Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2018

CIVIL TECHNOLOGY: CONSTRUCTION

MARKS: **200**

TIME: **3 hours**

ICVLTE2

This question paper consists of 18 pages, including 3 pages of answer sheets.

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 QUESTIONS 2.6, 3.1, 4.8 and 6.6 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. Due to electronic transfer, drawings in the question paper are NOT to scale.

QUESTION 1: SAFETY AND MATERIAL (GENERIC)

1.1 Answer the following questions with regard to the safety equipment in FIGURE 1.1.

FIGURE 1.1

1.1.1 What is the safety equipment in FIGURE 1.1 called? (1)

1.1.2 On which type of site is this type of safety equipment compulsory? (1)

1.2 Describe the safety measure which is applicable to each of the following factors:

1.2.1 Loose clothing (1)

1.2.2 Type of shoes in a workshop (1)

1.2.3 Carrying of sharp objects (1)

1.2.4 Dangerous moving parts of power tools (1)

1.2.5 Number of operators who operate a machine (1)

1.3 Who is responsible for the safety of visitors on a construction site? (1)

1.4 Name any FOUR safety measures which are applicable to the storage of flammable liquids. (4 x 1) (4)

1.5 Unreinforced concrete, reinforced concrete and precast concrete are used on construction sites.
Identify the type of concrete which will be used for the following work:

1.5.1 Suspended concrete floors (1)

1.5.2 Lintels above door openings (1)

1.5.3 Foundations for single-storey buildings (1)

1.6 Name ONE use of screed. (1)

1.7 Name TWO reasons why lime can be added to a mortar mix. (2 x 1) (2)

1.8 Briefly motivate why pine wood is used for carpentry work on a construction site. (2)

1.9 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the number in the ANSWER BOOK.

1.9.1 Board products are cheaper than solid wood products. (1)

1.9.2 Stock bricks are manufactured from cement. (1)

1.9.3 Face bricks must be plastered. (1)

1.9.4 Cement blocks are cast with hollow cores to make them lighter. (1)

1.10 Briefly motivate why sinks are manufactured from stainless steel. (2)

1.11 Briefly describe what an alloy is. (3)

1.12 Name ONE use of thermosetting plastic. (1 x 1) (1)

[30]

QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)

2.1 Answer the following questions with regard to the hand tool in FIGURE 2.1.

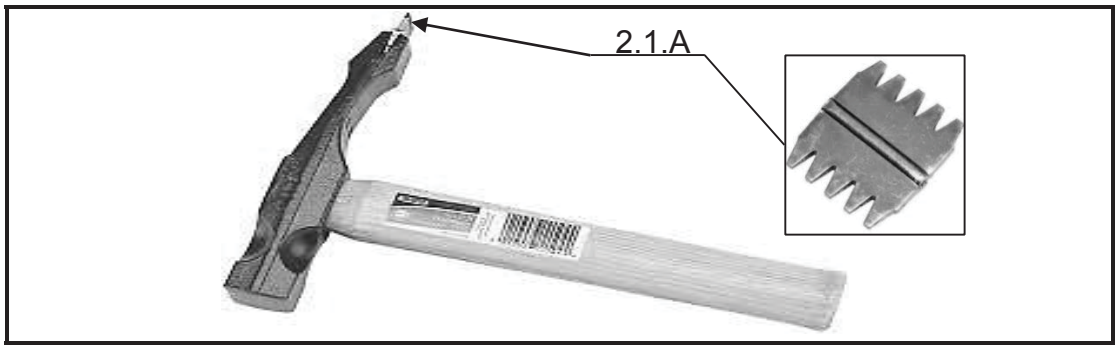


FIGURE 2.1

2.1.1 What is this tool called? (1)

2.1.2 Describe the purpose of part 2.1.A. (2)

2.1.3 Briefly motivate why part 2.1.A must be replaced regularly. (2)

2.2 Identify the tool in FIGURE 2.2 and name THREE measures that should be taken to care for it. (4)

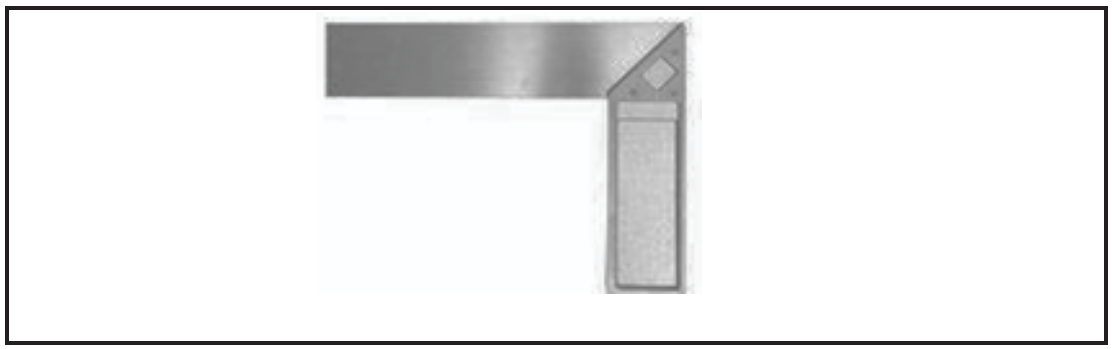


FIGURE 2.2

2.3 Identify the tool in FIGURE 2.3 and name THREE measures that should be taken to care for it. (4)

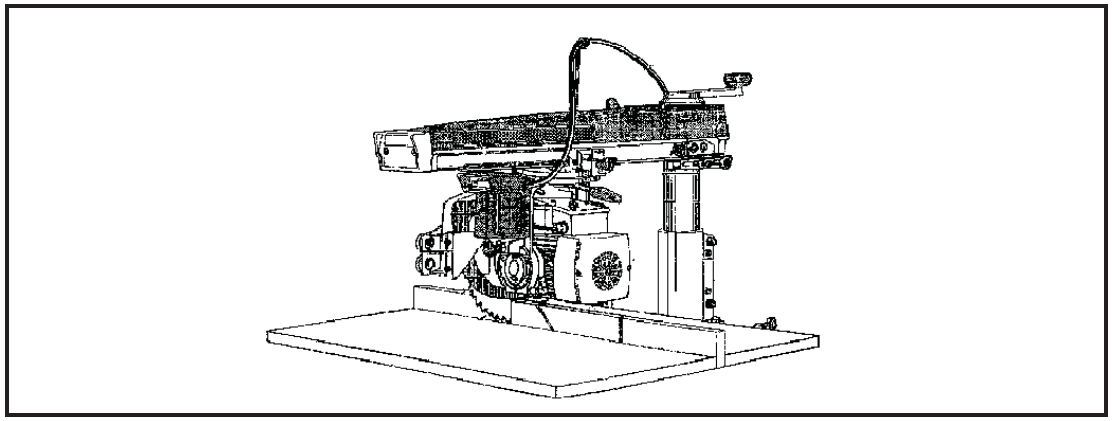


FIGURE 2.3

2.4 Name TWO measures for caring for a concrete mixer. (2 x 1) (2)

2.5 Answer the following questions with regard to the plan elevation in FIGURE 2.5.

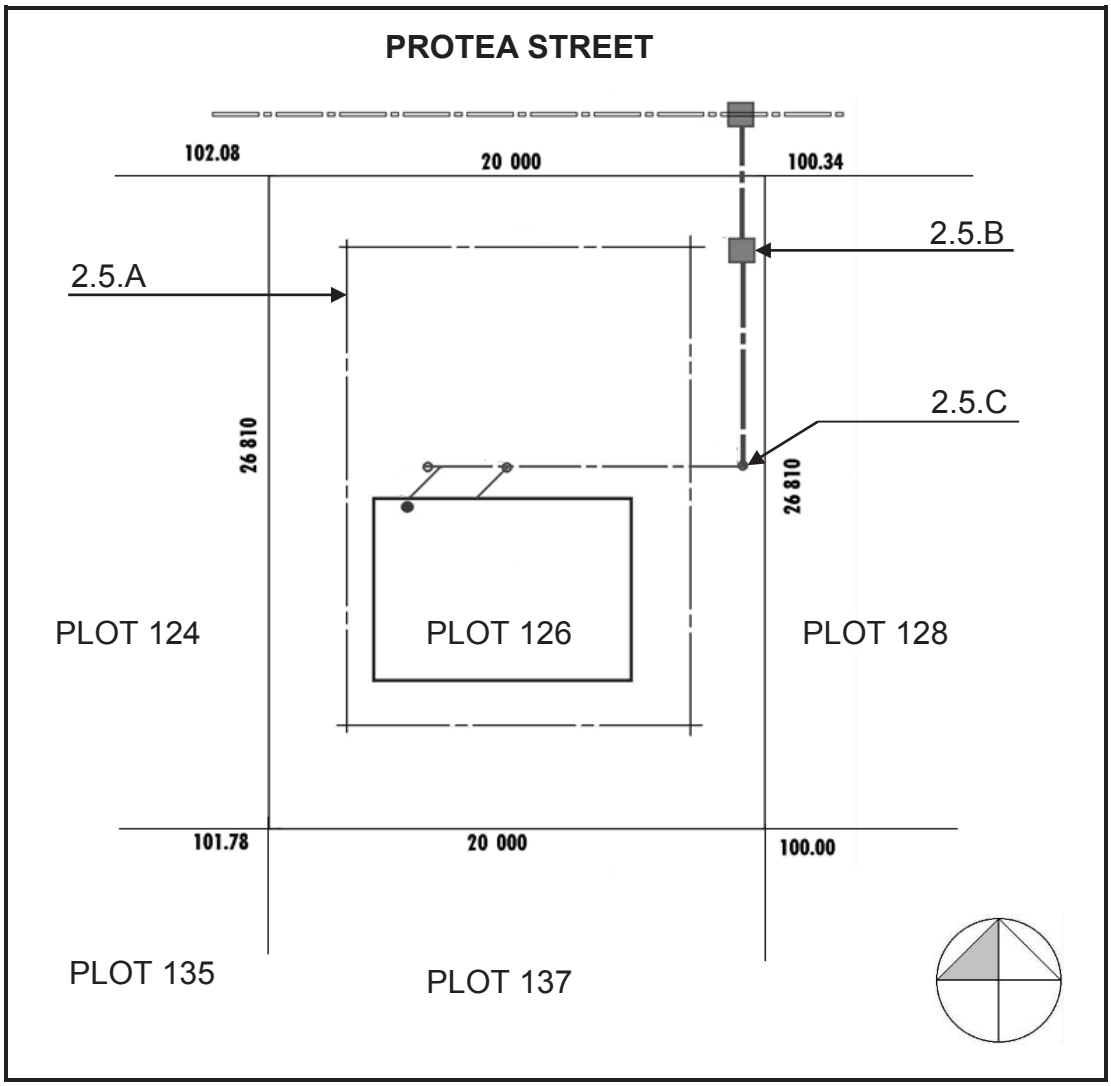


FIGURE 2.5

2.5.1 What is the plan elevation called? (1)

2.5.2 What is the plot number of the plot on the west side of plot 126? (1)

2.5.3 What are the lines at 2.5.A called? (1)

2.5.4 Identify the symbols at 2.5.B and 2.5.C. (2)

2.6 FIGURE 2.6, on ANSWER SHEET A, shows an incomplete section view of a single brick wall. Complete the section view to scale 1 : 20 and show the following parts with symbols and labels:

2.6.1	A strip foundation of 700 x 250 mm with the invert level of 400 mm		(3)
2.6.2	A single brick wall with a height of 2 700 mm from the floor level and 10 mm plaster work on the outside and inside		(5)
2.6.3	The hardcore filling of 250 mm		(1)
2.6.4	The dampproof course		(2)
2.6.5	The blinding layer of 50 mm		(1)
2.6.6	The concrete floor slab of 90 mm		(1)
2.6.7	A door opening with a height of 2 100 mm		(1)
2.6.8	A concrete lintel with a thickness of 70 mm above the door opening		(2)
2.6.9	A wall plate of 114 x 38 mm		(2)
2.6.10	Show any TWO labels.	(2 x 1)	(2)
			[40]

QUESTION 3: QUANTITIES, JOINING AND GRAPHICS (GENERIC)

3.1 FIGURE 3.1 shows the foundation wall of a building. The width of the wall is 220 mm and the height 450 mm.

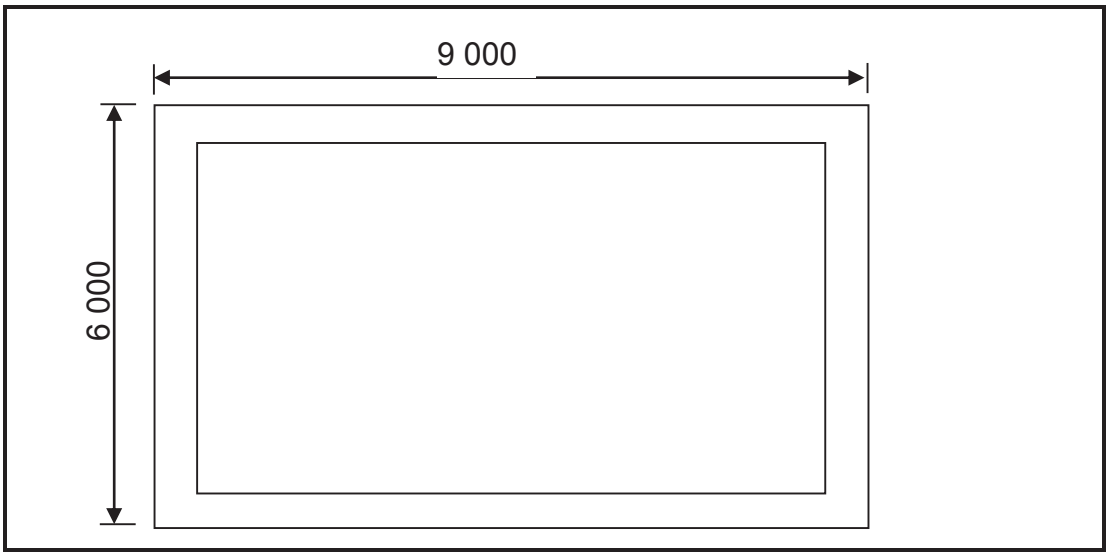


FIGURE 3.1

Use the quantity list on ANSWER SHEET B and calculate the following:

3.1.1 Determine the centre line of the foundation wall. (6)

3.1.2 Determine the quantity of bricks needed to build the foundation wall. Make provision for 5% brick breakages. (9)

3.2 Fully describe the purpose of the description column on the dimension paper for quantities. (3)

3.3 Describe, in point form, the application process of contact glue. (3)

3.4 Which joining glue/material consists of resin and a hardener? (1)

3.5 Name TWO properties of mastic sealant. (2 x 1) (2)

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

3.6.1 Gully (2)

3.6.2 Check valve (2)

3.6.3 Dressed wood (2)

[30]

QUESTION 4: MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

4.1 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the number in the ANSWER BOOK.

4.1.1 Solid bricks have an indent (frog) for a better grip. (1)

4.1.2 The cavities of a cellular brick make up 35% of the volume of the brick. (1)

4.1.3 The cavities of a cellular brick weaken the insulating property of the brick. (1)

4.1.4 Perforated bricks are very dense and hard. (1)

4.1.5 Hollow clay blocks give better thermal insulation than solid bricks do. (1)

4.1.6 Hollow concrete blocks are inclined to crack due to shrinkage. (1)

4.2 Give a short description of a queen closer. (2)

4.3 Name any THREE properties of cement bricks. (3 x 1) (3)

4.4 Briefly motivate why clay bricks must be dried before the firing process. (2)

4.5 Identify the following tools and name ONE use of each.

4.5.1

(2)

4.5.2

(2)

4.6 Choose the description in COLUMN B that matches the steel property in COLUMN A. Write only the letter (A–H) next to the question number (4.6.1–4.6.6) in the ANSWER BOOK, for example 4.6.7 J.

COLUMN A		COLUMN B	
4.6.1	Strength	A	The ability to change shape permanently when the bending force is great enough
4.6.2	Elasticity	B	It is easily filed, drilled and shaped by tools
4.6.3	Plasticity	C	Can absorb forces applied and return to its original shape when the force is removed
4.6.4	Malleability	D	Resists forces without bending, breaking, fracturing or losing shape
4.6.5	Workability	E	Resistant to environmental factors that can damage it
4.6.6	Durability	F	The ability to change shape when it is stretched
		G	To be resistant to scratching, scouring, wear and denting
		H	The ability to change its shape without fracturing when it is hammered

(6 x 1) (6)

4.7 Make a neat sketch of a butterfly pattern wall tie. (2)

4.8 FIGURE 4.8 on ANSWER SHEET C shows a layer brickwork of a dead-end in a brick wall in stretcher bond.
Draw in good ratio on ANSWER SHEET C the consecutive layer of bricks for the dead-end. (4)

4.9 What is the purpose of the inspection holes during the construction of a cavity wall? (1)

[30]

QUESTION 5: EXCAVATIONS, FOUNDATIONS AND STEEL (SPECIFIC)

5.1 Name TWO reasons why the topsoil must be removed for foundation excavations. (2 x 1) (2)

5.2 Answer the following questions with regard to the foundation excavation in FIGURE 5.2.

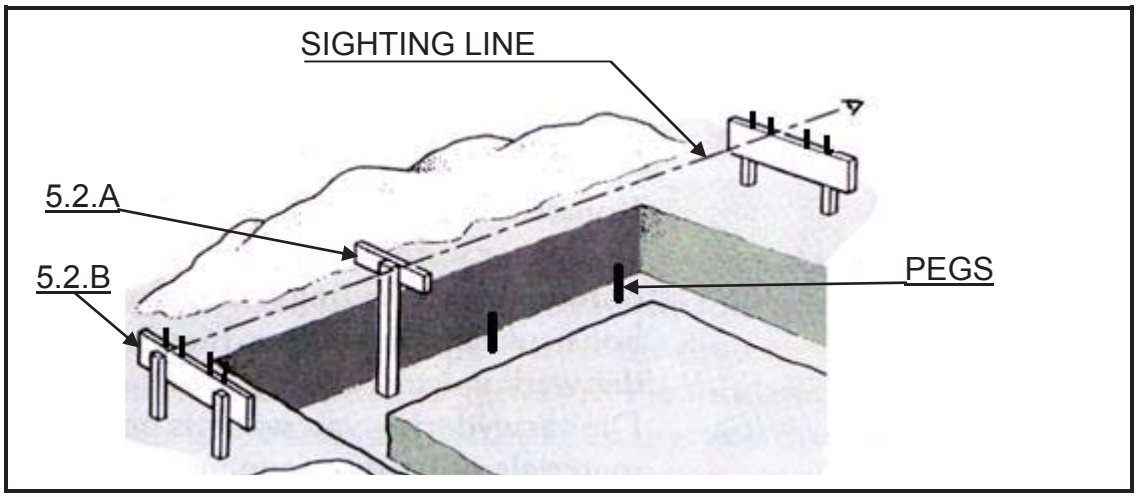


FIGURE 5.2

5.2.1 Name parts 5.2.A and 5.2.B. (2 x 1) (2)

5.2.2 Which measurements must be marked out on part 5.2.B? (2 x 1) (2)

5.2.3 What is the purpose of the pegs in the foundation trench? (1)

5.3 Name THREE methods of dewatering of excavations. (3 x 1) (3)

5.4 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the number in the ANSWER BOOK.

5.4.1 Keep excavated material more than 500 mm from edges of trenches. (1)

5.4.2 Hardboard with a thickness of 3 mm can be used for formwork of excavation in hard soil. (1)

5.4.3 Open formwork is only used in excavations of hard soil. (1)

5.4.4 The boards that are placed vertically against the sides of the trenches are called poling boards. (1)

5.5 Briefly describe the function of a foundation. (2)

5.6 Answer the following questions with regard to the foundation in FIGURE 5.6.

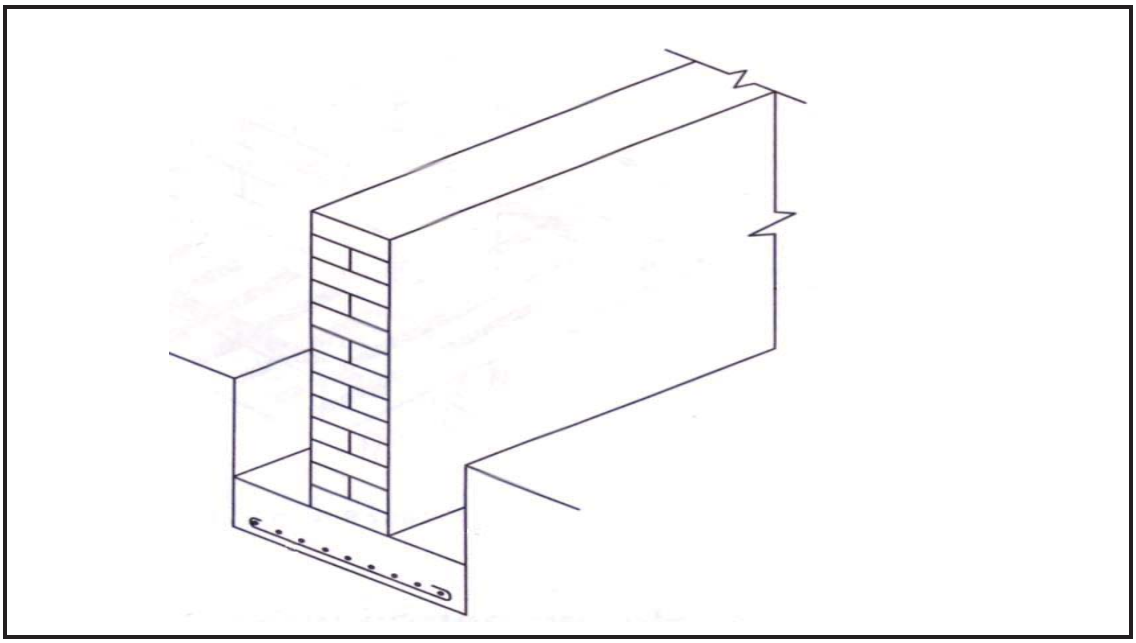


FIGURE 5.6

5.6.1 What is the foundation called? (1)

5.6.2 In what type of soil will the foundation be used? (1)

5.6.3 Fully motivate why steel reinforcement is placed at the bottom of the foundation. (2)

5.7 Name THREE factors that will require the use of foundation piles. (3 x 1) (3)

5.8 Briefly describe the steps of installing a short-bored pile. (3)

5.9 Make a neat sketch to illustrate the difference between the steel sections of an I-beam and an H-beam.
Show the flanges and webs of the steel sections. (4)

[30]

QUESTION 6: TOOLS, CONCRETE, FORMWORK AND LINTELS (SPECIFIC)

6.1 Answer the following questions with regard to the tool in FIGURE 6.1.

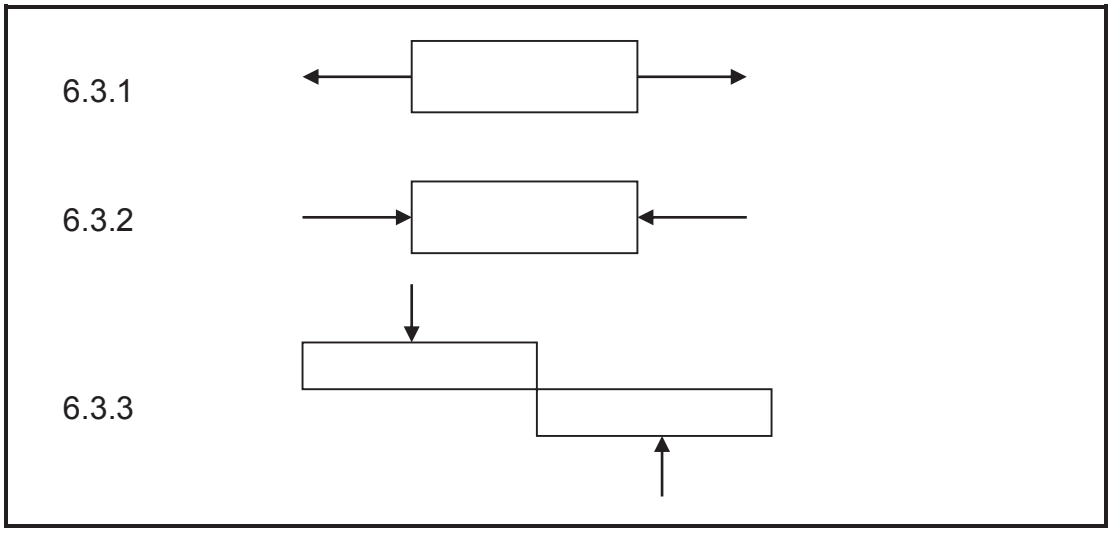
FIGURE 6.1

6.1.1 What is this tool called? (1)

6.1.2 Briefly describe the use of the tool. (2)

6.2 Briefly state the definition of scaffolding. (3)

6.3 Identify the structural forces illustrated by sketches 6.3.1 to 6.3.3: (3)



6.4 Briefly motivate why steel reinforcement must be free from rust and oiliness. (2)

6.5 Answer the following questions with regard to the installation of steel reinforcement in FIGURE 6.5.

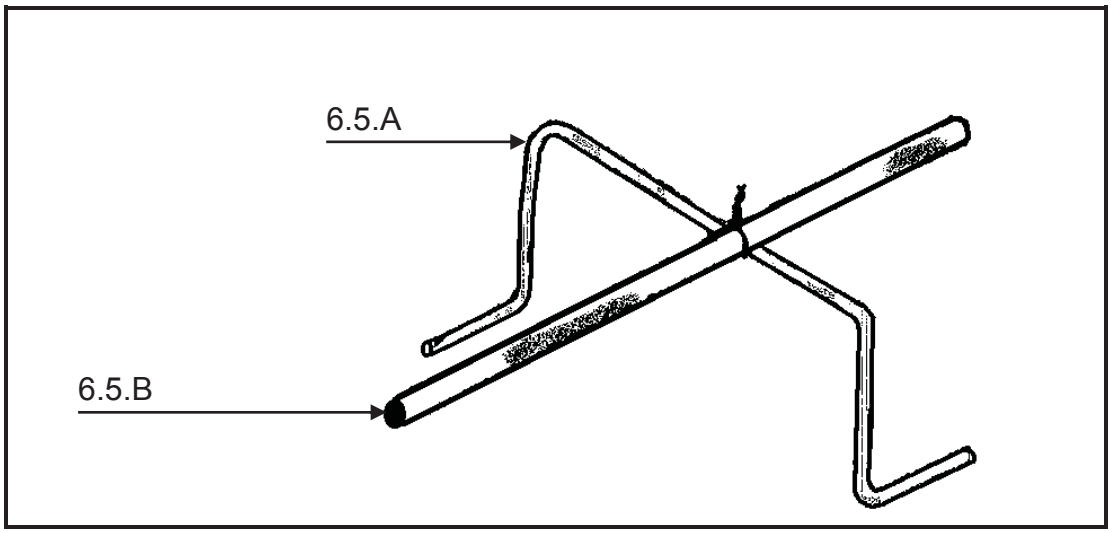


FIGURE 6.5

6.5.1 What is part 6.5.A called? (1)

6.5.2 What is the purpose of part 6.5.A? (1)

6.5.3 Identify the type of steel bar illustrated by part 6.5.B. (1)

6.6 FIGURE 6.6 on ANSWER SHEET C shows the outside lines of the top view of a concrete column.
Draw the following steel reinforcing to scale 1 : 10.

6.6.1 10 mm stirrups with a concrete cover of 50 mm (4)

6.6.2 Four main reinforced bars with a diameter thickness of 40 mm (3)

6.7 Name TWO advantages of steel reinforcement in concrete constructions. (2 x 1) (2)

6.8 Give the correct concrete mixture for a reinforced concrete floor. (3)

6.9 Describe the purpose of the following requirements that are applicable to formwork:

6.9.1 Joints must be sealed (1)

6.9.2 Must be free of dirt (1)

6.9.3 A release agent must be applied to the inside (1)

6.9.4 Must be built sturdily enough (1)

6.10 Answer the following questions with regard to the staircase in FIGURE 6.10.

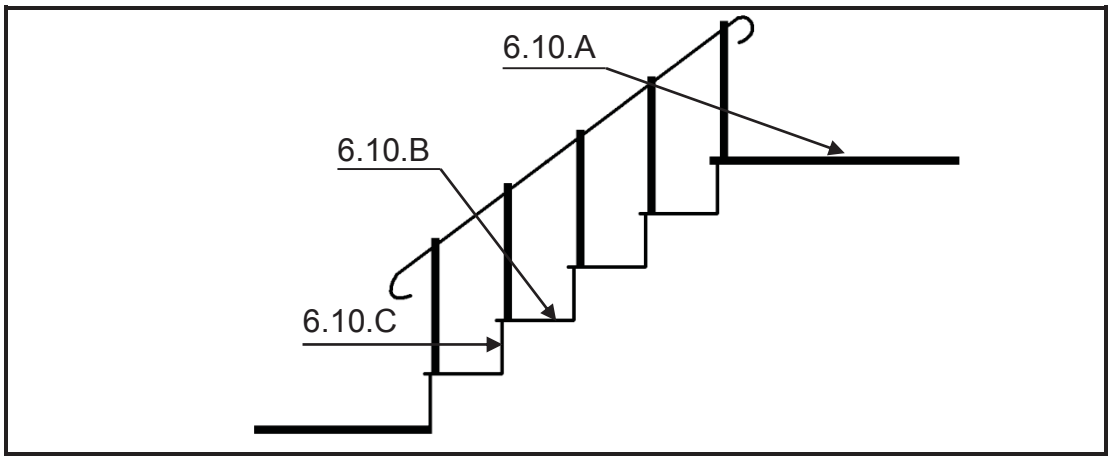
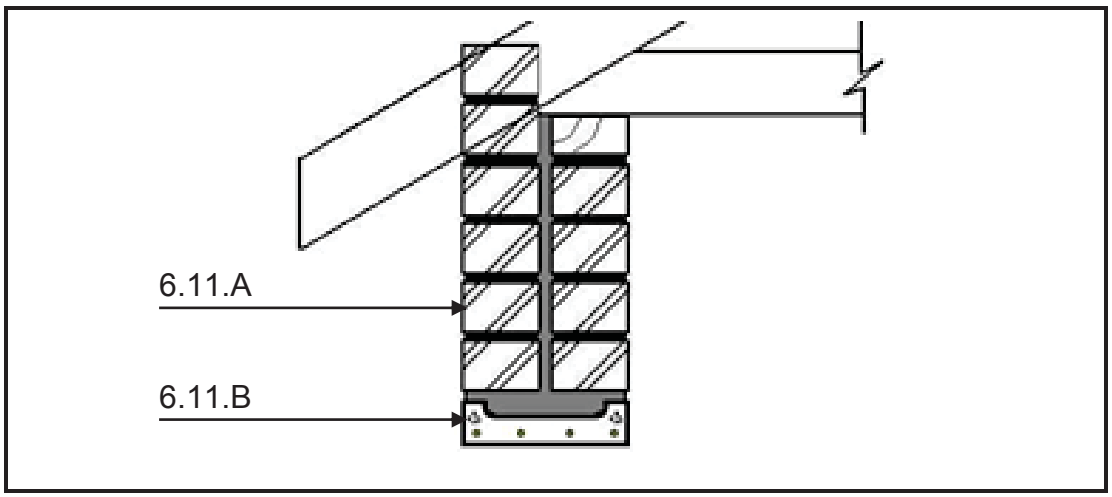


FIGURE 6.10

6.10.1 Name the parts 6.10.A to 6.10.C. (3 x 1) (3)

6.10.2 What is the minimum height of part 6.10.C? (1)

6.11 Answer the following with regard to the construction in FIGURE 6.11.



6.11.1 What is the thickness of the single-brick wall 6.11.A? (1)

6.11.2 What is part 6.11.B called? (1)

6.11.3 Briefly describe the purpose of part 6.11.B. (2)

6.11.4 Name TWO advantages of part 6.11.B. (2)
[40]

TOTAL: 200

ANSWER SHEET **A**	**CIVIL TECHNOLOGY GENERIC**	**NAME:** _____

2.6 FIGURE 2.6 on ANSWER SHEET A shows an incomplete section view of a single brick wall. Complete the section view to scale 1 : 20.

2.6.1	Strip foundation	3	
2.6.2	Single brick wall	5	
2.6.3	Hard core filling	1	
2.6.4	Damp proof course	2	
2.6.5	Blinding layer	1	
2.6.6	Concrete floor slab	1	
2.6.7	Door opening	1	
2.6.8	Concrete lintel	2	
2.6.9	Wall plate	2	
2.6.10	2 Labels	2	
	TOTAL	**20**	

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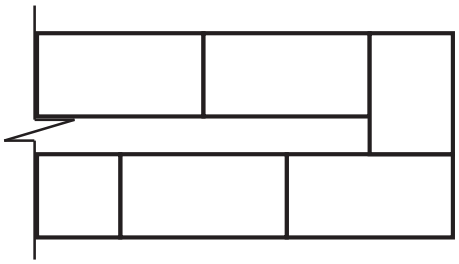
ANSWER SHEET **B**	CIVIL TECHNOLOGY GENERIC	NAME: _____

QUESTION 3.1			
A	**B**	**C**	**D**
			3.1.1 CENTRE LINE: (6)
			..... x ..... m = ... m
			..... x ..... m = ... m
			= ..... m
			Minus: ..... x ..... m = ... m
			TOTAL CENTRE LINE = ... m
			3.1.2 QUANTITY OF BRICKS: (9)
			AREA:
			Total wall area
.....	.....		
	.....	.....	Thus: Total wall area = ...
			TOTAL BRICKS
	.....		100 bricks/ m^2 for single brick wall
	.....	.....	Thus: ..... bricks for total wall
			5% BREAKAGE
			TOTAL BRICKS:
			..... + ... = ... total quantity bricks

ANSWER SHEET C	CIVIL TECHNOLOGY CONSTRUCTION	NAME: _____

4.8 Draw in good ratio on ANSWER SHEET C the consecutive layer of bricks for the dead-end. (4)



Brick work	3	
Ratio	1	
TOTAL	**4**	

CONSECUTIVE LAYER

6.6 FIGURE 6.6 on ANSWER SHEET C shows the outside lines of a concrete column.
Draw the following steel reinforcing on scale 1:10:

6.6.1 10 mm stirrups with a concrete cover of 50 mm (4)
6.6.2 Four main reinforced bars with a diameter thickness of 40 mm (3)

Stirrups	2	
Scale	1	
Concrete covering	1	
Main reinforcement	2	
Scale	1	
TOTAL	**7**	