



Province of the
EASTERN CAPE
EDUCATION



**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2023

**CIVIL TECHNOLOGY: CONSTRUCTION
(DEAF)**

MARKS: 200

TIME: 3 hours

This paper has 17 pages and 2 answer sheets.

REQUIREMENTS:

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

INSTRUCTIONS AND INFORMATION

1. This question paper has **SIX questions**.
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. Use **sketches** to help with your answers.
7. Write **ALL calculations** and **answers** in the **ANSWER BOOK** or on the **attached ANSWER SHEETS**.
8. The mark allocation will tell you how much to write.
9. Make drawings and sketches in pencil, fully dimensioned and neatly finished off with descriptive titles and notes.
Use the *SANS/SABS Code of Practice for Building Drawings*.
10. For this question paper, the size of a brick is 220 mm x 110 mm x 75 mm.
11. Think for yourself when dimensions and/or details have been left out.
12. Answer QUESTIONS 2.2, 5.2 and 5.9 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. Hand them in with your ANSWER BOOK, whether you have used them or not.
14. Drawings in the question paper are NOT to scale due to electronic transfer.
15. Write neatly.

QUESTION 1: SAFETY AND MATERIALS (GENERIC)

Start this question on a NEW page.

- 1.1 What is the **aim** of the **Occupational Health and Safety Act (Act 85 of 1993) (OHS Act)**? (1)
- 1.2 Name the **TWO main causes** of accidents. (2 x 1) (2)
- 1.3 Name **ONE reason** why **scaffolding** should be **inspected, before** it can be **used**. (1 x 1) (1)
- 1.4 **Answer the questions** about **scaffolding** in FIGURE 1.4.

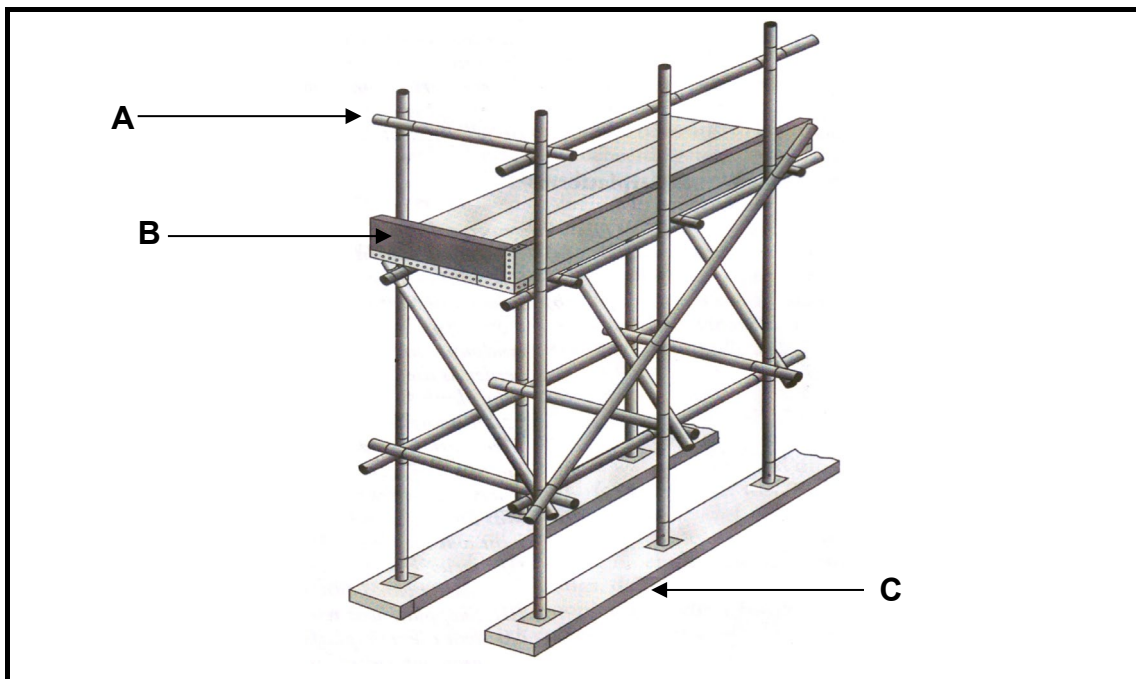


FIGURE 1.4

- 1.4.1 Name parts **A** to **C**. (3 x 1) (3)
- 1.4.2 Is this a **dependant** or an **undependant scaffolding**? (1)
- 1.4.3 What is the **maximum height** that part **A** must be **from** the **platform**? (1)
- 1.5 **Answer the questions** about **regulations** on a **construction site**.
- 1.5.1 Name **ONE way** to **transport waste material** from **higher levels** in a building to the **ground level**. (1 x 1) (1)
- 1.5.2 If work is done above an entrance, what will **prevent materials** from **falling on workers below**? (1)

- 1.6 Indicate whether the following statements are TRUE or FALSE.
- 1.6.1 Trestle scaffold is **used** on **heights** greater than 3 m. (1)
- 1.6.2 No stack height should **exceed**^(bigger) **three times** the **width** of the **material**. (1)
- 1.6.3 Aluminium ladders can be used in the **proximity**^(closeness) of **electrical wires**. (1)
- 1.6.4 The **horizontal part** of a **ladder** is called a **stile**. (1)
- 1.7 Name the **TWO main groups** into which **paint** can be **divided**. (2 x 1) (2)
- 1.8 What is the **purpose** of **galvanising**? (1)
- 1.9 Name **TWO advantages** of **curing (concrete)**. (2 x 1) (2)
- [20]**

QUESTION 2: GRAPHICS, JOINING AND EQUIPMENT (GENERIC)

Start this question on a NEW page.

2.1 **Identify SIX** of the **descriptions** below which are applicable_(relevant) to the **checklist** of a **floor plan**.

- Window numbers
- Building lines
- Plot number
- Door swings
- Names of rooms
- Ground contours
- Stair directions
- Sliding doors
- Street number
- Water connection point
- Position of proposed building
- Floor covering

(6 x 1) (6)

2.2 FIGURE 2.2 on ANSWER SHEET A **shows** the **incomplete elevation** of a building. **Complete** the **elevation** by **drawing** in the **following parts** on **scale 1 : 50**.

2.2.1 A **window** with a **length** of **1 800 mm** and a **height** of **900 mm**. The **window** is built in **700 mm** from the **right-hand side** and one-third of the **right side** of the **window** can **open**.

(7)

2.2.2 A **door** according to **standard measurements**, **900 mm** from the **left side** of the **building**. The **door opens** to the **left**. There is **one step** to the **ground level**.

(5)

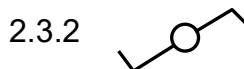
2.2.3 The **barge board** against the **gable end**.

(2)

2.3 **Identify** the **appliances** which are **illustrated** by the **drawing symbols**.



(1)



(1)

- 2.4 Make **neat sketches** according to **standard building drawing practice** to **illustrate** the following **symbols**.
- 2.4.1 Water meter (2)
- 2.4.2 Plaster (2)
- 2.4.3 Invert level (2)
- 2.5 **Briefly explain** the **advantages** of the **square shoulder screw**. (2)
- 2.6 **Explain** the **meaning** of the **code** on rawl bolts: **R-RBL M06/18**. (3)
- 2.7 What is the **purpose** of the **foot screws** of the **dumpy level**? (1)
- 2.8 **Identify** the cross hairs **A** to **C** in the **telescope** of the **dumpy level** in **FIGURE 2.8**.

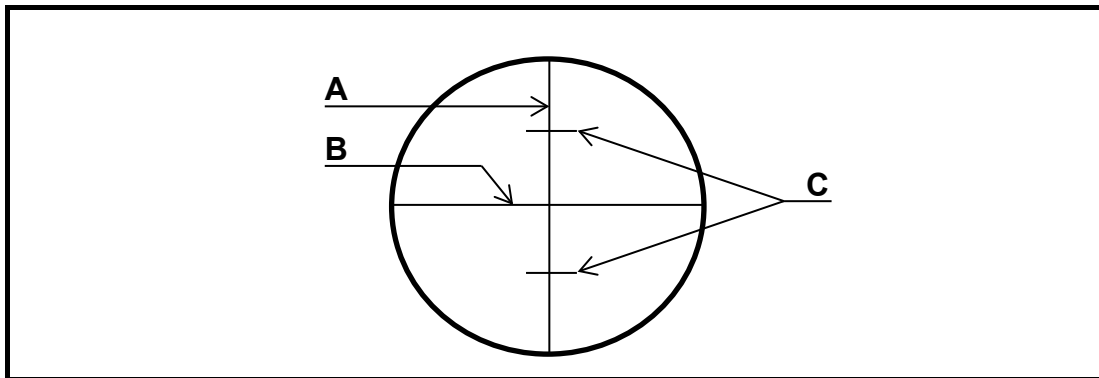


FIGURE 2.8

- (3 x 1) (3)
- 2.9 Name **TWO uses** of the **dumpy level**. (2 x 1) (2)
- 2.10 **Motivate** briefly why **labels** and **metal plates** should be **removed** from the **multi-detector** before using the instrument. (1)

[40]

TOTAL SECTION A: 60

QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

Start this question on a NEW page.

3.1 Answer the questions about the roof truss in FIGURE 3.1.

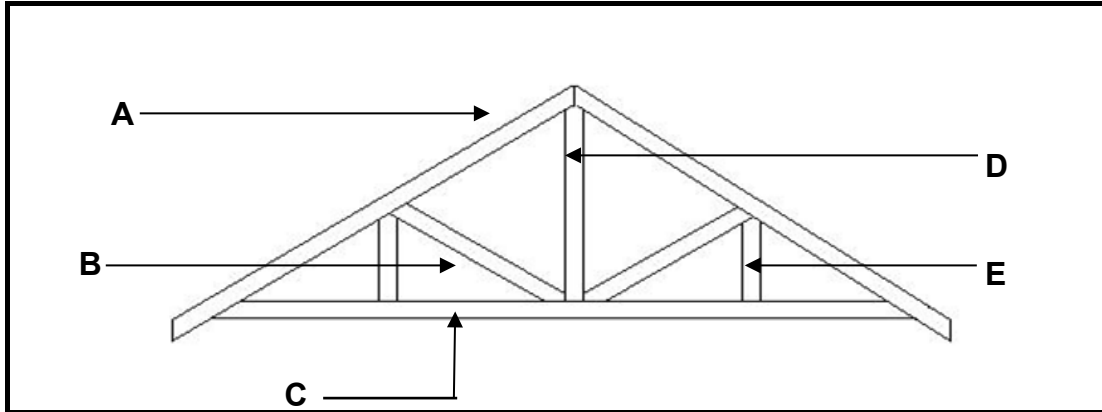


FIGURE 3.1

- 3.1.1 Name parts **A** to **E**. (5 x 1) (5)
- 3.1.2 Identify this type of roof truss. (1)
- 3.2 Name **THREE** requirements that roof trusses should meet_(have). (3 x 1) (3)
- 3.3 Answer the questions about thatched roofs.
- 3.3.1 What is the **minimum diameter** of roof poles? (1)
- 3.3.2 What is the **thickness** of the **dry thatch bundles** that are **fixed** to the **roof**? (1)
- 3.3.3 Why should the **thatched roof overhangs** be at least **4,5 m from any neighbouring property**? (1)
- 3.4 Name **TWO** advantages for the use of roof underlay. (2 x 1) (2)
- 3.5 Provide the **MEASUREMENT** for the descriptions of staircases.
- 3.5.1 The **minimum measurement** from the **pitch line** to the **ceiling**. (1)
- 3.5.2 The **maximum measurement** of the **gaps** between the **vertical posts**. (1)
- 3.5.3 The **maximum pitch** of the **stairs used** by the **public**. (1)

3.6 Provide **ONE** term for the **descriptions** of **staircases**.

3.6.1 A **level area** between **two flights** of **stairs**. (1)

3.6.2 The **horizontal part** of a **stair**. (1)

3.6.3 A **combination** of **balusters**. (1)

3.7 Answer the **questions** about the **staircase** in **FIGURE 3.7**.

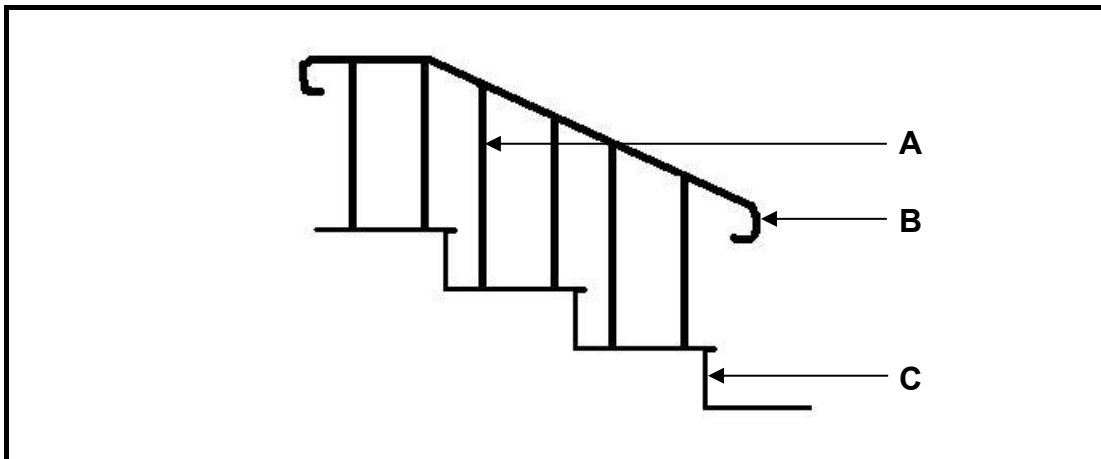


FIGURE 3.7

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

3.7.2 Name **ONE** **material** that part **B** can be made of. (1)

3.8 Indicate whether the statements are **TRUE** or **FALSE**.

3.8.1 **Galvanised steel straps cannot rust**. (1)

3.8.2 **Roof underlays is 250 micron in thickness**. (1)

3.8.3 The **ridge plate joins the roof truss to the wall plate**. (1)

3.8.4 The **cornice joins the wall plate to the wall**. (1)

3.9 Name **TWO** **types** of **cast-in anchors**. (2 x 1) (2)

[30]

QUESTION 4: MATERIAL, EQUIPMENT AND TOOLS, EXCAVATIONS AND FOUNDATIONS (SPECIFIC)

Start this question on a NEW page.

- 4.1 Choose a **description** from **COLUMN B** that **matches an item** in **COLUMN A**. Write the letter next to the **question numbers** (4.1.1 to 4.1.6) in the ANSWER BOOK, for example 4.1.7 J.

COLUMN A		COLUMN B	
4.1.1	Brass	A	alloy of steel and tin
4.1.2	Polystyrene	B	highly toxic
4.1.3	Cast iron	C	pumps small volumes of concrete
4.1.4	Line pipe concrete pump	D	hard, but is brittle and breaks easily
4.1.5	Lead	E	packaging material
4.1.6	Boom pump	F	dipped in molten zinc
		G	alloy of copper and zinc
		H	pumps high volumes of concrete

(6 x 1)

(6)

- 4.2 Answer the questions with regard to the test in FIGURE 4.2.

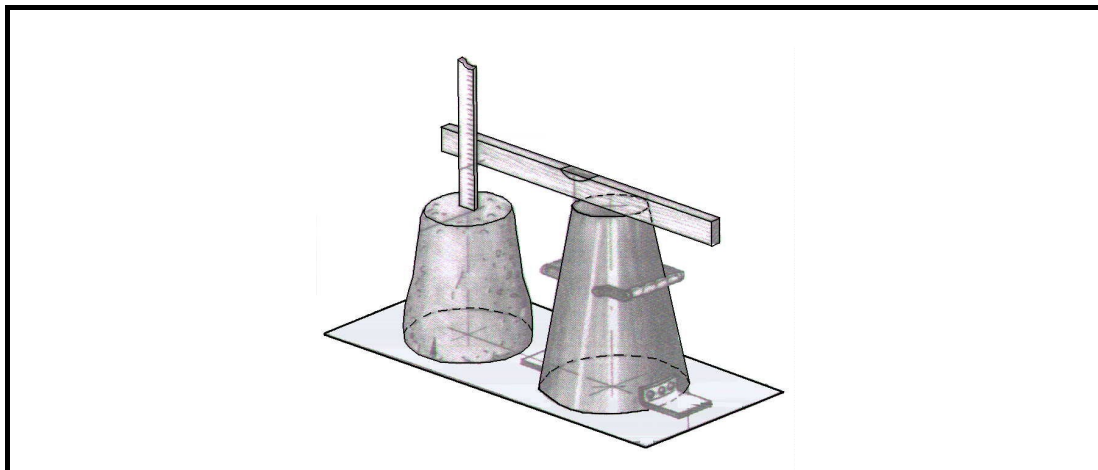


FIGURE 4.2

- 4.2.1 **Identify** this **type** of **test**. (1)
- 4.2.2 What is the **bottom** (bigger) **diameter** of the **cone**? (1)
- 4.2.3 What is the **length** of the **tamping rod**? (1)
- 4.2.4 Name **TWO reasons** for this **test**. (2 x 1) (2)

- 4.3 Name **TWO ways** of **curing concrete**. (2 x 1) (2)
- 4.4 Name the **TWO main groups** into which metals can be classified. (2 x 1) (2)
- 4.5 Name **THREE types** of **material** that can be used for the **cladding** of **buildings**. (3 x 1) (3)
- 4.6 Answer the questions on the construction machine in FIGURE 4.6.



FIGURE 4.6

- 4.6.1 **Identify** this machine. (1)
- 4.6.2 Name **TWO ways** of **maintaining** the machine. (2 x 1) (2)
- 4.6.3 **Where** will this machine be used? (1)
- 4.7 Name **THREE causes** for the **collapse** of an **excavation**. (3 x 1) (3)
- 4.8 Name **THREE ways** of **making excavations safe during the night**. (3 x 1) (3)
- 4.9 **Explain** the **safety regulations** for the following during **excavations**.
- 4.9.1 **Access** to a **deep excavation** (1)
- 4.9.2 The **distance** of **machinery** away from **trenches** (1)
- 4.9.3 **Testing** for **atmospheric hazards** (1)
- 4.10 Identify the following statements as TRUE or FALSE.
- 4.10.1 **Bracing** is **necessary** for **trenches deeper** than **one metre**. (1)
- 4.10.2 **Shoring** is **not compulsory** where the **banks** are **sloped**. (1)
- 4.10.3 **Excavated material** must be at least **two metres** from **trench edges**. (1)

4.11 Answer the questions about the shuttering in FIGURE 4.11.

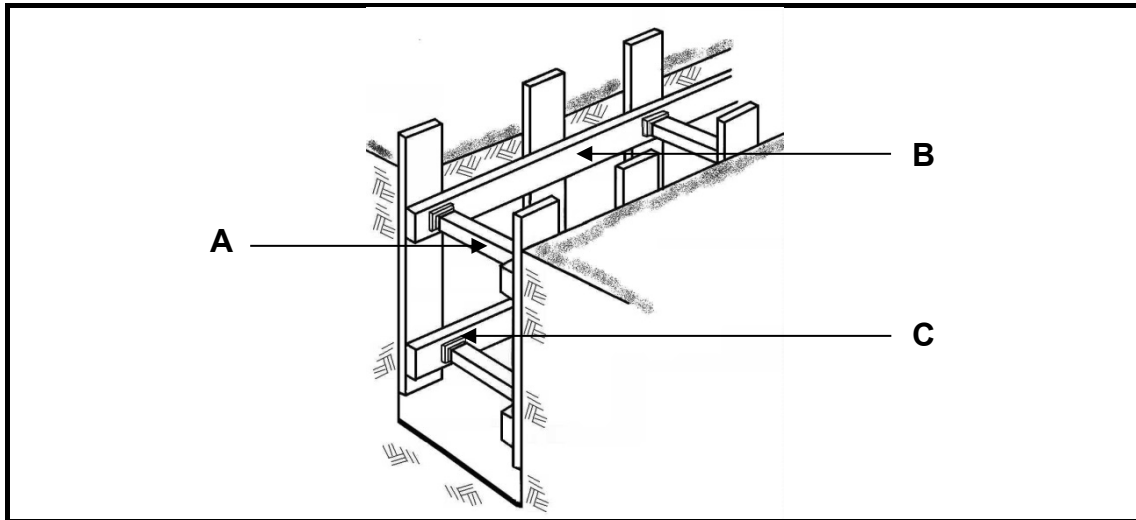


FIGURE 4.11

4.11.1 Identify the **type** of **soil** in FIGURE 4.11. (1)

4.11.2 Name the parts **A** to **C**. (3 x 1) (3)

4.12 Name any **TWO foundation types**. (2 x 1) (2)

[40]

QUESTION 5: BRICKWORK, GRAPHICS, PLASTER AND SCREED (SPECIFIC)

Start this question on a NEW page.

5.1 Answer the questions about the wall in FIGURE 5.1.

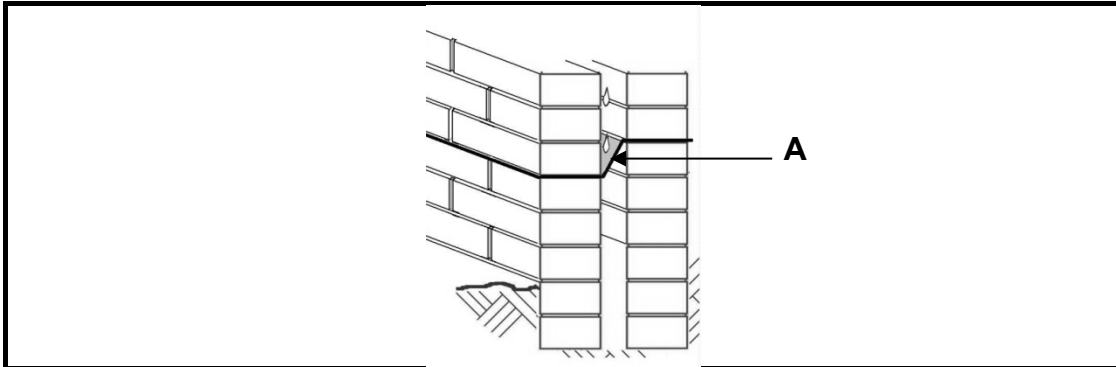


FIGURE 5.1

- 5.1.1 In what **type** of **bond** has this **wall** been **build**? (1)
- 5.1.2 Identify the **wall type**. (1)
- 5.1.3 What is the **width** of the **wall**? (1)
- 5.1.4 Identify part **A**. (1)
- 5.2 Draw a **neat sketch** on ANSWER SHEET B.
Show a **three-layer brick wall** in **stretcher bond**.
Show raking back on the left-hand side and toothing on the right-hand side.
Use any **sufficient**_(proper) **scale**. (4)
- 5.3 Answer the questions about cavity walls.
- 5.3.1 What is the **purpose** of a **weep hole**? (1)
- 5.3.2 What is the **maximum length** for a **cavity wall**? (1)
- 5.3.3 What is the **maximum height** for a **cavity wall**? (1)
- 5.3.4 What **connects** the **two skins**? (1)
- 5.3.5 In what **type** of **regions** will **ventilating bricks** be used? (1)
- 5.3.6 How **high** above **ground level** must the **damp-proof course** be **laid**? (1)
- 5.4 Name **TWO advantages** of **cavity walls**. (2 x 1) (2)
- 5.5 Name any **TWO types** of **wall ties**. (2 x 1) (2)

5.6 Choose a **description** from COLUMN B that **fits best** with the item in COLUMN A. Write the **letter** next to the question numbers (5.6.1 to 5.6.4) in the ANSWER BOOK, for example. 5.6.5 G.

COLUMN A	COLUMN B
5.6.1 Kerb	A natural soil on which the paving will be laid
5.6.2 Sub-base	B sand used as grouting between paving blocks
5.6.3 Subgrade	C best form of edge restraint for paving
5.6.4 Bedding sand	D final layer upon which paving is laid
	E preparation of the sub-base
	F prepared layer beneath paving and bedding sand

(4 x 1) (4)

5.7 Name TWO **advantages** of **mortar-set paving**. (2 x 1) (2)

5.8 Name TWO **reasons** for **construction failure of paving**. (2 x 1) (2)

5.9 Draw a neat sketch with EIGHT (8) **bricks** of the **basket-weave paving pattern** on ANSWER SHEET B. Use own sufficient scale. (4)

5.10 Answer the question about the arch in FIGURE 5.10.

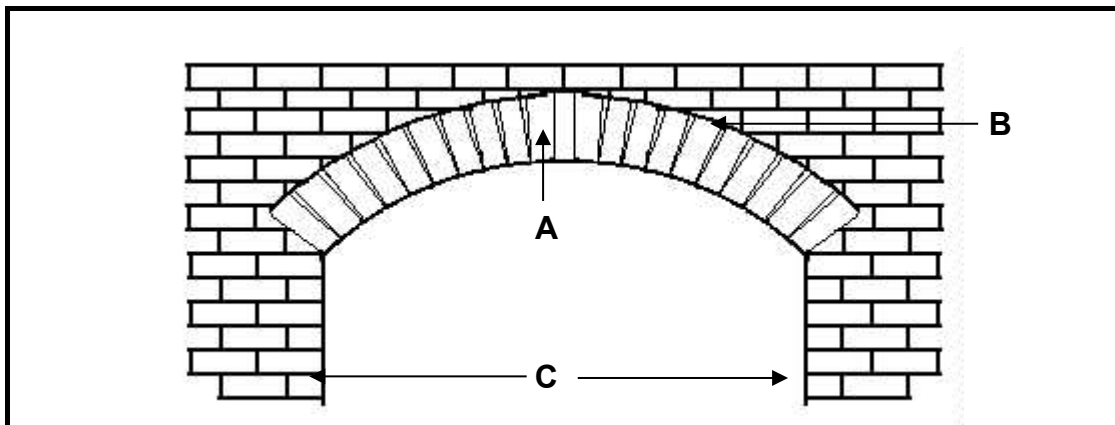


FIGURE 5.10

5.10.1 Identify this **type** of arch construction. (1)

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

5.11 Name the TWO **ingredients** of **plaster** (water and lime excluded). (2 x 1) (2)

5.12 Name TWO **types** of **plaster finishes**. (2 x 1) (2)

5.13 Name TWO **types** of **screed layers**. (2 x 1) (2)

[40]

QUESTION 6: FORMWORK, REINFORCEMENT, CONCRETE FLOORS AND QUANTITIES (SPECIFIC)

Start this question on a NEW page.

- 6.1 Name TWO materials that can be **used** to line the **formwork**, to **obtain**_(get) a **smoother finish** for the **concrete**. (2 x 1) (2)
- 6.2 Name TWO **types** of **timber boards** that can be **used** for **formwork**. (2 x 1) (2)
- 6.3 Name THREE **properties** of **good formwork**. (3 x 1) (3)
- 6.4 Answer the following questions about the floor construction in FIGURE 6.4.

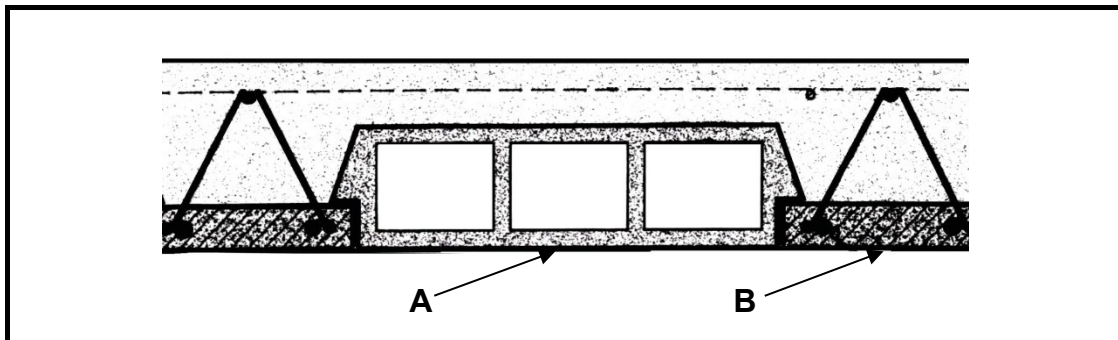


FIGURE 6.4

- 6.4.1 Name parts **A** and **B**. (2 x 1) (2)
- 6.4.2 Identify this **type** of **concrete floor**. (1)
- 6.4.3 Name ONE **disadvantage** of this **floor type**. (1 x 1) (1)
- 6.5 Answer the questions about the rod code in FIGURE 6.5.

Rod / bar code: **16Y20-01-250**

FIGURE 6.5

- 6.5.1 What **type** of **steel** is **used**? (1)
- 6.5.2 What is the **diameter** of the **rods**? (1)
- 6.5.3 What is **spacing** of the **rods**? (1)
- 6.6 What **forces** are **counteracted** by the following **parts** in a **concrete beam**?
- 6.6.1 Main bar (1)
- 6.6.2 Anchor bar (1)

- 6.7 Name **THREE properties** of **reinforced steel bars**. (3 x 1) (3)
- 6.8 Name **TWO reasons** for the **cover depth** of **reinforcement in concrete work**. (2 x 1) (2)
- 6.9 FIGURE 6.9 shows the foundation strips with inside measurements for a storeroom. The foundation is 700 mm wide and 250 mm thick.

Answer the questions in the ANSWER BOOK.
Table format is NOT compulsory (Show ALL formulas and steps.)

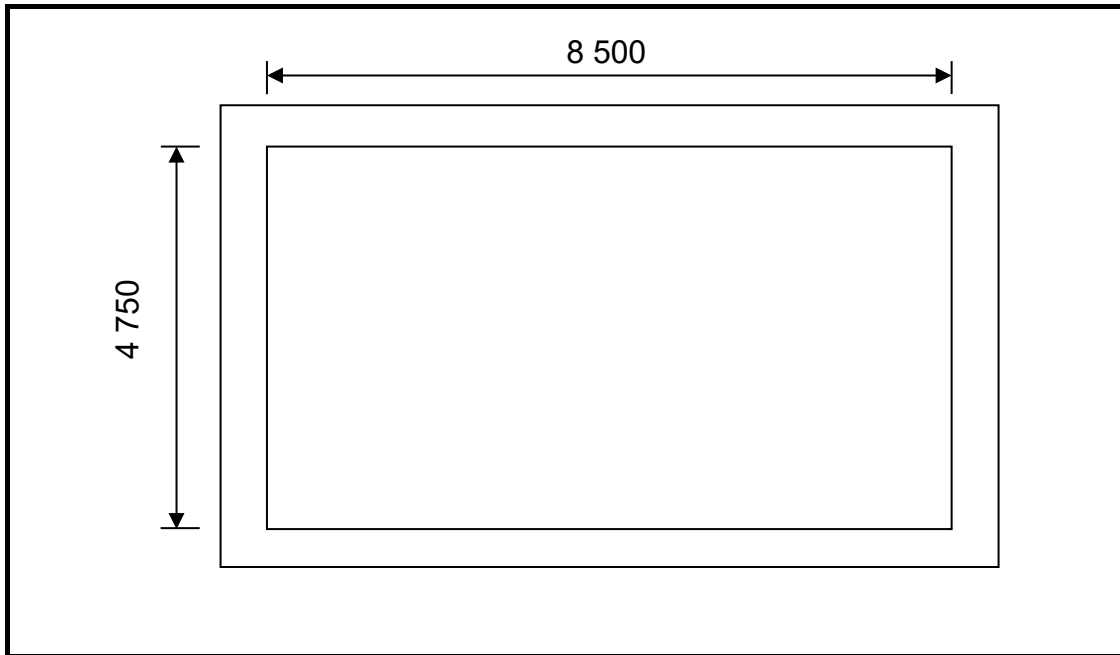


FIGURE 6.9

- 6.9.1 Calculate the **centreline** of the **foundation**. (5)
- 6.9.2 Calculate the **volume** of **concrete needed**. (4)

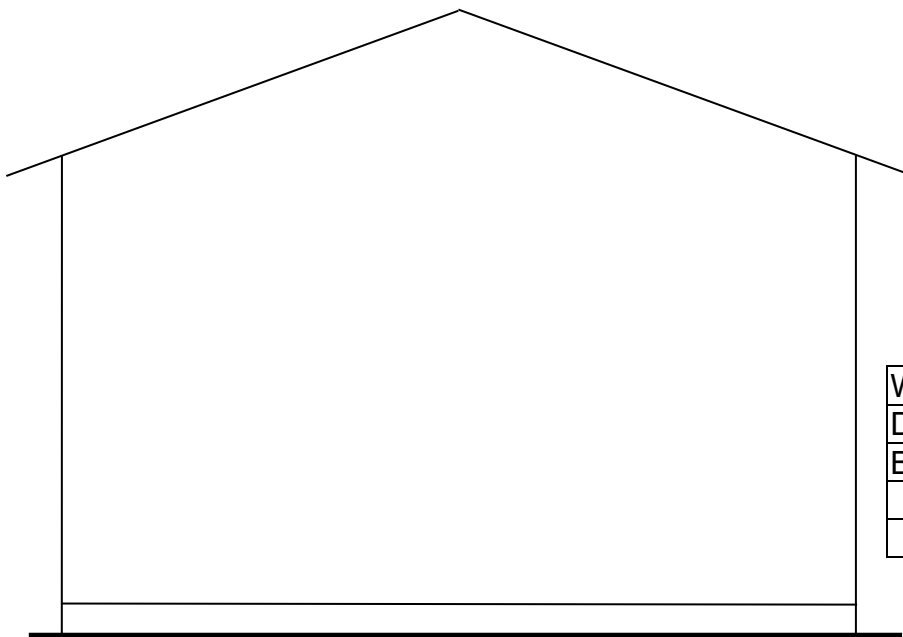
[30]

TOTAL: 200

ANSWER SHEET	A	CIVIL TECHNOLOGY GENERIC	NAME: _____
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2.2 FIGURE 2.2 on ANSWER SHEET A shows the incomplete elevation of a building. Complete the elevation by drawing in the following parts on scale 1 : 50.

- 2.2.1 A window with a length of 1 800 mm and a height of 900 mm. The window is built in 700 mm from the right-hand side and one-third of the right side of the window can open. (7)
- 2.2.2 A door according to standard measurements, 900 mm from the left side of the building. The door opens to the left. There is one step to the ground level. (5)
- 2.2.3 The barge board against the gable end. (2)



Window	7	
Door	5	
Barge board	2	
TOTAL:	14	

FIGURE 2.2

ANSWER SHEET B	CIVIL TECHNOLOGY CONSTRUCTION	NAME: _____
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- 5.2 Draw a neat sketch and show a three layer brick wall in stretcher bond.
Show raking back on the left-hand side and toothing on the right-hand side.
Use own sufficient scale

(4)

- 5.9 Draw a neat sketch with eight (8) bricks of the basket-weave paving pattern.
Use own sufficient scale.

(4)