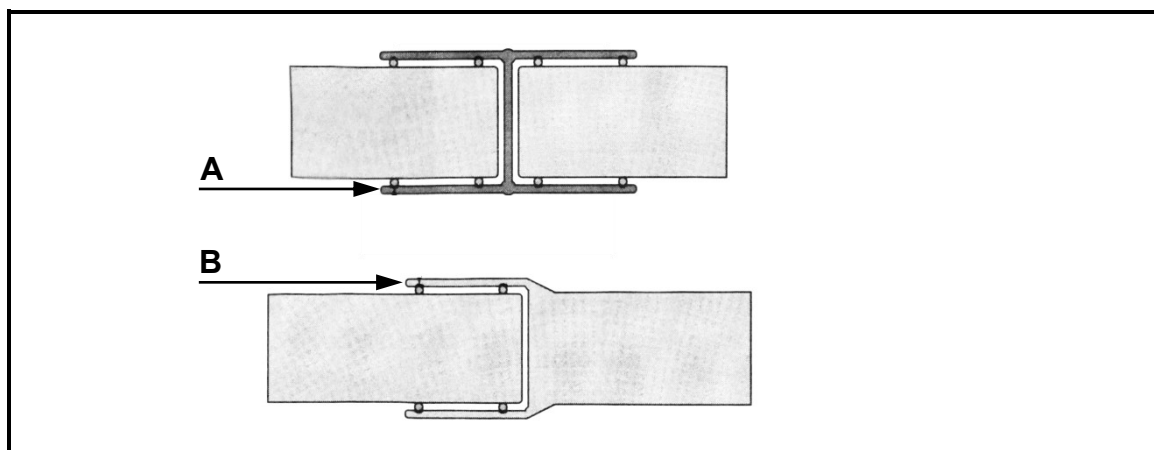
Start this question on a **NEW** page.

- 5.1 Choose a description with regard to drainage in COLUMN B that matches the term in COLUMN A. Write only the letter (A-F) next to the question numbers (5.1.1 to 5.1.4) in the ANSWER BOOK, for example 5.1.5 G.

COLUMN A	COLUMN B
5.1.1 Soiled water	A is built at main pipeline connections
5.1.2 Storm water sewer	B transports water from showers
5.1.3 Manhole	C it contains organic contaminants
5.1.4 Vent pipe	D transports rainwater from a site
	E is used when draining waste water
	F is installed at least one metre above the lowest point of the roof

(4)

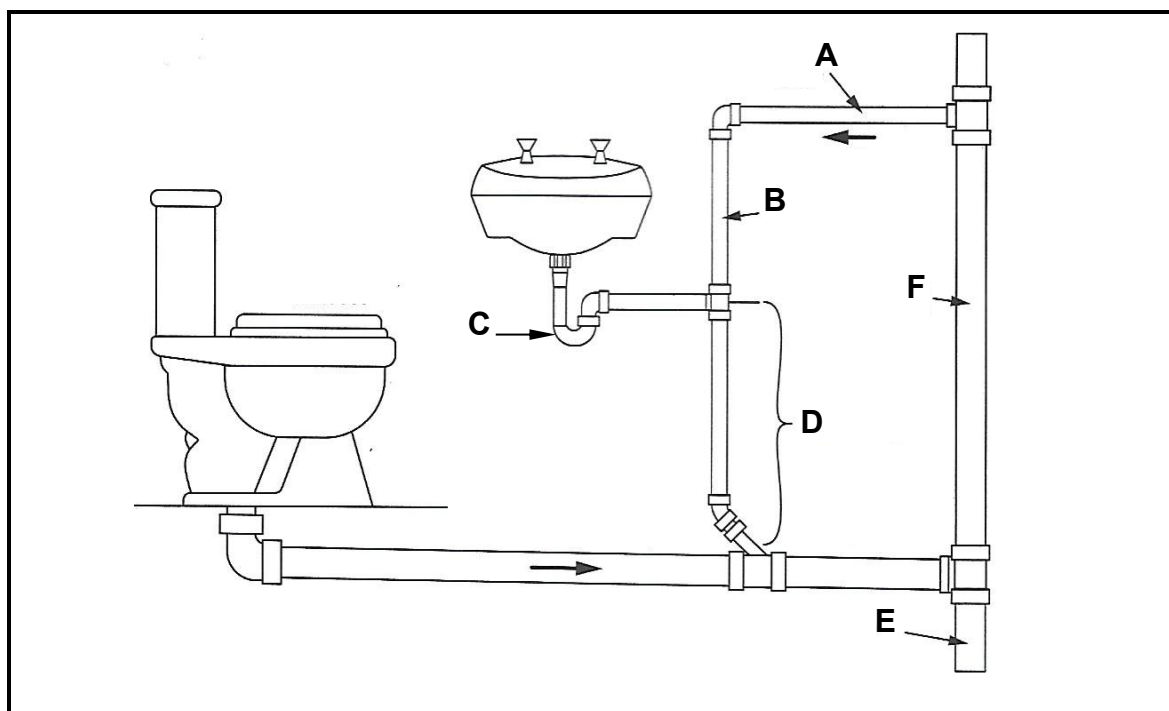
- 5.2 Briefly motivate why sharp bends in drainage systems should be avoided. (1)
- 5.3 Why should sewer pipes be well sealed at joints? (1)
- 5.4 Which type of pipes are most popular for use in drainage systems? (1)
- 5.5 Which type of sewer pipe is used when ground movement may occur? (1)
- 5.6 Identify the types of sewer pipe joining methods **A** and **B** in FIGURE 5.6.



(2)

FIGURE 5.6

5.7 Answer the following questions with regard to the sewer system in FIGURE 5.7.



FIGUUR 5.7

5.7.1 Name the parts **A** to **E** in FIGURE 5.7. (5 x 1) (5)

5.7.2 What is the purpose of part **C**? (1)

5.7.3 What is the purpose of parts **E** and **F**? (1)

5.7.4 Explain what will happen in part **C** if parts **E** and **F** are not installed. (2)

5.8 Choose the correct description with regard to a septic tank.

5.8.1 **Sewage / Waste water** flows from the **tap / water closet** into the first chamber. (2 x 1) (2)

5.8.2 Heavier particles are **retained in the benching / sink to the bottom of the chamber**. (1)

5.8.3 **Viruses / Bacteria** decompose the solid waste, and convert it into a **gas / liquid**. (2 x 1) (2)

5.8.4 The **sludge / liquid** must be cleaned regularly. (1)

5.9 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question numbers (5.9.1 to 5.9.3) in the ANSWER BOOK.

5.9.1 Sewage is collected in a septic tank. (1)

5.9.2 A French drain consists of a trench filled with rock fragments and concrete. (1)

5.9.3 Sewage pipes are identified by a blue colour code on a drainage plan. (1)

5.10 FIGURE 5.10 shows the front elevation of the cold-water supply from the water meter to a house on scale 1 mm = 100 mm. The main cold-water pipe has a diameter of 22 mm and the branch pipes have a diameter of 15 mm. Study the drawing and determine the material needed for the plumbing installation by completing the table.

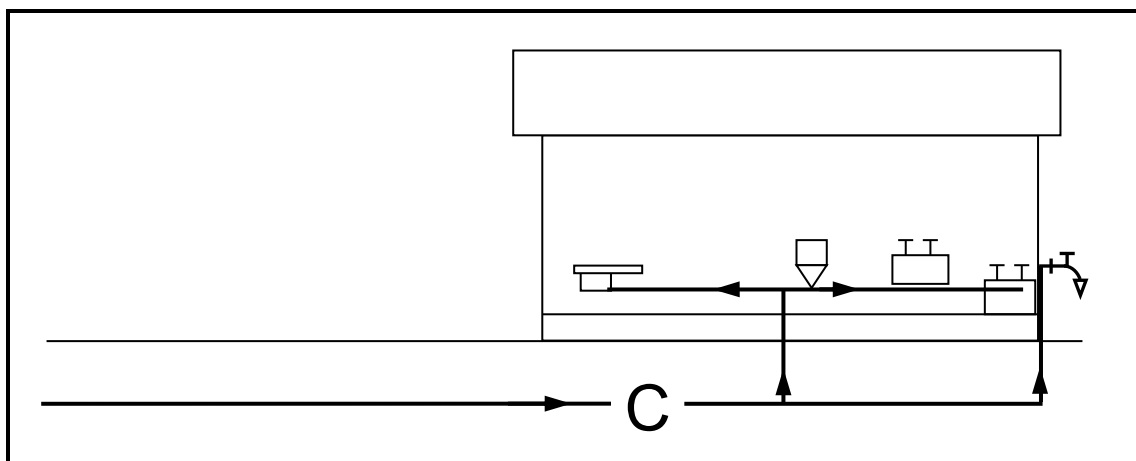


FIGURE 5.10

WATER SUPPLY APPLIANCES	MATERIAL	SIZE	QUANTITY	LENGTH
Cold-water pipe	5.10.1	22 mm	1	5.10.2
Cold-water pipe	5.10.3	15 mm	1	5.10.4
Reducing elbow 90°	5.10.5	22 mm x 15 mm	5.10.6	
Elbow 90°	5.10.7	15 mm	5.10.8	
Reducing tee	5.10.9	22 mm x 22 mm x 15 mm	5.10.10	
Tee	5.10.11	15 mm x 15 mm	5.10.12	

(12)
[40]

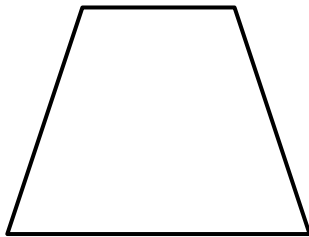
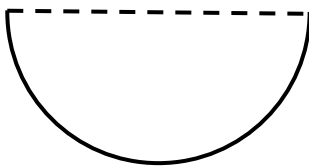
QUESTION 6: GRAPHIC COMMUNICATION, ROOF WORK, STORMWATER AND JOINING (SPECIFIC)

Start this question on a NEW page.

- 6.1 FIGURE 6.1 on ANSWER SHEET A shows half of the top view and the front view of the frustum of a right cone.
Draw the development of the cone on ANSWER SHEET A using the radial line method.
Show ALL construction lines. (14)
- 6.2 Choose the correct description regarding roofing.
- 6.2.1 Roof drainage is directed to the **sewerage system / stormwater system**. (1)
- 6.2.2 Gutters funnel into **downpipes / stormwater pipes**. (1)
- 6.2.3 Gutters must have a downward slope of **50 mm / 25 mm** for every **4,8 m / 3,8 m**. (2 x 1) (2)
- 6.2.4 The gutters are attached to the **fascia board / walls** with **pipe clamps / brackets**. (2 x 1) (2)
- 6.3 What is used to cut PVC gutters to size? (1)
- 6.4 Briefly explain the purpose of flashings in roof constructions. (2)
- 6.5 Identify the types of stormwater drainage fittings.
- 6.5.1 Made of precast concrete and carries stormwater to rivers or dams. (1)
- 6.5.2 It is called a charged system for rainwater tanks (1)
- 6.5.3 It is a hard concrete surface that is placed underneath a downpipe. (1)
- 6.6 What is the purpose of the grid at the openings of stormwater systems? (1)
- 6.7 Name any THREE principles of soldering that must be applied before starting soldering work. (3 x 1) (3)

[30]**TOTAL: 200**

ANSWER SHEET A	CIVIL TECHNOLOGY (SPECIFIC)	NAME AND SURNAME:	

**FRONT VIEW****TOP VIEW**

Dividing lines 0–6 on top view	3	
Construction lines AC and BC	1	
Halve circle BF and DE	2	
Seam lines BD and FE	1	
Construction lines C0–C12	6	
Neatness	1	
TOTAL	14	