



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2019**

**CIVIL TECHNOLOGY: CIVIL SERVICES**

**MARKS: 200**

**TIME: 3 hours**



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This question paper consists of 14 pages, including 3 pages answer sheets.

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**REQUIREMENTS:**

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

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of SIX QUESTIONS: THREE questions are generic and THREE 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 QUESTIONS 3.2, 5.1 and 6.2 on the attached ANSWER SHEETS, 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. Drawings in the question paper are NOT to scale due to electronic transfer.

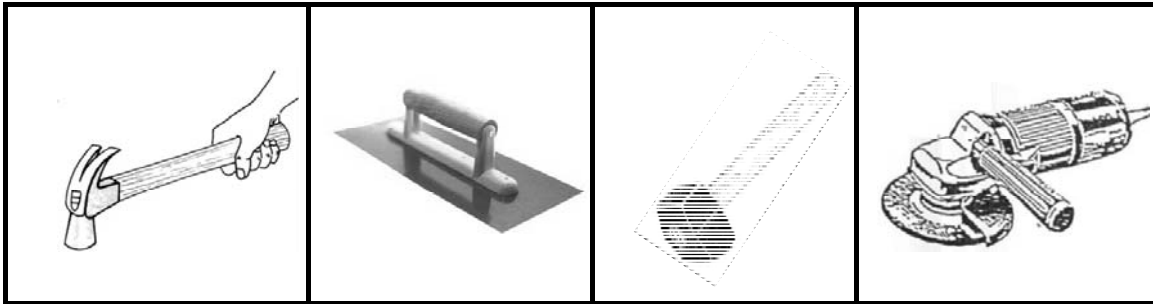
**QUESTION 1: SAFETY AND MATERIALS (GENERIC)**

- 1.1 What is the meaning of the abbreviation *PPE*? (1)
- 1.2 Name TWO requirements for protective footwear that is worn on a building site. (2 x 1) (2)
- 1.3 General safety for small plant equipment is important. Briefly motivate why the following safety rules must be adhered to:
- 1.3.1 Pre-operational checks should be conducted on equipment. (1)
- 1.3.2 Petrol engines should only be used outside. (1)
- 1.3.3 Driving and rotating parts should be covered. (1)
- 1.3.4 Operators should receive training with regards to equipment. (1)
- 1.4 Answer the following questions with regard to the safe stacking of materials:
- 1.4.1 What should workers use to climb up and down the stack? (1)
- 1.4.2 Name TWO factors that should not be affected by a stack. (2 x 1) (2)
- 1.4.3 Determine the maximum height of a stack if the material have a width of 500 mm and a thickness of 250 mm. (2)
- 1.4.4 Why should a stack have no protruding parts? (1)
- 1.5 Name the TWO main elements of screed. (2 x 1) (2)
- 1.6 Name ONE example of a fine aggregate. (1)
- 1.7 Name ONE purpose of lime in a building mixture. (1)
- 1.8 Name TWO board products that are suitable for wall panelling. (2 x 1) (2)
- 1.9 Name TWO uses of stainless steel. (2 x 1) (2)
- 1.10 What element of ferrous metals makes it prone to corrosion? (1)
- 1.11 Define the term *alloy*. (3)
- 1.12 Name TWO uses of safety glass (2 x 1) (2)
- 1.13 Name ONE use of a mastic sealant. (1)
- 1.14 Define the term *thermoplastic*. (2)

**[30]**

**QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)**

2.1 Name the tools in FIGURES 2.1.1 to 2.1.4 and name ONE use of each. (4 x 2) (8)

**FIGURE 2.1.1****FIGURE 2.1.2****FIGURE 2.1.3****FIGURE 2.1.4**

2.2 Which power tool will be used for the following work:

2.2.1 Sharpening of chisels (1)

2.2.2 To cut rebates in wood (1)

2.3 Identify the tool in FIGURE 2.3 and name TWO uses of it. (3 x 1) (3)

**FIGURE 2.3**

2.4 Name TWO maintenance measures which are applicable to straight edges. (2 x 1) (2)

2.5 Briefly motivate why universal pliers cannot be used for clamping plumbing pipes. (1)

2.6 Answer the following questions with regard to the elevation in FIGURE 2.6.

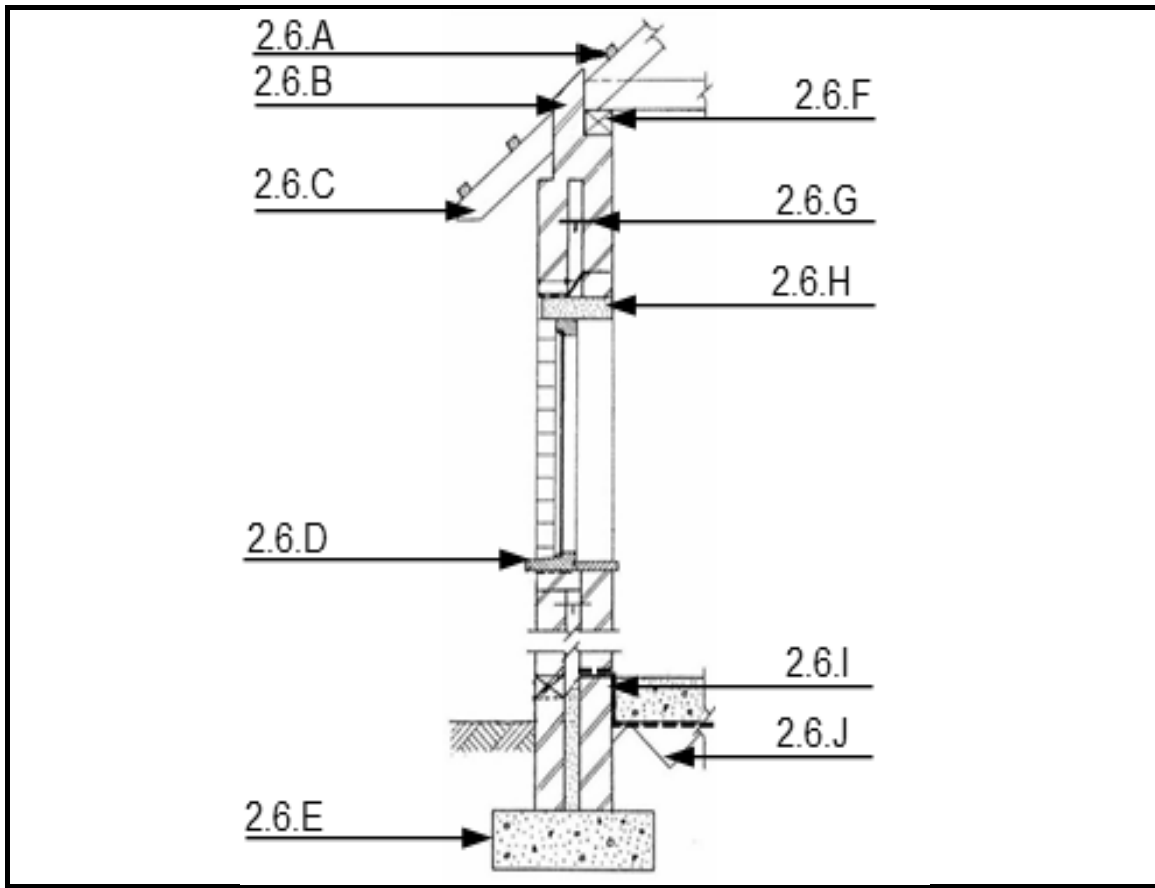


FIGURE 2.6

- 2.6.1 Name the type of elevation. (1)
- 2.6.2 Name the parts labelled 2.6.A to 2.6.J. (10)
- 2.6.3 What are the width and thickness dimensions of part 2.6.F? (2)
- 2.6.4 What is the purpose of part 2.6.G? (1)
- 2.7 Name FOUR particularities with regard to roof constructions which must be indicated in elevations. (4 x 1) (4)
- 2.8 Make neat sketches to illustrate the following symbols:
  - 2.8.1 Plaster (2)
  - 2.8.2 Undressed wood (2)
  - 2.8.3 Invert level (2)

[40]

**QUESTION 3: QUANTITIES, JOINING AND GRAPHICS (GENERIC)**

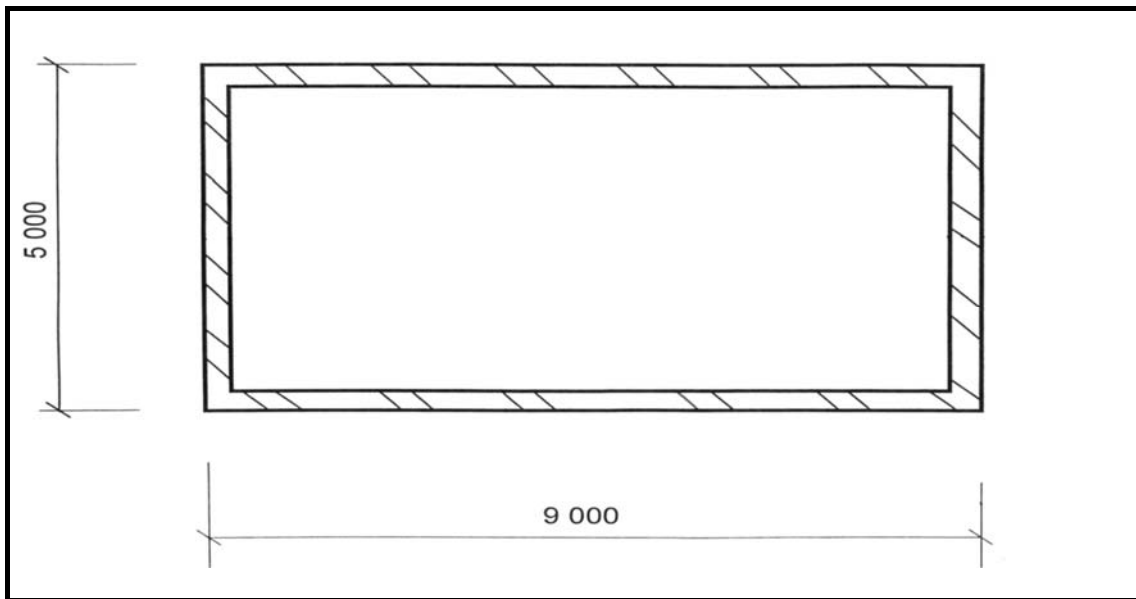
3.1 Make neat sketches to illustrate the following symbols on a floor plan:

3.1.1 Grease trap (2)

3.1.2 DPC (Damp-proof course) (2)

3.1.3 Staircase (2)

3.2 FIGURE 3.2 below shows the floor plan of the foundation walls of a single room.



**FIGURE 3.2**

Use the following specifications:

- The floor slab is 85 mm thick
- Walls are 220 mm thick

Use ANSWER SHEET 1 and calculate the volume of concrete needed to cast the floor slab between the external walls. (12)

3.3 Name THREE properties of silicone. (3 x 1) (3)

3.4 Describe the application process of contact glue. (3)

3.5 Name ONE property of PVC-adhesive. (1)

3.6 Name THREE functions of glass. (3 x 1) (3)

3.7 Discuss the difference between *polythene* and *polyvinyl chloride*. (2)

**[30]**

**QUESTION 4: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)**

- 4.1 Plumbers may come into contact with harmful sewage. Name THREE steps that can be taken to prevent infections involving sewerage. (3 x 1) (3)
- 4.2 Name TWO safety measures which must be applied to avoid breathing in of soldering fumes. (2 x 1) (2)
- 4.3 Choose a term in COLUMN B that matches the description in COLUMN A. Write only the letter (A–E) next to the question number (4.3.1–4.3.3) in the ANSWER BOOK, for example 4.3.4 F.

COLUMN A		COLUMN B	
4.3.1	Where concrete structures are not subjected to tensile and bending stress	A	Cement
4.3.2	To bind masonry	B	Screed
4.3.3	Smoothing of concrete floors	C	Mortar
		D	Unreinforced concrete
		E	Coarse aggregates

(3 x 1) (3)

- 4.4 Which type of board product will be used as formwork when a smooth finish for concrete is required? (1)
- 4.5 Briefly motivate why meranti wood will not be used for the manufacturing of roof trusses. (1)
- 4.6 Explain the difference in use of filler bricks and face bricks. (2)
- 4.7 Briefly motivate why copper is more suitable than malleable iron for the use of hot water supply. (1)
- 4.8 Which metal is used for the galvanising of iron? (1)
- 4.9 Which factor determines the thickness of the glass in window frames? (1)
- 4.10 Name THREE properties of polypropylene which make it ideal for sewer pipes. (3 x 1) (3)

- 4.11 Answer the following questions with regard to the tools in FIGURES 4.11.A and 4.11.B.

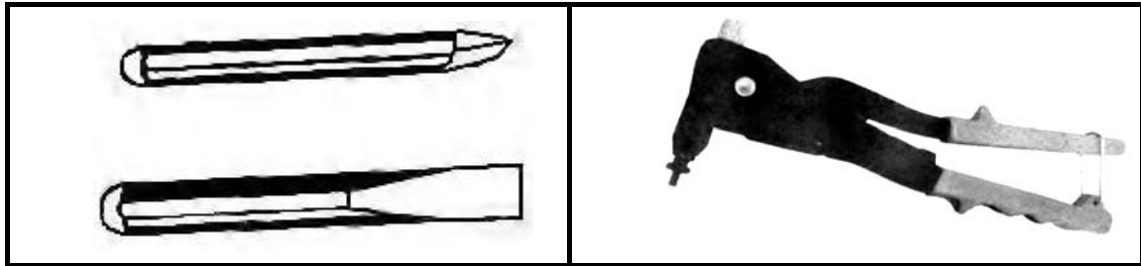


FIGURE 4.11.A

FIGURE 4.11.B

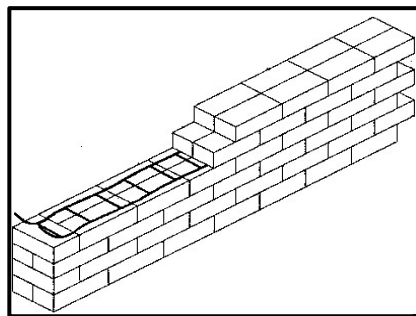
- 4.11.1 Identify the tools in FIGURES 4.11.A and 4.11.B. (2)
- 4.11.2 Name TWO maintenance measures which must be applied to tool 4.11.A. (2 x 1) (2)
- 4.11.3 Describe the use of tool 4.11.B. (2)
- 4.12 Briefly describe the preparation of the pipes which must be joined by heat fusion. (2)
- 4.13 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the question number (4.13.1–4.13.4) in the ANSWER BOOK.
- 4.13.1 Galvanised pipes are bent with a pipe bending spring. (1)
- 4.13.2 Polythene pipes are joined with thread connections. (1)
- 4.13.3 Lead solder must never be used for connecting drink-water pipes. (1)
- 4.13.4 Sleeve anchors are used when pipework is anchored to wood. (1)

**[30]**



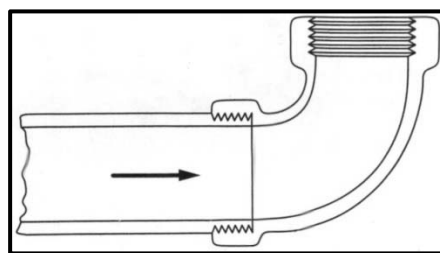
**QUESTION 5: GRAPHICS, CONSTRUCTION AND JOINING (SPECIFIC)**

- 5.1 FIGURE 5.1 on ANSWER SHEET 2 shows the plan and elevation of a square downpipe.  
Use ANSWER SHEET 2 and develop and draw the development of the square downpipe on scale 1 : 1. (16)
- 5.2 Briefly motivate why concrete must be cured. (2)
- 5.3 Name TWO defects in concrete which are caused by inadequate curing. (2 x 1) (2)
- 5.4 Answer the following questions with regard to the wall construction in FIGURE 5.4.



**FIGURE 5.4**

- 5.4.1 What is this type of wall called? (1)
- 5.4.2 In which bond is this wall built? (1)
- 5.4.3 What is the thickness of the wall? (1)
- 5.5 Describe the consequences of a water supply pipework installation which has not been sturdily secured to the structure. (2)
- 5.6 Answer the following question with regard to pipe connection in FIGURE 5.6:



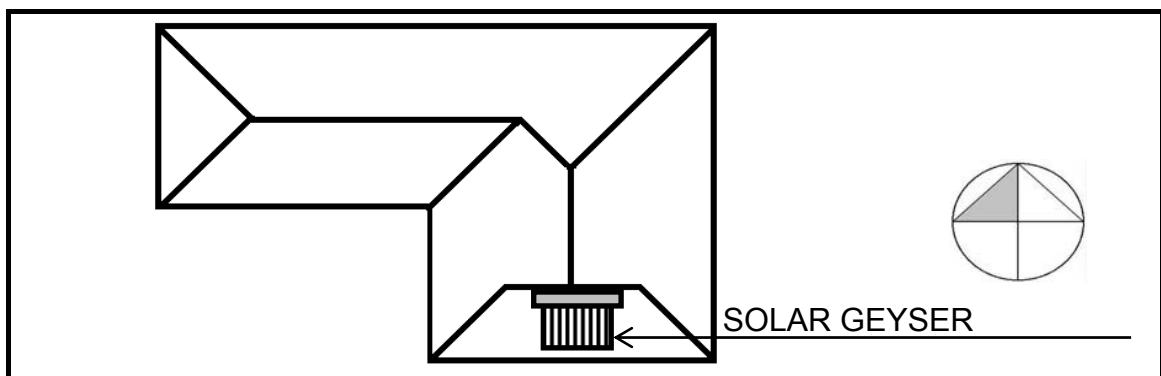
**FIGURE 5.6**

- 5.6.1 Which type of pipe is connected with this type of fitting connection? (1)
- 5.6.2 Describe the method which must be used to ensure a water tight connection. (1)
- 5.7 Briefly describe the working of a spring toggle bolt which makes it ideal for securing against drywalls. (2)
- 5.8 Make a neat sketch to illustrate the shape of a grooved seam joint in sheet metal. (1)

**[30]**

**QUESTION 6: COLD AND HOT WATER SUPPLY, DRAINAGE AND SANITARY FITMENTS (SPECIFIC)**

- 6.1 Identify the type of pipe which is connected by means of each of the following joining methods:
- 6.1.1 Soldering (1)
- 6.1.2 Compression joint (1)
- 6.1.3 Threaded joint (1)
- 6.2 FIGURE 6.2 on ANSWER SHEET 3 shows an incomplete sketch of a valve for cold water supply. Answer the following questions with regard to the valve.
- 6.2.1 Complete the sketch on ANSWER SHEET 3 by drawing in the TWO missing parts of the valve. (2)
- 6.2.2 What is this valve called? (1)
- 6.2.3 Explain the purpose of the valve. (2)
- 6.3 Briefly motivate why pipes below a building must be laid inside a sleeve. (2)
- 6.4 Make neat sketches of symbols for the following hot water systems:
- 6.4.1 Automatic shut-off valve (1)
- 6.4.2 Non-return valve (1)
- 6.4.3 Pressure-relief valve (1)
- 6.4.4 Vacuum-relief valve (1)
- 6.5 Briefly motivate why the hot water outlet is on top of the high pressure geyser. (2)
- 6.6 Name TWO factors which cause pressure relief valves to discharge. (2 x 1) (2)
- 6.7 FIGURE 6.7 shows a roof plan and the position of a solar hot water geyser. Answer the following questions with regard to the position of the solar geyser.



**FIGURE 6.7**

- 6.7.1 Motivate why the solar geyser in the FIGURE 6.7 is not in a good position. (2)
- 6.7.2 Identify the correct placing for the solar geyser. (1)

- 6.8 What is the purpose of the tank vent pipe of a solar geyser. (1)
- 6.9 FIGURE 6.9 shows the cross-section of a high-pressure solar geyser. Identify the parts 6.9.A to 6.9.C. (3)

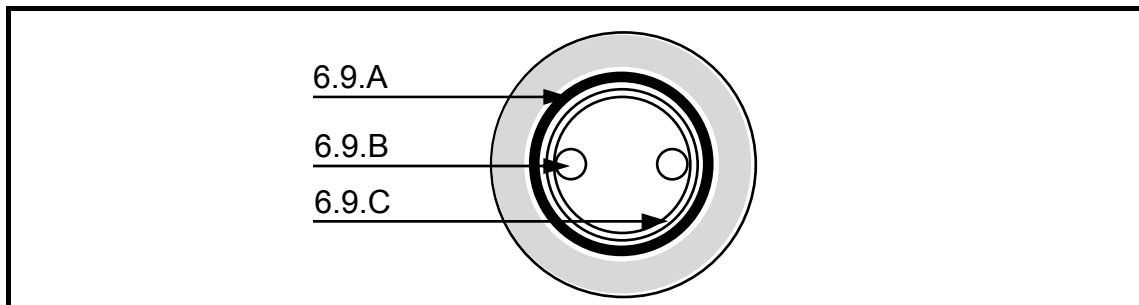


FIGURE 6.9

- 6.10 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the question number (6.10.1–6.10.3) in the ANSWER BOOK.
  - 6.10.1 Excess sewage must be discharged in stormwater channels. (1)
  - 6.10.2 Sanitary fittings must be made of impermeable material. (1)
  - 6.10.3 The water supply outlet to the waste appliances must be at least 120 mm above the flood level of the appliance. (1)
- 6.11 Explain the consequence of siphonage in a sanitary pipe system. (4)
- 6.12 How is siphonage in a sanitary pipe system eliminated? (1)
- 6.13 What is the difference between a *stub-stack sanitary system* and a *one-pipe sanitary system*? (1)
- 6.14 Name TWO disadvantages of a one-pipe sanitary system. (2 x 1) (2)
- 6.15 Name TWO materials from which cisterns are manufactured. (2 x 1) (2)
- 6.16 Briefly explain the working of the outlet silencer pipe of a cistern. (2)

[40]

TOTAL: 200



<b>ANSWER SHEET 1</b>	<b>CIVIL TECHNOLOGY CIVIL SERVICES (GENERIC)</b>	NAME: _____
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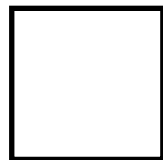
3.2 Calculate the volume of concrete needed to cast the floor slab between the external walls. (12)

A	B	C	D
			<b>Internal measurements of long walls (3)</b>
			= _____ - _____ - _____
			=
			<b>Internal measurements of short walls (3)</b>
			= _____ - _____ - _____
			=
			<b>Volume of concrete needed (6)</b>
			<b>Length of floor slab =</b>
			<b>Width of floor slab =</b>
			<b>Thickness of floor slab =</b>
			<b>(12)</b>

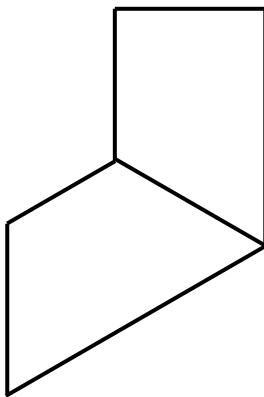


<b>ANSWER SHEET 2</b>	<b>CIVIL TECHNOLOGY CIVIL SERVICES (GENERIC)</b>	<b>NAME:</b> _____
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5.1 FIGURE 5.1 on ANSWER SHEET 2 shows the plan and elevation of a square downpipe.  
Use ANSWER SHEET 2 and develop and draw the development of the square downpipe on scale 1 : 1. (16)



PLAN VIEW



ELEVATION VIEW

Base lines:	3	
Seam lines:	2	
Vertical construction lines:	6	
Intersection lines:	5	
<b>TOTAL:</b>	<b>16</b>	

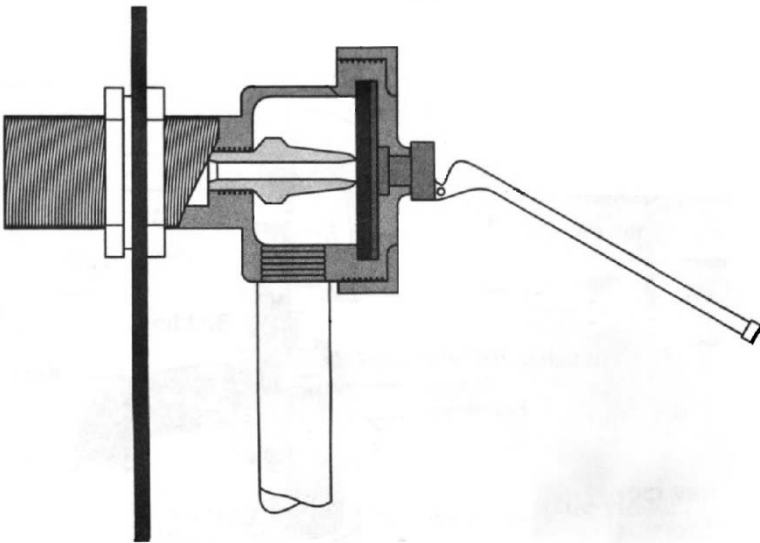




<b>ANSWER SHEET    3</b>	<b>CIVIL TECHNOLOGY CIVIL SERVICES (GENERIC)</b>	NAME: _____

6.2 FIGURE 6.2 on ANSWER SHEET 3 shows an incomplete sketch of a valve for cold water supply. Answer the following questions with regard to the valve.

6.2.1 Complete the sketch on ANSWER SHEET C by drawing in the TWO lacking parts of the valve. (2)



Lacking parts	2	
<b>TOTAL:</b>	<b>2</b>	

