



**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2022**

**CIVIL TECHNOLOGY: CONSTRUCTION  
(EXEMPLAR)**

**MARKS: 200**

**TIME: 3 hours**

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This paper consists out of 14 pages, including 1 answer sheet.

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**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 QUESTION 2.7 on the attached ANSWER SHEET 1, using drawing instruments where necessary.
13. Write your NAME on ANSWER SHEET 1 and hand it 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.
15. Google images was used as the source of all photographs and pictures.
16. Write neatly and legibly.

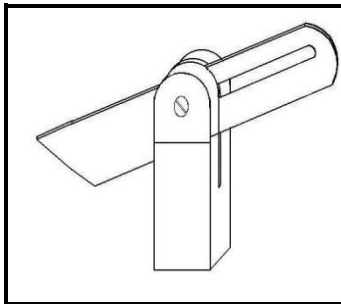
**QUESTION 1: SAFETY AND MATERIALS (GENERIC)**

- 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]**

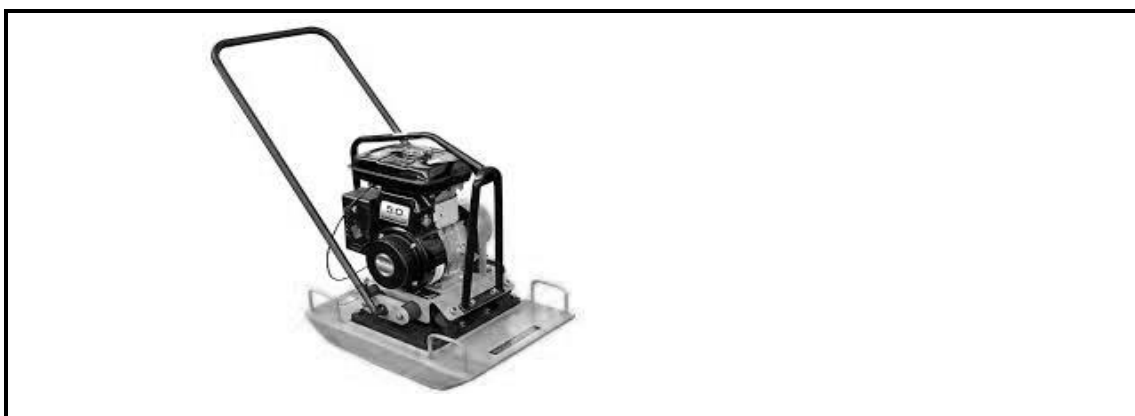
**QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)**

- 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.

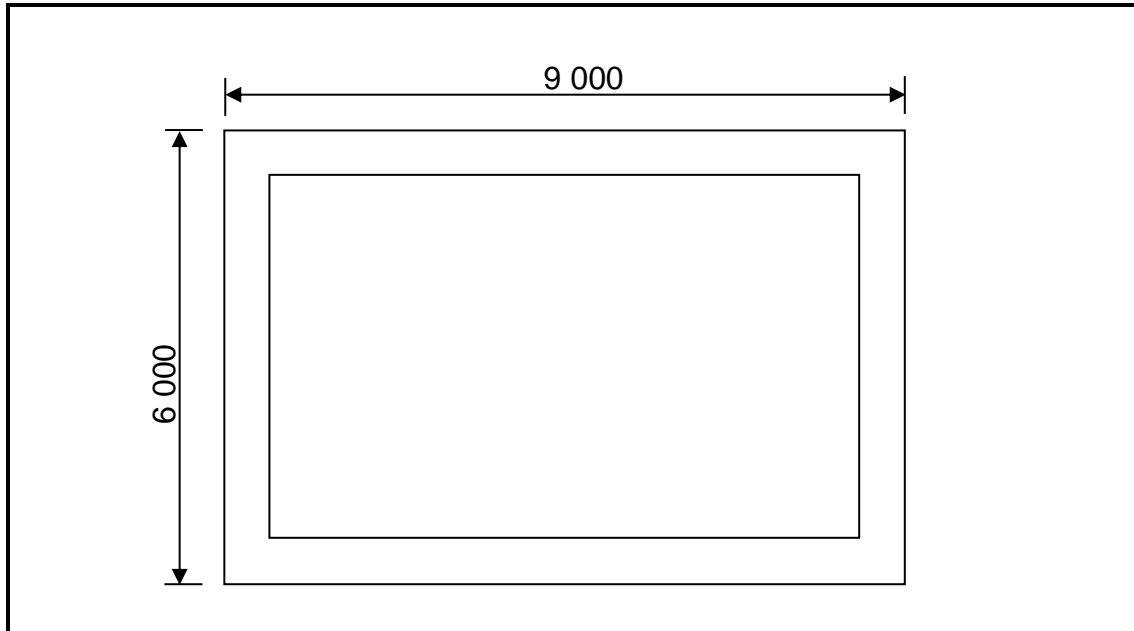
**FIGURE 2.6**

- 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 a detail drawing. (2)
- 2.9 Name THREE detail 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 amount 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]**

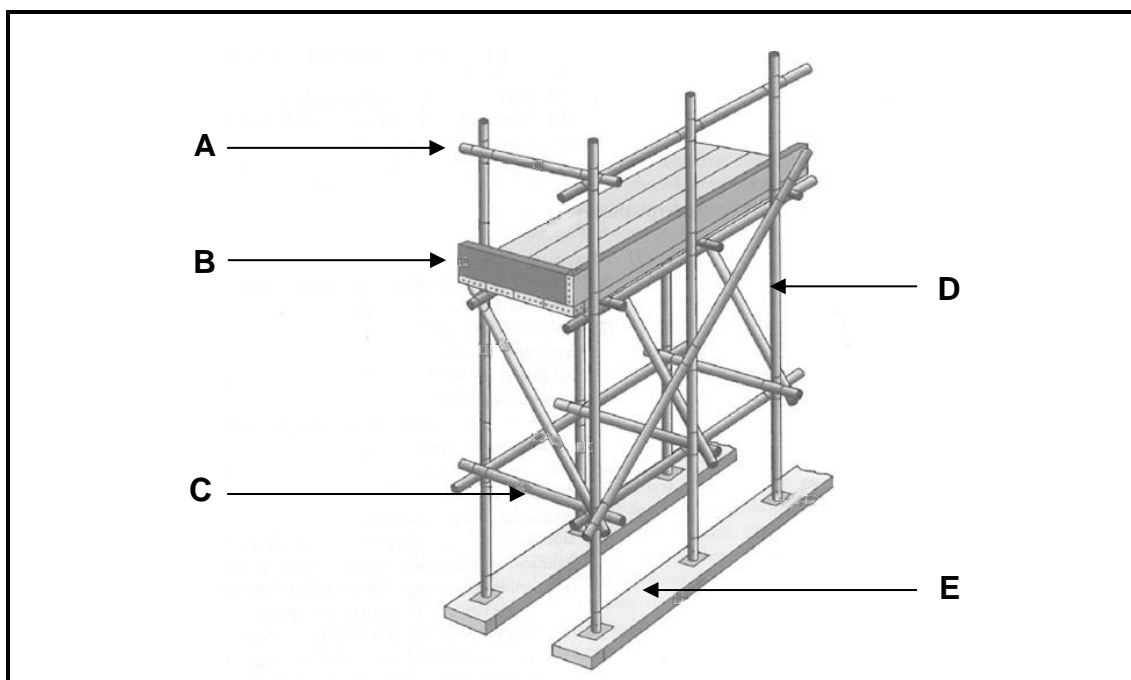
**QUESTION 4: MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)**

Start this question on a NEW page.

- 4.1 Answer the following questions in regard with cellular bricks.
- 4.1.1 Name ONE use of this brick. (1)
  - 4.1.2 What is the maximum percentage that the cavities may make up? (1)
  - 4.1.3 Name TWO advantages of the cavities in these bricks. (2 x 1) (2)
- 4.2 Identify the following statements as TRUE or FALSE.
- 4.2.1 Clay stock bricks do not need to be plastered. (1)
  - 4.2.2 Solid concrete bricks can be cut with a trowel. (1)
  - 4.2.3 Concrete paving bricks are often laid without mortar. (1)
- 4.3 Identify the type of brick that is described in the following statements.
- 4.3.1 Grooves on the sides provide a better grip for plaster (1)
  - 4.3.2 Brittle and breaks easily (1)
  - 4.3.3 Used in parking areas (1)
- 4.4 Name the TWO main ingredients of cement. (2 x 1) (2)
- 4.5 Name the MPa of the following concrete strengths:
- 4.5.1 Low-strength concrete (1)
  - 4.5.2 High-strength concrete (1)



4.6 Answer the following questions with regard to the equipment in FIGURE 4.6.



**FIGURE 4.6**

4.6.1 What is this scaffolding called? (1)

4.6.2 Name parts **A** to **E**. (5 x 1) (5)

4.6.3 What is the purpose of part **B**? (1)

4.7 Identify the equipment that is described in the following statements.

4.7.1 To remove air / voids from freshly poured concrete. (1)

4.7.2 To achieve a level, smooth finish on large concrete floors. (1)

4.7.3 A scaffolding with a maximum height of two metres. (1)

4.8 Name TWO methods to fix a timber doorframe to the brickwork. (2 x 1) (2)

4.9 Name TWO types of wall ties. (2 x 1) (2)

4.10 Name ONE material that wall ties are made of. (1)

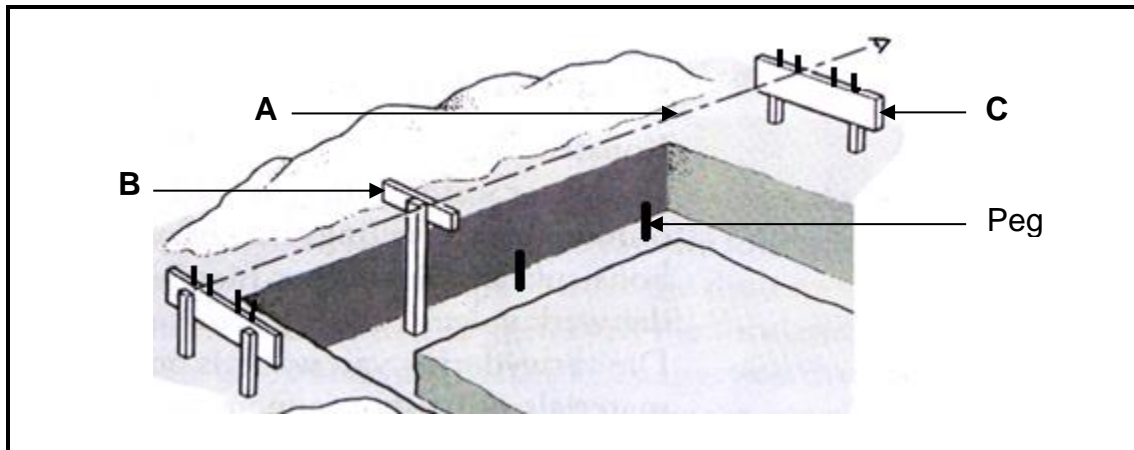
4.11 What is the purpose of a wall tie? (1)

**[30]**

**QUESTION 5: EXCAVATIONS, FOUNDATIONS AND STEEL (SPECIFIC)**

Start this question on a NEW page.

- 5.1 Answer the following questions with regard with the foundation excavation in FIGURE 5.1.



**FIGURE 5.1**

- 5.1.1 Name parts **A** to **C**. (3 x 1) (3)

- 5.1.2 How deep should the pegs be driven into the soil? (1)

- 5.2 Choose a description from COLUMN A that fits best with the item in COLUMN B. Write only the letter next to the question number in the ANSWER BOOK, for example 5.2.6 H.

COLUMN A	COLUMN B
5.2.1 Datum peg	A expensive material for formwork
5.2.2 Timber	B most accurate way to test levelness
5.2.3 Topsoil	C remove 450 mm
5.2.4 Steel	D all heights are determined from this point
5.2.5 Dumpy level	E remove 300 mm
	F cheaper material for formwork
	G inaccurate way to test levelness

(5 x 1) (5)

- 5.3 Name TWO methods for the dewatering of foundation trenches. (2 x 1) (2)

- 5.4 Name THREE causes of trench accidents. (3 x 1) (3)

5.5 Choose the best answer from the block below for the following statements.

<b>Wide strip foundation, Block foundation,</b>	<b>Short-bored pile (auger drill), Franki-pile, Steel pipe casing pile</b>
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5.5.1 Used to transfer the loads from a column. (1)

5.5.2 Steel tube is left in the ground. (1)

5.5.3 Used to transfer the loads from a long wall. (1)

5.5.4 Steel tube is removed afterwards. (1)

5.5.5 Maximum drilling depth of 15 metres. (1)

5.6 Describe step-by-step the installation process of the short-bored pile. (3)

5.7 Name THREE advantages for the use of piles. (3 x 1) (3)

5.8 Discuss the difference between an *I-beam* and a *H-beam*. (2)

5.9 Which type of steel profile is most commonly used? (1)

5.10 Identify what type of steel profile is used in the following descriptions:

5.10.1 Conveying machinery (1)

5.10.2 Fencing (1)

**[30]**

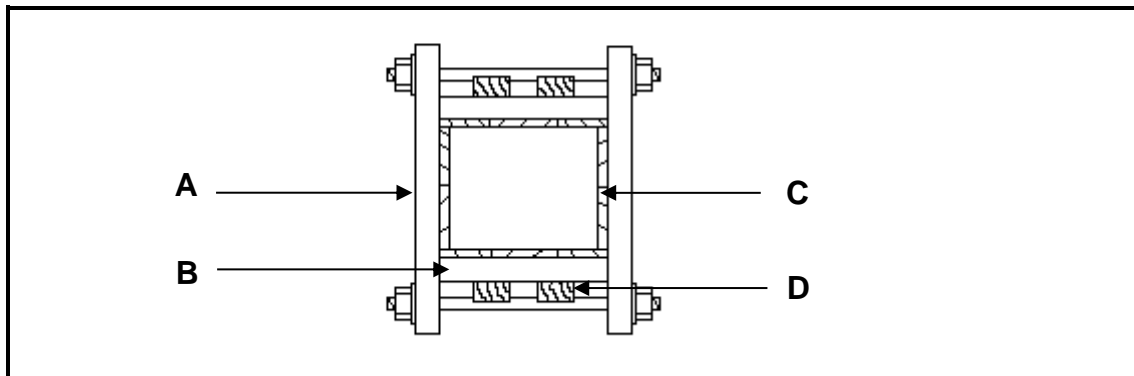
**QUESTION 6: FORMWORK, BRICKWORK, STAIRS AND QUATITIES (SPECIFIC)**

Start this question on a NEW page.

6.1 Define the term *formwork*. (2)

6.2 Describe THREE properties of good formwork. (3 x 1) (3)

6.3 Answer the following questions with regard with the formwork in FIGURE 6.3.



**FIGURE 6.3**

6.3.1 Is this formwork for a column or a beam? (1)

6.3.2 Name parts **A** to **D**. (4 x 1) (4)

6.4 Name TWO reasons for the cover depth of concrete. (2 x 1) (2)

6.5 Identify the following statements as TRUE or FALSE.

6.5.1 A lintel is used in a horizontal position. (1)

6.5.2 The steel wire in the lintel must be of high compressive strength. (1)

6.5.3 Sides of a lintel may be slightly tapered. (1)

6.5.4 The bottom-side of the lintel must have grooves. (1)

6.6 What is the width of a queen closer? (1)

6.7 Can the English bond be used in a half-brick wall? (1)

6.8 Why will the English bond be used? (1)

6.9 Name THREE places where damp-proof coarse will be used in a house. (3 x 1) (3)

6.10 Answer the following questions with regard to the arch construction in FIGURE 6.10.

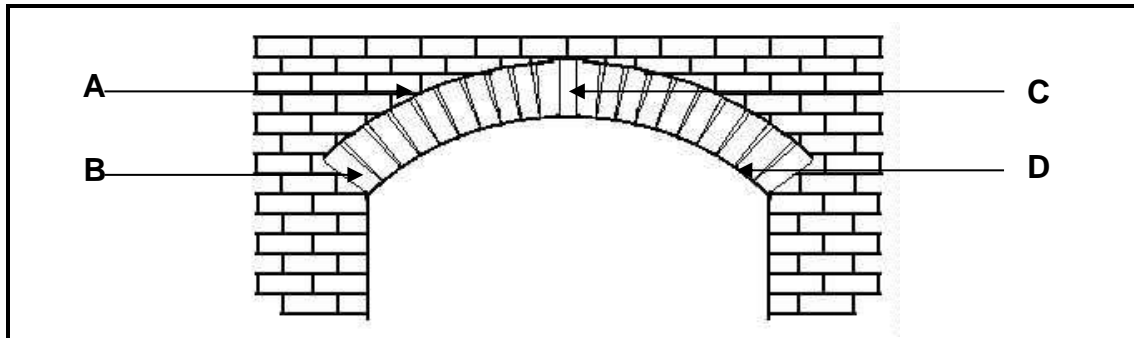


FIGURE 6.10

6.10.1 Name this type of arch construction. (1)

6.10.2 Is this wall built in stretcher bond or English bond? (1)

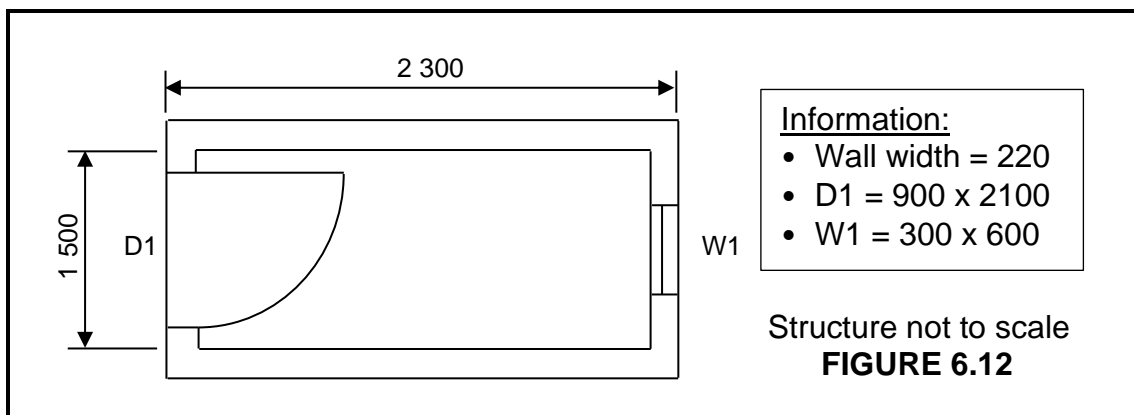
6.10.3 Name parts **A** to **D**. (4 x 1) (4)

6.11 Provide ONE word for the following descriptions of stairs.

6.11.1 The horizontal part of a stair (1)

6.11.2 The vertical part of a stair (1)

6.12 Answer the following questions of FIGURE 6.12 in the ANSWER BOOK.



6.12.1 Determine the perimeter of the structure. (Show all steps.) (3)

6.12.2 Determine the floor area, without the part at the door opening. (Show all steps.) (3)

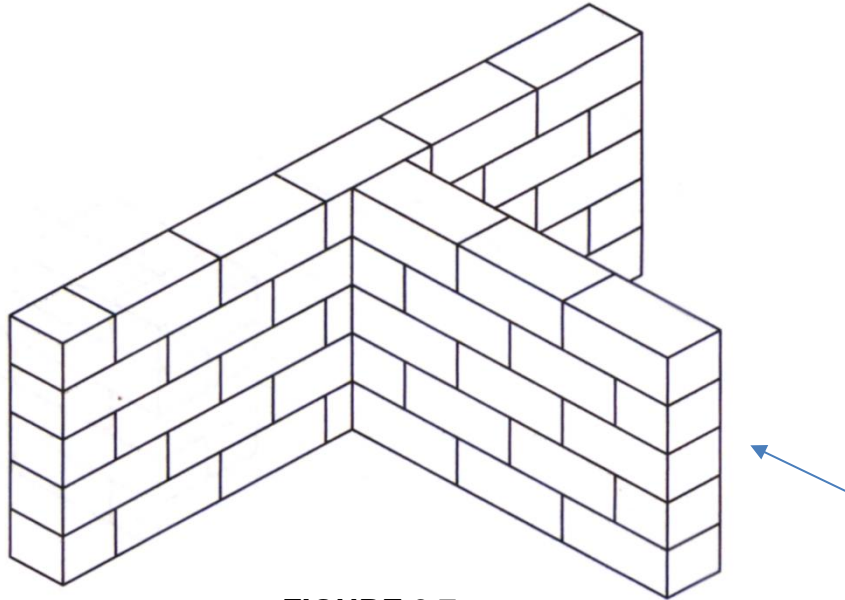
6.12.3 Determine the length of floor skirting needed (show all steps). (4)

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TOTAL: 200

<b>ANSWER SHEET 1</b>	<b>CIVIL TECHNOLOGY CONSTRUCTION</b>	<b>NAME:</b> _____
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- 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 scale 1 : 10. (13)



**FIGURE 2.7**



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