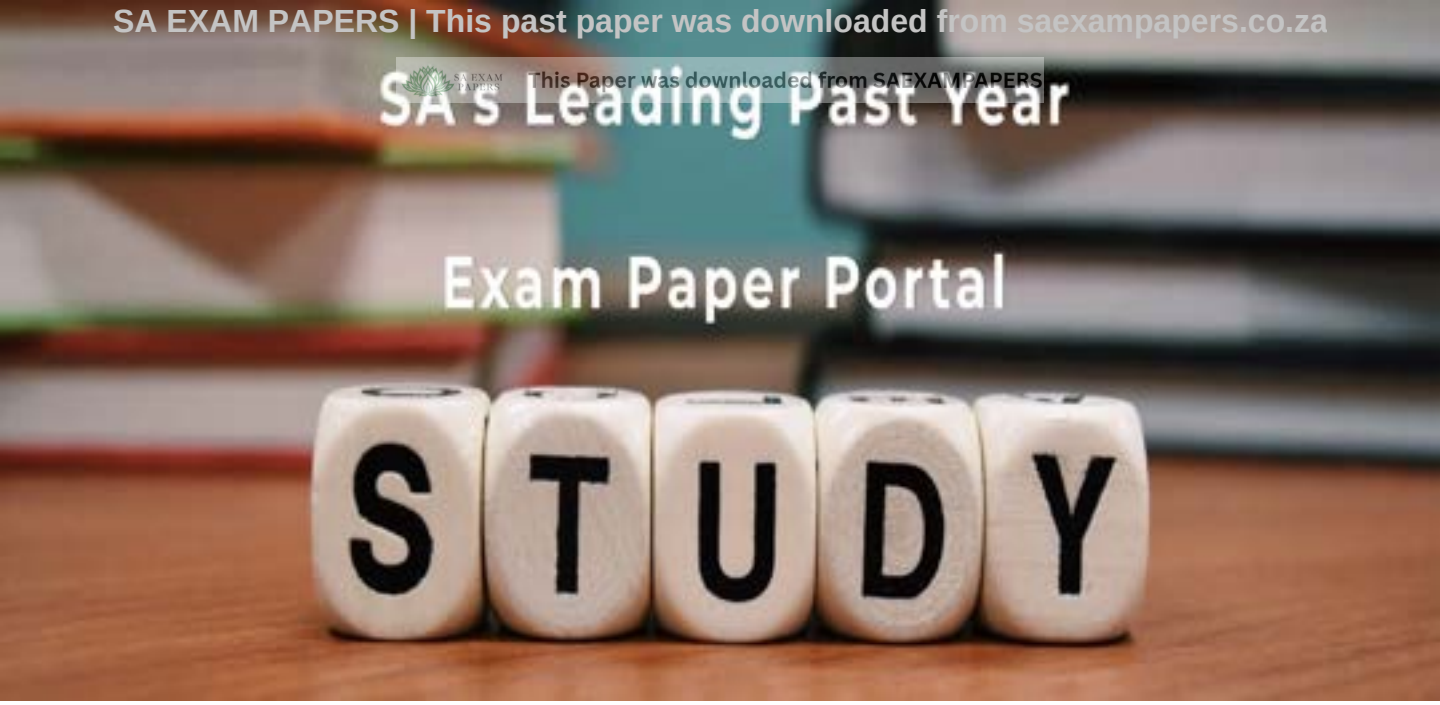


GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
JUNIE EKSAMEN
GRADE / *GRAAD 12*
2025

CIVIL TECHNOLOGY:
SIVIELE TEGNOLOGIE:
CIVIL SERVICES
SIVIELE DIENSTE

CIVIL TECHNOLOGY Civil Services

C2140E

TIME/*TYD:* 3hours/*uur*
MARKS/*PUNTE*: 200
13 pages and 4 answer sheets
13 bladsye en 4 antwoordblaaie

X05

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. The SI unit for answers must be indicated next to the answer.
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, 3.4, 5.1 and 5.2 on the attached ANSWER SHEETS using drawing instruments, where necessary.
15. Write your NAME AND SURNAME 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 drawn 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: OHS, 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 – N) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 O.

COLUMN A		COLUMN B	
1.1.1	Conveyor belt	A	Process takes 38 days
1.1.2	Builder's hoist	B	Has rungs
1.1.3	Ladder	C	Based on visual inspections and visible features
1.1.4	Curing	D	Expensive
1.1.5	Powder coating	E	Strength usually refers to bending strength
1.1.6	Painting	F	Gates must be shut when in use
1.1.7	Galvanising	G	Loose material must never be dropped from elevated areas
1.1.8	Mechanically graded timber	H	Improves the durability of concrete by reducing cracks
1.1.9	Visually graded timber	I	Changes the surface properties of a metal
1.1.10	Linseed oil	J	Suitable for hardwood furniture
		K	Apply using a compressor and a spray gun
		L	To be used by 2 or more people
		M	To cover iron/steel with a layer of zinc to prevent it from rusting
		N	Enhances appearance of surfaces

(10 x 1) (10)

1.2 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 (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 A.

1.2.1 Electroplating is the process of …

A applying a plastic coating on metal using electrolysis.
B coating metal with another metal using electrolysis.
C applying paint to a metal by means of magnetism.
D applying liquid zinc to a metal using pressure. (1)

1.2.2 Why would you coat a metal with a layer of paint?

A To resist extreme temperatures
B To prevent corrosion
C To prevent warping
D Only A and B (1)

1.2.3 When using a scaffold, it must be inspected to ensure that …

A the scaffold is not attached to the building.
B the scaffold platform is supported every 4 metres.
C the scaffold is free from any defects.
D All the above-mentioned. (1)

1.2.4 … of scaffolds should be secured vertically.

A Transoms
B Diagonal braces
C Standards
D Base plates (1)

1.2.5 The employer must ensure that the rungs of wooden ladders are …

A not painted.
B free from grease.
C not cracked.
D All of the above-mentioned. (1)

1.3 FIGURE 1.3 below shows a tool that is used in the building industry.

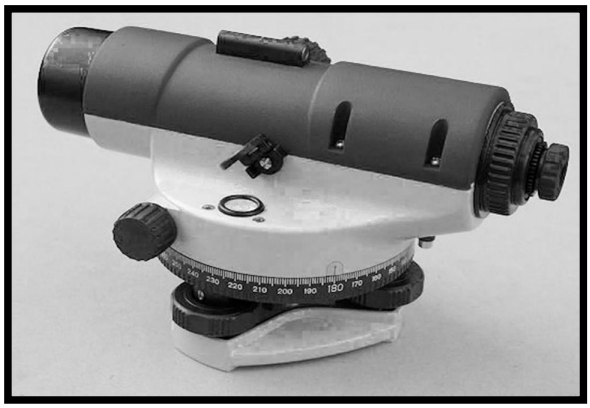


FIGURE 1.3

1.3.1 Identify the tool shown above. (1)

1.3.2 Explain the use of the tool in FIGURE 1.3. (1)

1.4 Explain what could happen if the ends of scaffold planks exceed 230 mm beyond the last support. (1)

1.5 Explain the safety purpose of the following members of a scaffold:

1.5.1 Guardrail (1)

1.5.2 Toe-board/Kickboard (1)
[20]

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)

FIGURE 2 below shows drawings that appear on a building plan. Analyse the drawings and complete the table on ANSWER SHEET 2.

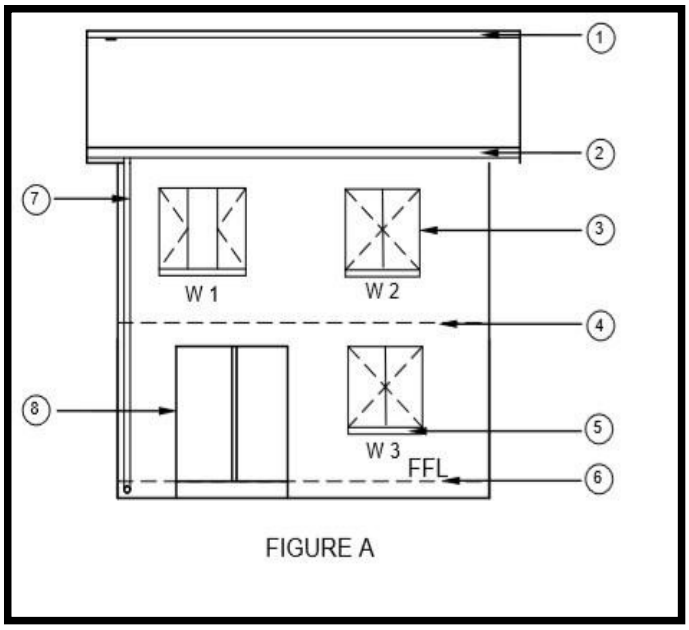
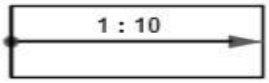


FIGURE A

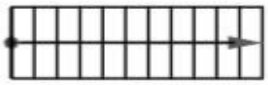
NOTES:
Contractors must verify all dimensions and levels on site before commencing work. Architects to be notified immediately of any discrepancies.

ARCHITECT'S SIGNATURE .....
CLIENT'S SIGNATURE .....

The following must be placed in front of the sliding door:



Access to the first floor must be by means of a:



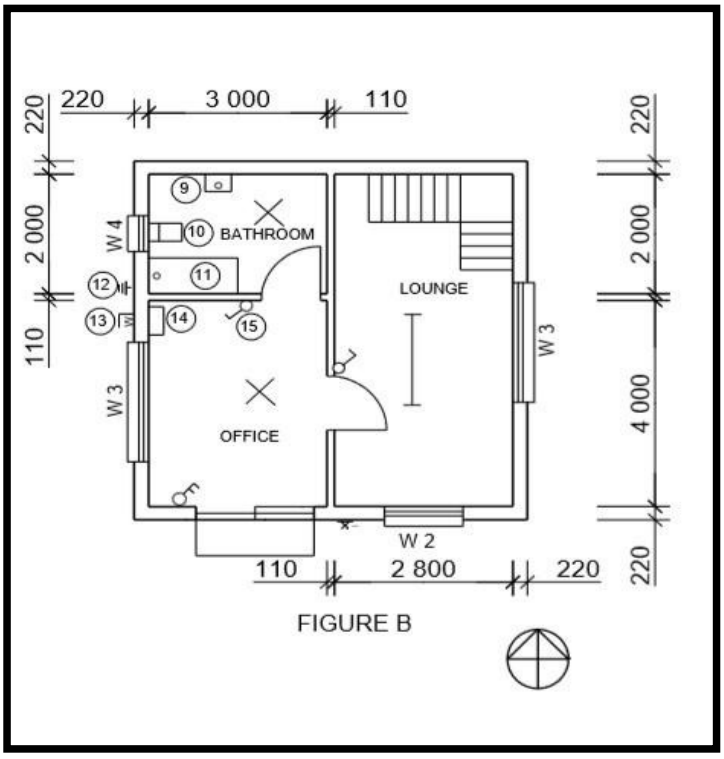


FIGURE B

REVISION	DATE	DESCRIPTION
PRINTED BY: NKOSI PRINTERS	DATE OF PRINT: 2018/10/02	
DRAWING TITLE: SITE PLAN STAND 1843		
PROJECT: PROPOSED DWELLING ON STAND 1843, DIEPRIVIER		
PROJECT NO. GR 557-102	DRAWING NO. 557P9	

DATE	DRAWN	CHECKED	SCALE
25/4/2018	JP MALOI	P BRITZ	1 : 100

REFERENCE CODE
QP 1 - 2018

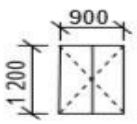
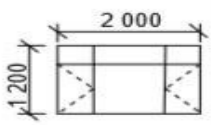
WINDOW 2	WINDOW 3
	

FIGURE 2 **[40]**

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

Start this question on a NEW page.

3.1 Give ONE word/term for each of the following descriptions by choosing a word/term from the list below. Write only the word/term next to the question numbers (3.1.1 to 3.1.5) in the ANSWER BOOK, e.g. 3.1.6 gutter

1 : 40; solid ground; spirit level; 228 mm x 38 mm; 150 mm; 76 mm x 50 mm; 144 mm x 38 mm; surveyor's site level; 1 : 90; boning rod; 1 : 60; water-logged ground; 400 mm

3.1.1 The dimensions of struts used for shoring (1)

3.1.2 Excavation conditions that require the presence of an engineer at all times (1)

3.1.3 The slope at which a 225 mm diameter pipe should be laid (1)

3.1.4 The device that could be used for setting out drain levels on shorter distances (1)

3.1.5 The recommended basic thickness of layers for backfilling (1)

3.2 FIGURE 3.2 below is a picture of a construction that is used to protect workers when working in excavations. Study FIGURE 3.2 and answer the questions that follow.

FIGURE 3.2

3.2.1 Identify the construction in FIGURE 3.2. (1)

3.2.2 Explain the purpose of the sides of the construction. (1)

3.2.3 Name the TWO acceptable colours for the warning signals that should be visible around excavations. (2)

3.2.4 Name TWO items that should NOT be placed near the edge of an excavation. (2)

3.2.5 Briefly describe the process of soil compaction. (2)

3.3 The internal measurements of the sides of a cubical water reservoir are 3 000 mm.

Show ALL calculations and round-off your answers to TWO decimal places.

3.3.1 Calculate the volume of the tank in m^3. (5)

3.3.2 Calculate the volume of the tank in litres. (2)

3.4 FIGURE 3.4 below shows the sectional front view and top view of the bricks and the floor slab. The manhole opening is 660 mm x 520 mm. Use the information in the drawing and the specifications provided below to calculate the quantity of materials needed to construct the manhole.

Use the following specifications:

- Walls are 220 mm thick
- Use 50 bricks per square metre for a half-brick wall

Calculate the following:

- The volume of concrete needed for the foundation
- The number of bricks needed for the manhole. Ignore the openings for the inlet and outlet pipes
- The total number of bricks required, including a 5% breakage allowance

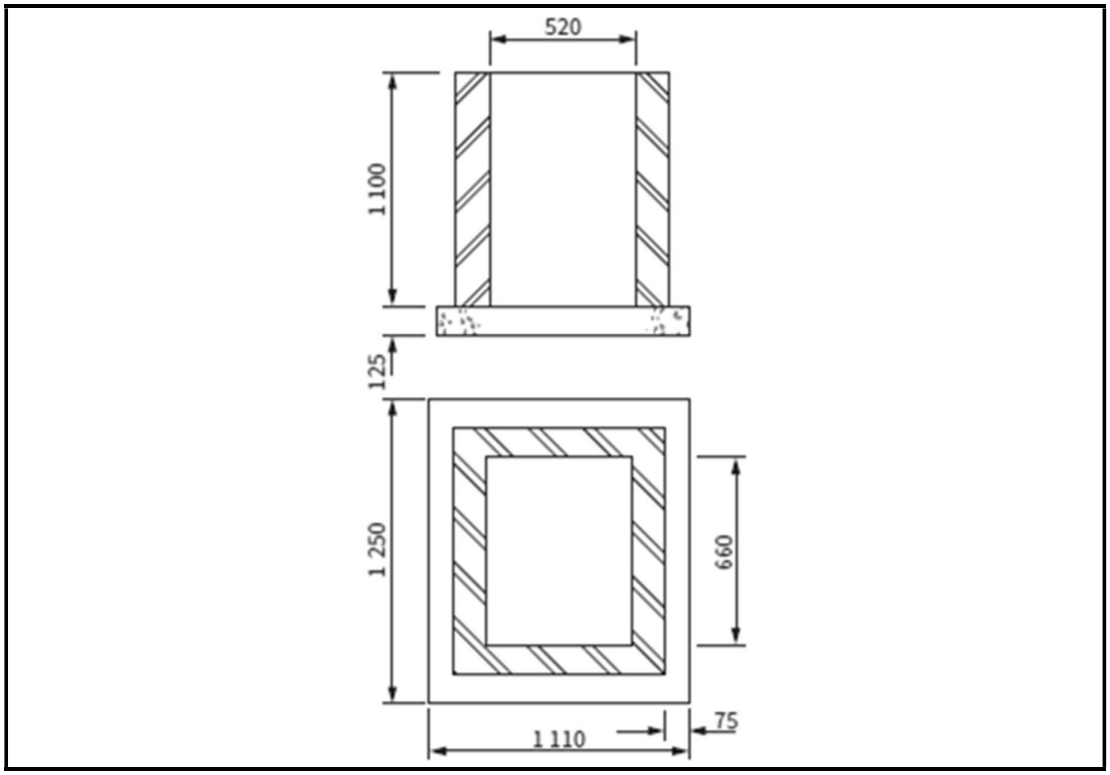


FIGURE 3.4

3.4.1 Calculate the volume of concrete needed for the foundation. (4)

3.4.2 Calculate the number of bricks needed for the manhole. Ignore the openings for the inlet and outlet pipes. (4)

3.4.3 Calculate the total number of bricks required, including a 5% breakage allowance. (2)

[30]

QUESTION 4: COLD-WATER SUPPLY AND CONSTRUCTION (SPECIFIC)

Start this question on a NEW page.

4.1 Draw a sectional view of a manhole with benching and add the relevant labels to the drawing. (14)

4.2 Answer the following questions about concrete ring manholes in your ANSWER BOOK.

4.2.1 Name THREE accessories that are included in a concrete ring manhole. (3)

4.2.2 Name THREE locations where manholes are installed. (3)

4.3 FIGURE 4.3 below is a drawing of a device used in a cold-water system. Answer the following questions.

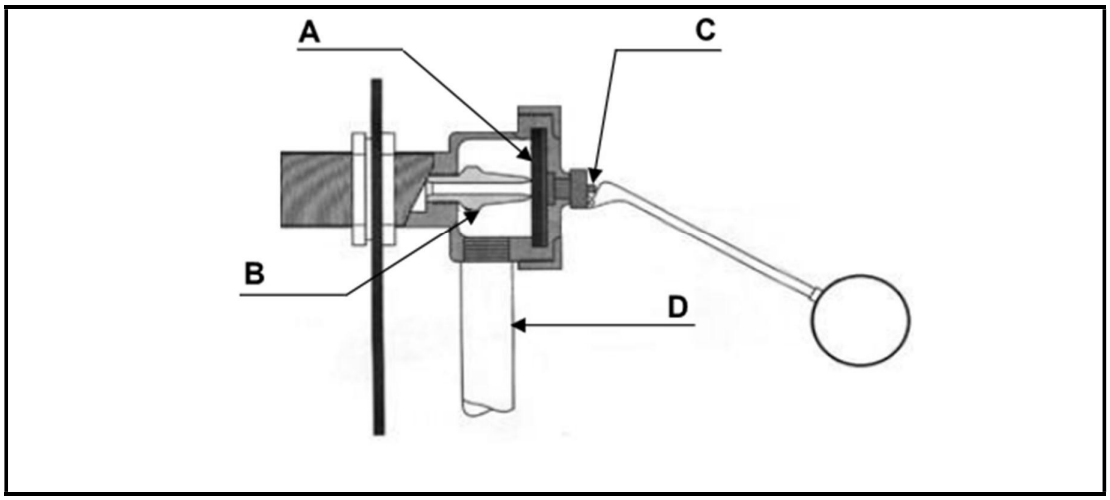


FIGURE 4.3

4.3.1 Name the device shown in FIGURE 4.3. (1)

4.3.2 Identify parts **A**, **B**, **C** and **D**. (4)

4.3.3 Explain what happens when part **B** rises and pushes against part **A**. (2)

4.3.4 Where is the device in FIGURE 4.3 used? (1)

4.4 Name FOUR water-saving devices. (4)

4.5 Describe the term *wastewater.* (2)

4.6 What should be placed between the flange joint when it is in use? (1)

4.7 What type of coupling can be used to join TWO galvanised pipes together? (1)

4.8 Draw a simple lap joint with poor surface contact. (4)
[40]

QUESTION 5: GRAPHICS AS MEANS OF COMMUNICATION AND QUANTITIES (SPECIFIC)

Start this question on a NEW page.

5.1 ANSWER SHEET 5.1 shows the front view and top view of cylindrical pipe elbow.

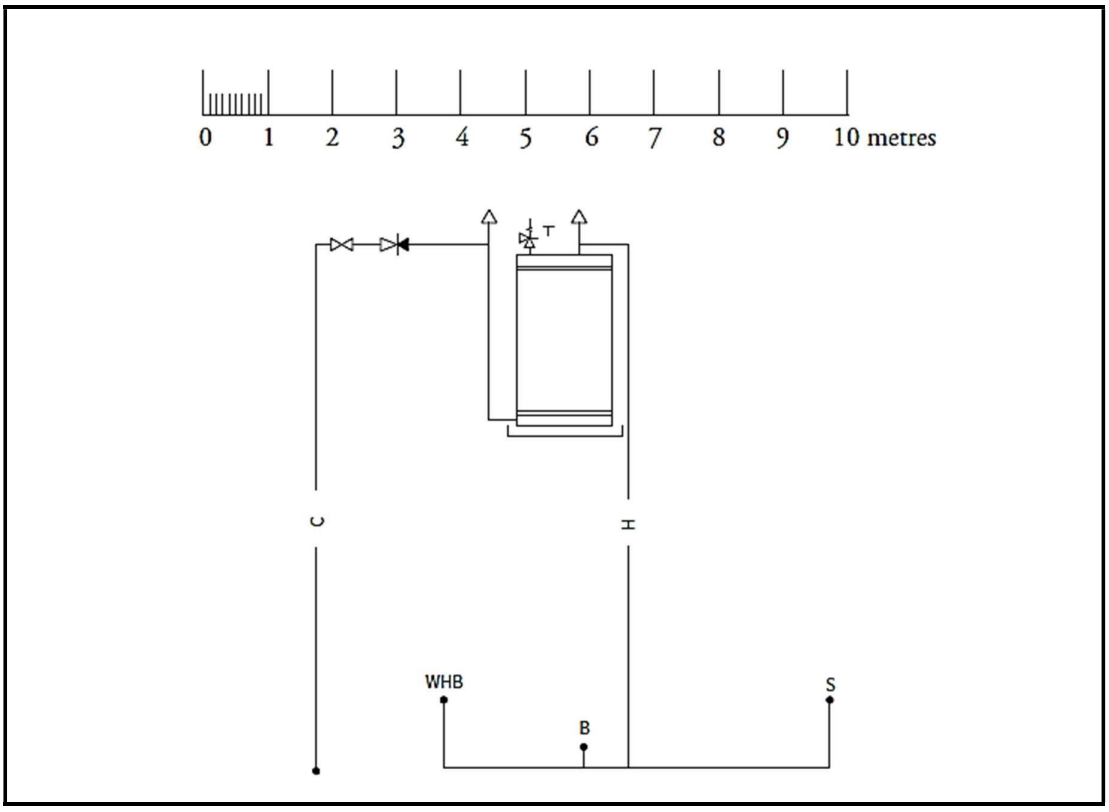
Use the drawing and the information on the ANSWER SHEET 5.1 to draw ONE development of the vertical cylindrical pipe elbow. Start the development at **A**, showing the 3 mm seam on both sides.

Show ALL construction lines. Do NOT redraw the given views. Project the development from the given views. (20)

5.2 FIGURE 5.2 below shows a pictorial line diagram of the cold and hot-water supply for a building. The cold-water pipe to the geyser and the hot-water pipe from the geyser each have a diameter of 22 mm. The branch pipes for the hot water have a diameter of 15 mm. Study the drawing carefully and calculate the quantities of the material required to complete the cold- and hot-water installation below.

Use the graphic scale to calculate the length of piping needed.

Use ANSWER SHEET 5.2 to complete the question.



(10)

FIGURE 5.2

[30]

QUESTION 6: JOINING, MATERIALS AND TOOLS AND EQUIPMENT (SPECIFIC)

Start this question on a NEW page.

6.1 Explain dezincification. (2)

6.2 Name THREE problems that dezincification can cause. (3)

6.3 Briefly describe an electrolytic reaction. (3)

6.4 Name THREE ways to prevent corrosion. (3)

6.5 FIGURE 6.5 below shows a machine tool used in a workshop.

FIGURE 6.5

6.5.1 Identify the tool in FIGURE 6.5. (1)

6.5.2 What is the purpose of this machine? (2)

6.5.3 Name TWO ways to care for this machine. (2)

6.5.4 What safety measures should be taken before using this machine? (2)

6.5.5 Name TWO types of PPE that should be worn when working on this machine. (2)

6.6 Name TWO tools that can be used to cut copper pipes. (2)

6.7 Securing galvanised pipe is essential. Name TWO ways to secure galvanised pipes. (2)

6.8 Provide a step-by-step explanation of how to use a pipe cutter, including the entire process from start to finish when cutting a pipe. (6)

6.9 FIGURE 6.9 below shows a tool that is used on a building site and in workshops.

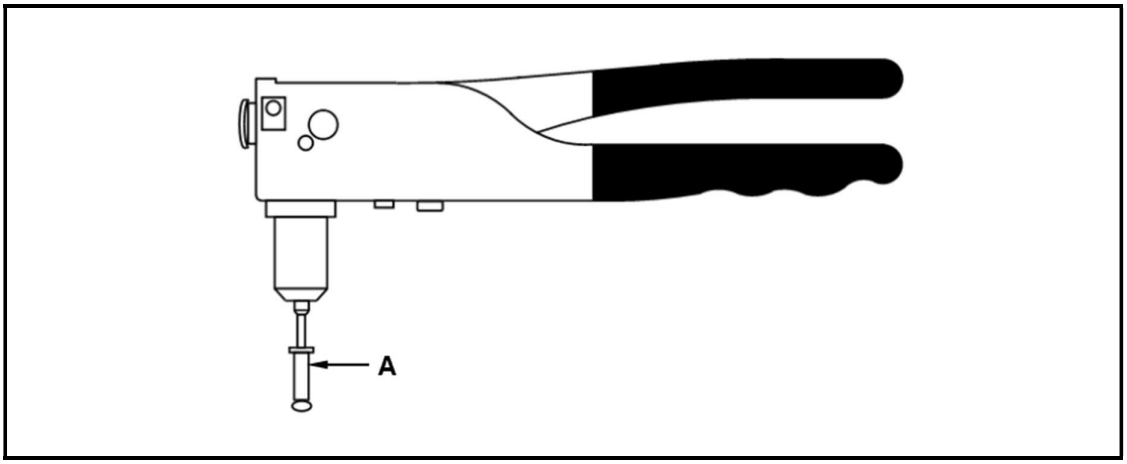


FIGURE 6.9

6.9.1 Identify the tool illustrated in FIGURE 6.9. (1)

6.9.2 Name ONE material that is normally used to manufacture the nail at point **A**. (1)

6.9.3 Name ONE material that is used to manufacture the head at point **A**. (1)

6.9.4 Identify TWO materials that can be joined using the tool shown in FIGURE 6.9. (1)

6.9.5 Draw a neat freehand sketch showing how to join two pieces of material with a rivet, and label the sketch. (6)

[40]

TOTAL: 200

END

NAME AND SURNAME: _____

ANSWER SHEET 2

NO.	QUESTION	ANSWER	MARKS
2.1	Name the drawing depicted in FIGURE **B.**		1
2.2	Deduce the scale of the drawing.		1
2.3	Identify number **4**.		1
2.4	Identify number **12**.		1
2.5	Identify number **11**.		1
2.6	Identify number **8**.		1
2.7	Identify number **7**.		1
2.8	Identify number **14**.		1
2.9	Identify number **5**.		1
2.10	Identify the number that indicates the ELECTRICITY METER in FIGURE **B**.		1
2.11	Recommend TWO suitable scales for floor plans other than the one listed in the notes.		2
2.12	Give the abbreviations for the following: 2.12.1 Water closet 2.12.2 Bath	2.12.1 2.12.2	2
2.13	Name the feature that must be placed in front of the sliding door as specified in the notes.		1
2.14	Who checked the drawing?		1
2.15	Describe what is indicated by number **3.**		1

NAME AND SURNAME: _____

ANSWER SHEET 2

2.16	Differentiate between the light installed in the lounge and that in the office.		2
2.17	Provide the drawing number from the building plan.		1
2.18	Who must be notified when a contractor sets out levels on a site and there are variances?		1
2.19	Identify ONE important feature that is omitted from the plan.		1
2.20	What should be installed for balancing and support as you go up the staircase?		1
2.21	Deduce the height of window 2 from the window schedule.		1
2.22	Draw the symbol for a shower.		1
2.23	Draw the electrical symbol for a wall mounted light.		2
2.24	Deduce the width of window **3** from the window schedule.		1

NAME AND SURNAME: _____

ANSWER SHEET 2

2.25	Recommend a suitable floor covering for the bathroom.		1
2.26	Explain what is meant by 1:10, as indicated on the symbol in the notes.		1
2.27	Identify the type of roof that is used for the building in FIGURE **A**.		1
2.28	Prove, by means of a control test, that the total vertical dimensions on the left and right of the plan in FIGURE **B** are equal.		6
2.29	Calculate the area of the bathroom. Show ALL calculations. Give your answer in m². Round-off your answer to TWO decimal places.		3
		TOTAL:	**40**

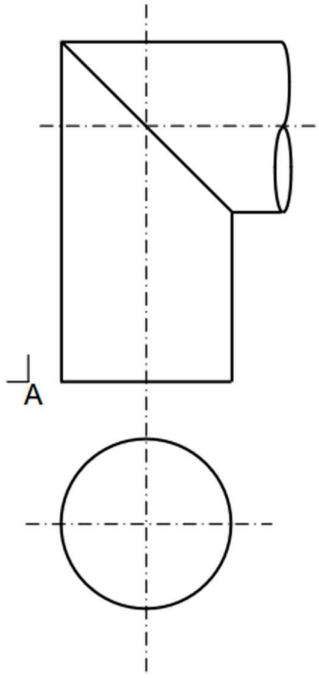
NAME AND SURNAME: _____

ANSWER SHEET 3.4

A	B	C	D
			3.4.1. **Volume of concrete needed for the floor slab:**
			Length of floor slab =
			Width of floor slab =
			Thickness of concrete =
			_____ m^3 of concrete is needed for the floor slab
			Centre line of manhole walls:
			_____ = _____
			_____ = _____
			Total: = _____
			Plus: _____ = _____
			Total centre line = _____
			(5)
			3.4.2 **Number of bricks:**
			Centre line = _____
			Height of wall for manhole = _____
		_____ bricks	50 bricks per m^2 for a $\frac{1}{2}$ brick wall
			_____ bricks are needed
			(3)
			3.4.3 **5% for breakage:**
			= $\frac{5}{100}$ x _____
			= _____
			= _____ bricks
			Total number of bricks needed:
			= _____ + _____
			= _____ bricks
			(2)
			(10)

NAME AND SURNAME: _____

ANSWER SHEET 5.1



NO.	ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
1	Correctness of development	20	
	TOTAL:	20	

NAME AND SURNAME: _____

ANSWER SHEET 5.2

ITEM	NAME OF SANITARY-WARE OR FITTING	MATERIAL	SIZE	QUANTITY
1	**5.2.1:**_____		150 litres	**5.2.2:**_____
2	Temperature and pressure safety valve with overflow	**5.2.3**: _____		1
3	**5.2.4:**_____	Copper		2
4	Drain cock	**5.2.5**: _____		**5.2.6**: _____
5	Pressure-control valve	**5.2.7**: _____	**5.2.8**: _____	**5.2.9**: _____
6	**5.2.10:**_____	Copper		1
				(10)