



Province of the
EASTERN CAPE
EDUCATION



**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2022

**CIVIL TECHNOLOGY: CIVIL SERVICES
(EXEMPLAR)**

MARKS: 200

TIME: 3 hours

This question paper consists of 16 pages, including 3 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: 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 2.7, 5.1, 5.6 and 5.7 on the attached ANSWER SHEET, using drawing instruments where necessary.
13. Write your NAME on all ANSWER SHEETS and hand them in with your ANSWER BOOK, whether you have answered the question or not.
14. Owing to electronic transfer, drawings in the question paper are NOT to scale.
15. Google images was used as the source of all photographs and pictures.

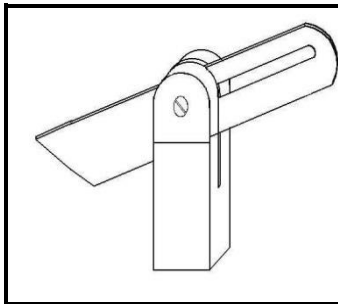
QUESTION 1: SAFETY AND MATERIALS (GENERIC)

- 1.1 What type of boot is compulsory to wear when working with cement or concrete? (1)
- 1.2 Under what circumstances will the following personal protective equipment be used:
- 1.2.1 Safety glasses (1)
- 1.2.2 Earplugs (1)
- 1.3 Briefly motivate why loose hanging clothes must be avoided when working on machines. (2)
- 1.4 Describe the safety precaution that is applicable with the following hand tools:
- 1.4.1 Hammer heads (1)
- 1.4.2 Sawing equipment (1)
- 1.4.3 When carrying chisels (1)
- 1.5 Briefly motivate why a concrete mixer with a petrol engine may only be used in the open air (outside). (2)
- 1.6 Name TWO requirements for the storing of cement. (2 x 1) (2)
- 1.7 Why should warning signs be shown where workers are busy with overhead work? (1)
- 1.8 Name FOUR requirements for storing of hazardous material in the workplace. (4 x 1) (4)
- 1.9 Name the THREE ingredients needed to mix screed. (3 x 1) (3)
- 1.10 Name THREE uses for screed. (3 x 1) (3)
- 1.11 Briefly motivate why coarse aggregate should not be used in a mortar mixture. (1)
- 1.12 Identify the type of board product that will be used for the following work:
- 1.12.1 Backs of cupboards (1)
- 1.12.2 Formwork for concrete (1)
- 1.13 Briefly describe the difference between *stock bricks* and *face bricks*. (2)
- 1.14 Name TWO uses of cast iron. (2 x 1) (2)

[30]

QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)

- 2.1 Briefly motivate why the round shovel is not effective to squarely finishing-off foundation trenches. (1)
- 2.2 Name THREE hand tools that can be used to dress / cut bricks. (3 x 1) (3)
- 2.3 Identify the tool that will be used for the following work:
- 2.3.1 Carrying of plaster so that it can be applied to a wall (1)
- 2.3.2 Scraping or floating plastered walls (1)
- 2.3.3 Creating a rounded edge along external corners (1)
- 2.3.4 Touching up of small areas (1)
- 2.4 Briefly describe the difference in using a rip saw and a cross-cut saw. (2)
- 2.5 Name the tools in FIGURES 2.5.1 to 2.5.3 below and name ONE use of each.

**FIGURE 2.5.1****FIGURE 2.5.2****FIGURE 2.5.3**

(3 x 2) (6)

- 2.6 Answer the following questions in regard to the construction machine in FIGURE 2.6.

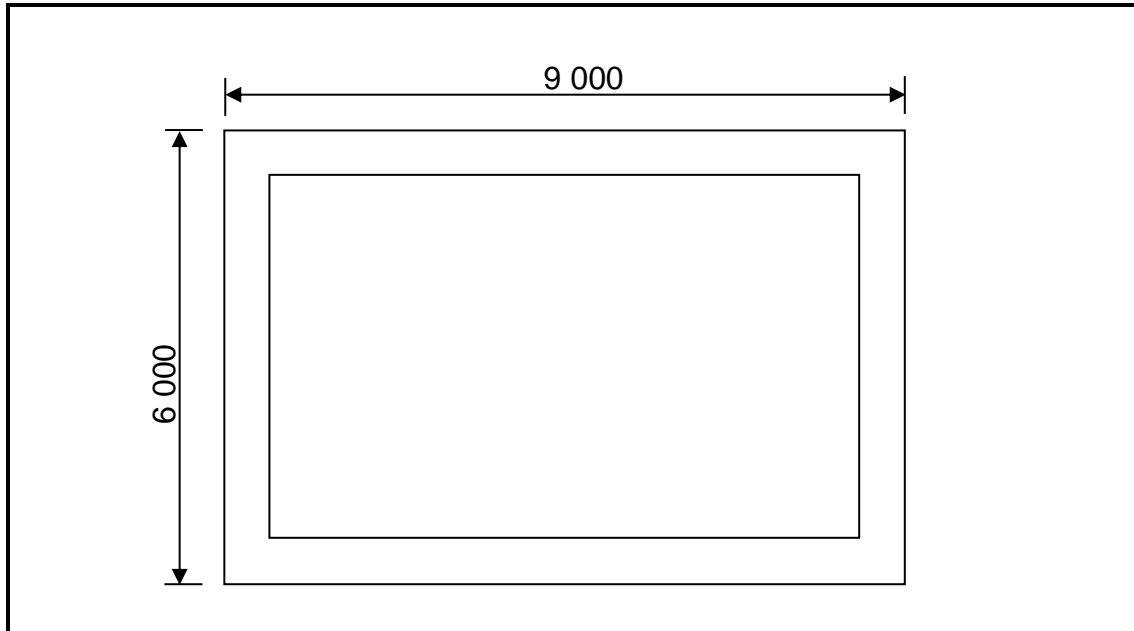
**FIGURE 2.6**

- 2.6.1 What is this tool called? (1)
- 2.6.2 Describe the purpose of this machine. (1)

- 2.7 FIGURE 2.7 on ANSWER SHEET 1 shows the isometric view of a T-junction of a half brick wall in stretcher bond.
Use ANSWER SHEET 1 and draw the front view of the brick wall on scale 1 : 10. (13)
- 2.8 Describe the purpose of detail drawings. (2)
- 2.9 Name THREE details that must be shown on a site plan. (3 x 1) (3)
- 2.10 Make a neat sketch of how the following symbols will be illustrated on a floor plan.
- 2.10.1 Water closet (2)
- 2.10.2 Hot-water cylinder (2)
- [40]**

QUESTION 3: QUANTITIES, JOINING AND GRAPHICS (GENERIC)

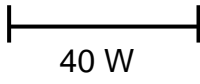
- 3.1 FIGURE 3.1 shows a foundation strip for a building.
The foundation is 600 mm wide and 200 mm thick.
A concrete mix of 1 : 4 : 4 is used.

**FIGURE 3.1**

- 3.1.1 Determine the centre line of the foundation. (5)
- 3.1.2 Determine the volume of concrete needed. (3)
- 3.2 A one brick wall of 1,2 m high and 12 m long must be constructed.
Determine the number of bricks needed.
Show ALL calculations. (5)
- 3.3 Describe the application process of PVC adhesive, when joining PVC pipes. (4)
- 3.4 Identify the following statements as TRUE or FALSE. Only write 'true' or 'false' next to the question number in the ANSWER BOOK.
- 3.4.1 Contact glue is rubbery. (1)
- 3.4.2 Contact glue is applied to one side of the area to be bonded. (1)
- 3.4.3 Contact glue must be applied at least 5 mm thick. (1)
- 3.4.4 Silicone is heat resistant. (1)
- 3.4.5 Silicone has a low toxicity. (1)
- 3.5 Name TWO safety precautions when using epoxy. (2 x 1) (2)
- 3.6 Make a neat sketch of a standard building practise north arrow. (2)

3.7 Describe the position of the north arrow on a drawing sheet. (2)

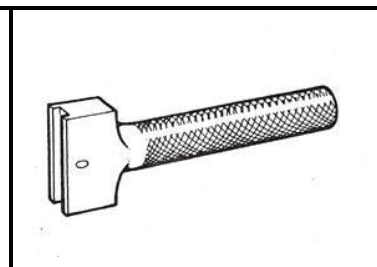
3.8 Identify the following drawing symbols.

3.8.1  (1)

3.8.2  (1)
[30]

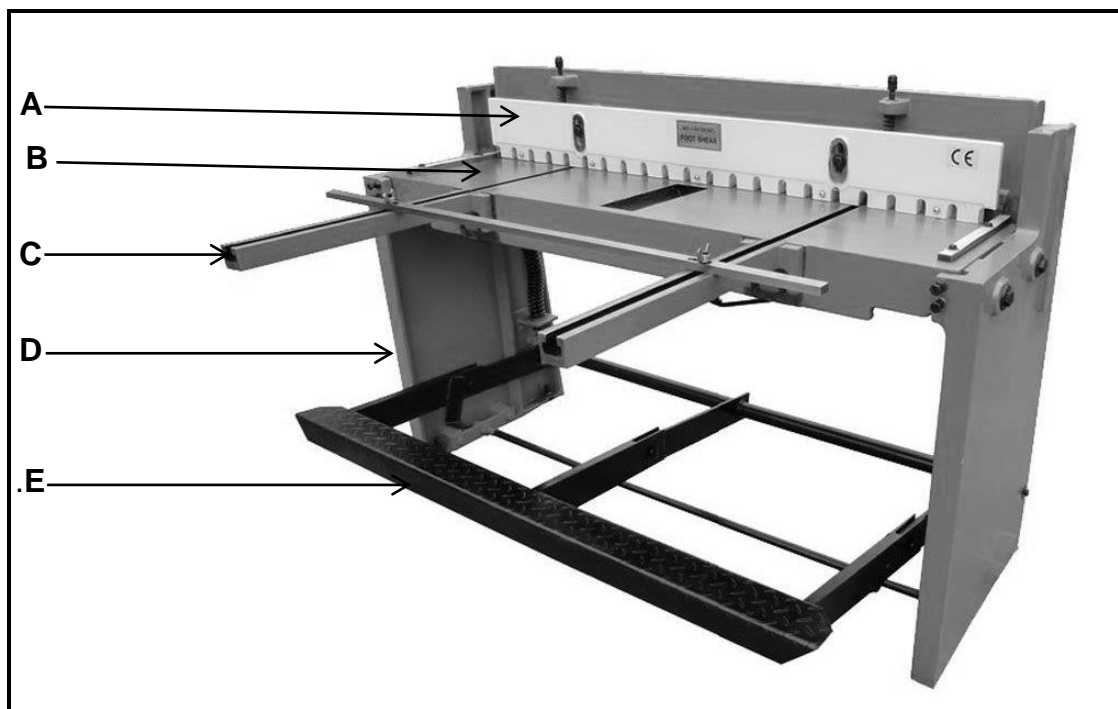
QUESTION 4: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

- 4.1 Raw sewage contains micro-organisms which can be harmful for plumbers. Name FOUR precautionary measures which must be taken to prevent infections. (4 x 1) (4)
- 4.2 Briefly motivate why solder cleaning solvents must be kept in a tight bottle. (1)
- 4.3 Which type of clothing must be worn when soldering work is done? Motivate your answer. (2)
- 4.4 Name TWO properties of ceramics. (2 x 1) (2)
- 4.5 Identify the type of tools in FIGURES 4.5.1 to 4.5.3 below and name ONE use of each.

**FIGURE 4.5.1****FIGURE 4.5.2****FIGURE 4.5.3**

(3 x 2) (6)

- 4.6 Answer the following questions with regard to the tool in FIGURE 4.6.

**FIGURE 4.6**

4.6.1 Identify the tool in FIGURE 4.6. (1)

4.6.2 Name parts **A** to **E** of the tool. (5)

4.6.3 Name TWO caring measures for the tool. (2 x 1) (2)

4.7 Answer the following questions with regard to the tool in FIGURE 4.7.



FIGURE 4.7

4.7.1 What is this tool called? (1)

4.7.2 Name the use of this tool. (1)

4.8 Name TWO components that a chemical anchor consists of. (2)

4.9 Choose a term in COLUMN B that matches the description in COLUMN A. Write only the letter (A–E) next to the question numbers (4.9.1 to 4.9.3) in the ANSWER BOOK, for example 4.9.4 F.

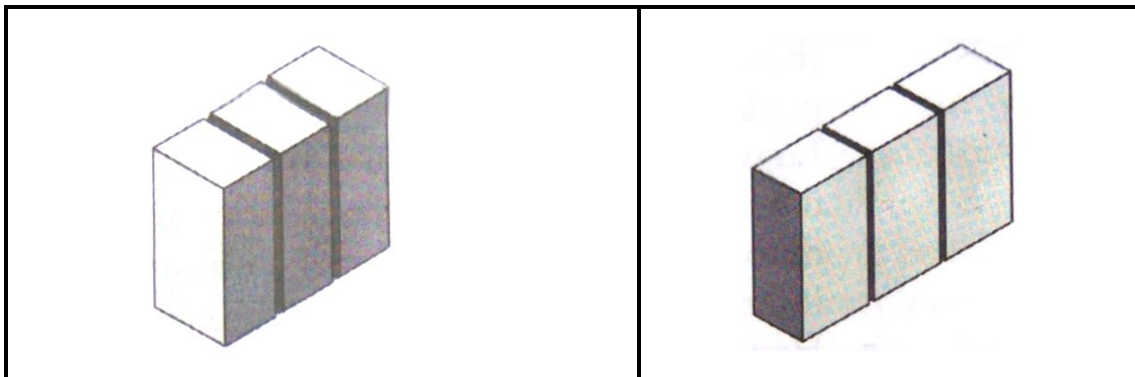
COLUMN A		COLUMN B	
4.9.1	An object for which a pattern has to be developed	A	Zinc chloride
4.9.2	Is used to solder steel which is coated with tin	B	Anvil
4.9.3	Is used when copper and brass are soldered	C	Fitting
		D	Rosin
		E	Raw acid

(3 x 1) (3)

[30]

QUESTION 5: GRAPHICS, CONSTRUCTION AND QUANTITIES (SPECIFIC)

- 5.1 FIGURE 5.1 on ANSWER SHEET 2 shows a 45° cut-off cylindrical pipe. Use ANSWER SHEET 2 and develop and draw the development of the cut-off of the cylindrical pipe on scale 1 : 1. (14)
- 5.2 When concrete is placed, air is trapped in the fresh concrete. What is the process, to remove the air called? (1)
- 5.3 Name THREE factors which must be considered during the placing of concrete. (3 x 1) (3)
- 5.4 Choose the correct answer from those in brackets and write it next to the question number in your ANSWER BOOK.
- 5.4.1 The minimum thickness of a manhole cover is (100 mm / 150 mm). (1)
- 5.4.2 The invert level of connecting pipes in a manhole should be at least (30 mm / 50 mm) above that of the main pipe. (1)
- 5.5 Identify the types of brick courses in FIGURES 5.5.1 and 5.5.2. (2)

**FIGURE 5.5.1****FIGURE 5.5.2**

- 5.6 Use the quantity list on ANSWER SHEET 3 and determine the volume of concrete needed for a floor of 6 m long, 3 m wide and 75 mm thick. (3)
- 5.7 Use the quantity list on ANSWER SHEET 3 and determine the number of bricks needed for a cavity wall with a length of 4 m and a height of 2,4 m. (5)

[30]

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

6.1 Indicate if the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question number in the ANSWER BOOK.

6.1.1 Copper pipes are rust resistant. (1)

6.1.2 Copper pipes bend easily. (1)

6.1.3 Galvanised pipes bend easily. (1)

6.1.4 High-density polyethylene pipes rust easily. (1)

6.2 Answer the following questions regarding the tap in FIGURE 6.2.

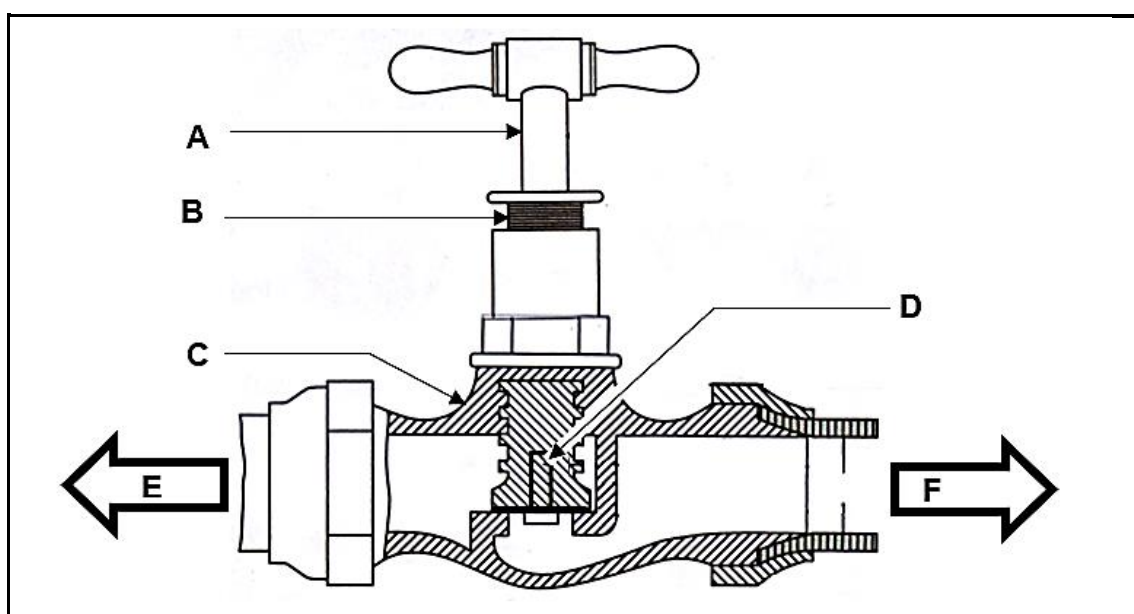


FIGURE 6.2

6.2.1 What is this type of tap called? (1)

6.2.2 Name parts **A** to **D**. (4)

6.2.3 Which arrow point indicates the correct flow direction; arrow point **E** or **F**? (1)

6.3 Describe the purpose of a ball valve. (2)

6.4 Name TWO requirements to which concealed water supply pipes in reinforced concrete must comply. (2 x 1) (2)

- 6.5 Make neat symbol sketches of the following cold-water systems:
- 6.5.1 Flow switch (2)
 - 6.5.2 Pipe crossing (2)
- 6.6 Identify the following abbreviations for hot-water systems:
- 6.6.1 BT (1)
 - 6.6.2 PCV (1)
- 6.7 Name TWO causes why T&P-valves of a geyser will discharge. (2 x 1) (2)
- 6.8 Briefly explain what a direct coupled solar hot water geyser system is. (2)
- 6.9 What is the disadvantage of a direct coupled solar hot water geyser system when it is not installed high enough? (1)
- 6.10 Briefly motivate why a solar hot water geyser system must face north. (1)
- 6.11 Describe the properties of the outer tube of the high pressure direct coupled solar hot water geyser system. (2)
- 6.12 What is the minimum gradient for a 300 mm-storm water pipe? (1)
- 6.13 Give the abbreviation for the following drainage systems:
- 6.13.1 Gully (1)
 - 6.13.2 Water closet (1)
 - 6.13.3 Soil pipe (1)
- 6.14 Name TWO advantages of a single stack drainage system. (2 x 1) (2)
- 6.15 What is the standard height above floor level that a shower rose is mounted? (1)

6.16 Answer the following questions regarding the fixture in FIGURE 6.16.

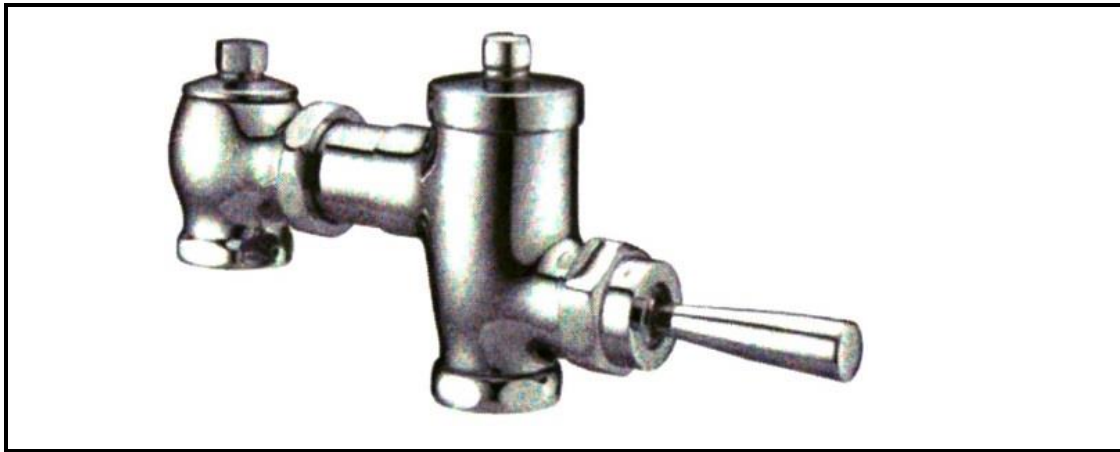


FIGURE 6.16

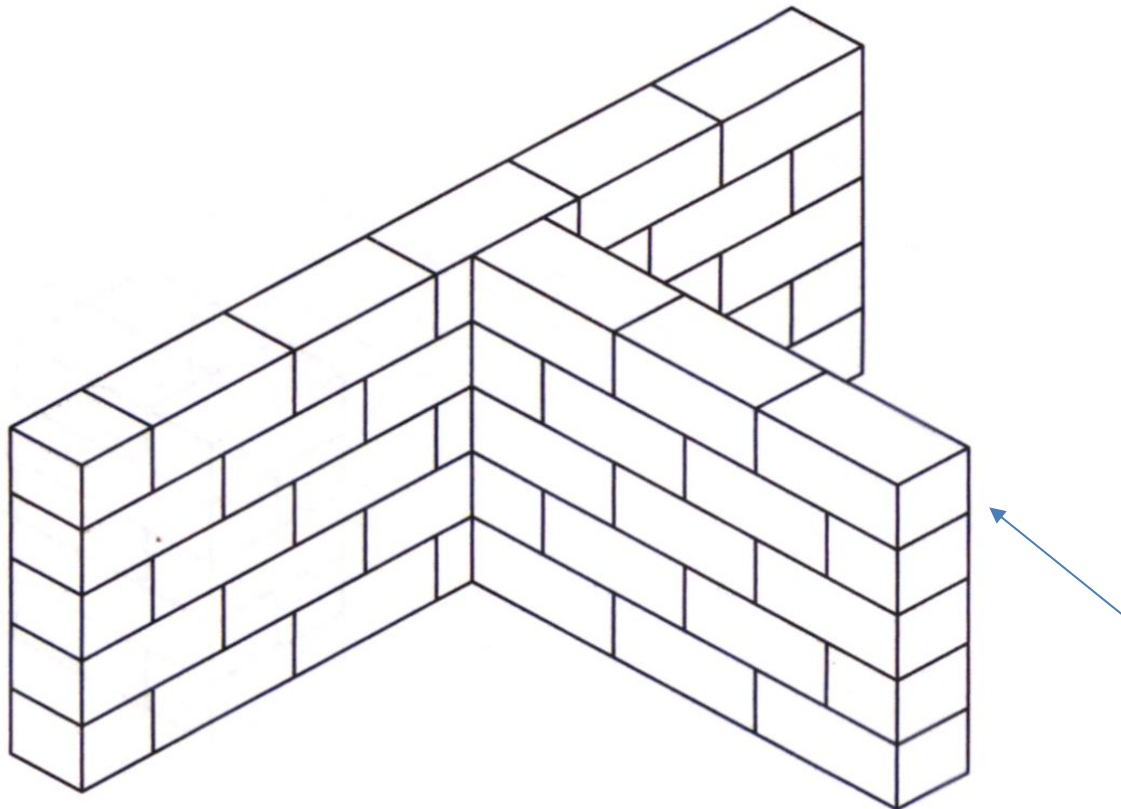
6.16.1 What is the fixture called? (1)

6.16.2 What is the purpose of this fixture? (1)

6.16.3 Name THREE disadvantages of this fixture. (3 x 1) (3)
[40]

ANTWOORDBLAD ANSWER SHEET	1	CIVIL SERVICES	NAAM: _____
			NAME: _____

- 2.7 FIGURE 2.7 on ANSWER SHEET 1 shows the isometric view of a T-junction of a half brick wall in stretcher bond. Use ANSWER SHEET 1 and draw the front view of the brick wall on scale 1 : 10. (13)

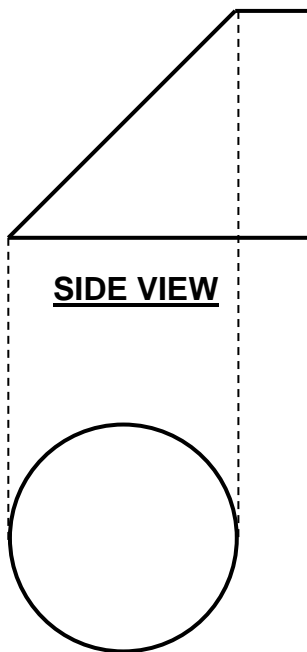


T-junction	4	
Brick sizes / Scale	3	
Height and length	2	
Stretcher bond	2	
Line work / Neatness	2	
TOTAL:	13	

ANTWOORDBLAD ANSWER SHEET	2 CIVIL SERVICES	NAAM: _____ NAME: _____
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- 5.1 FIGURE 5.1 on ANSWER SHEET 2 a 45° cut-off cylindrical pipe.
Use ANSWER SHEET 2 and develop and draw the development of the cut-off of the cylindrical pipe on scale 1 : 1.

(14)

**SIDE VIEW****TOP VIEW**

ANTWOORDBLAD ANSWER SHEET	3	CIVIL SERVICES	NAAM: _____ NAME: _____
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- 5.6 Use the quantity list on ANSWER SHEET 3 and determine the volume of concrete needed for a floor of 6 m long, 3 m wide and 75 mm thick. (3)
- 5.7 Use the quantity list on ANSWER SHEET 3 and determine the number bricks needed for a cavity wall with a length of 4 m and a height of 2,4 m. (5)

[illegible]