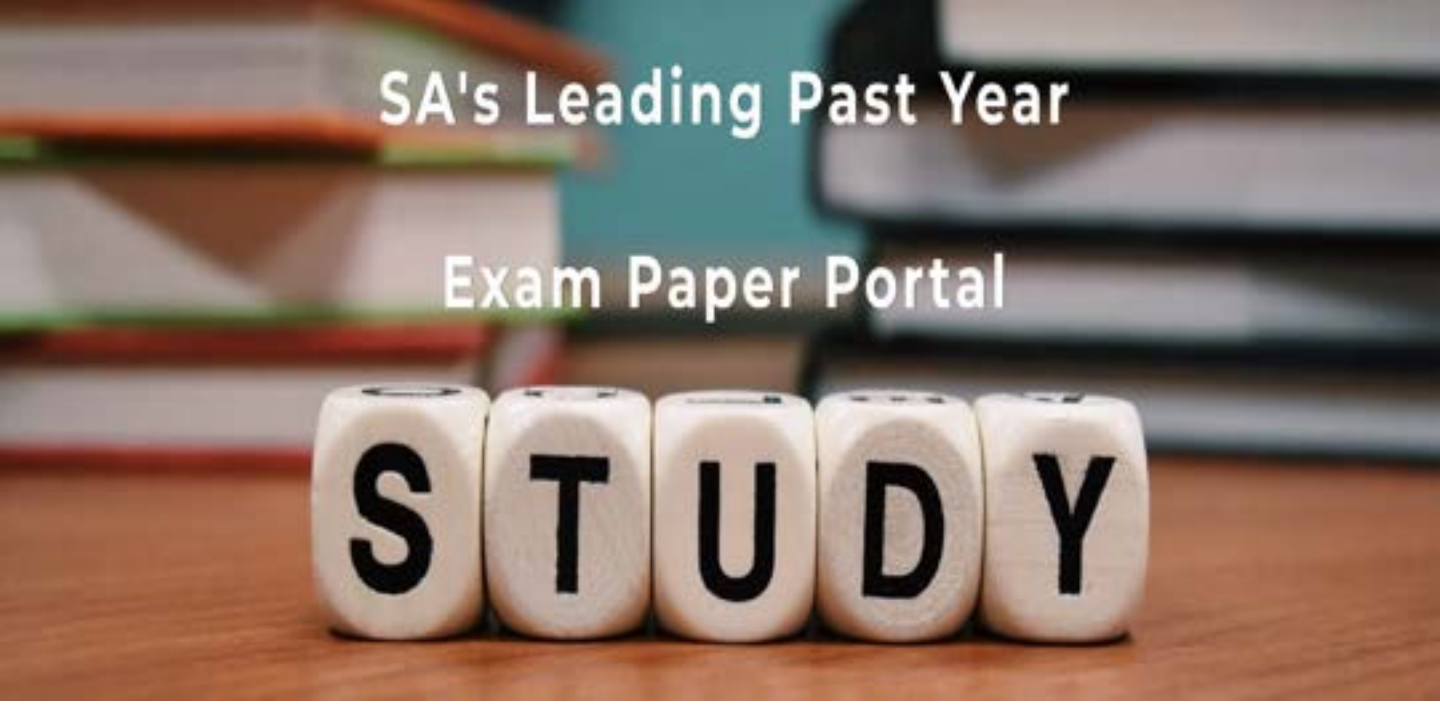

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GRADE 12

CIVIL TECHNOLOGY: CONSTRUCTION

NOVEMBER 2020

MARKS: 200

TIME: 3 hours

This question paper consists of 12 pages and 8 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.
2. Answer ALL the questions.
3. Read all questions carefully.
4. Answer each question as a whole. Do NOT separate subsections of questions.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Start the answer to EACH question on a NEW page.
7. Do NOT write in the margins of the ANSWER BOOK.
8. You may use sketches to illustrate your answers.
9. Write ALL calculations and answers in the ANSWER BOOK or on the attached ANSWER SHEETS.
10. Use the mark allocation as a guide to the length of your answers.
11. 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.*
12. For the purpose of this question paper, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
13. Use your own discretion where dimensions and/or details have been omitted.
14. Answer QUESTIONS 2, 3.6, 3.7, 4.15, 5.6, 5.7, 6.5 and 6.6 on the attached ANSWER SHEETS using drawing instruments, where necessary.
15. Write your CENTRE NUMBER and EXAMINATION NUMBER on every ANSWER SHEET and hand them in with your ANSWER BOOK, whether you have used them or not.
16. Drawings in the question paper are NOT to scale due to electronic transfer.
17. Google Images was used as the source of all photographs and pictures.
18. Write neatly and legibly.

QUESTION 1: OHSA, SAFETY, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)

Start this question on a NEW page.

1.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–K) next to the question numbers (1.1.1 to 1.1.8) in the ANSWER BOOK, e.g. 1.1.9 L.

COLUMN A		COLUMN B	
1.1.1	Powder coating	A	must be inclined slightly towards a building
1.1.2	Rungs	B	is used with the dumpy level to measure heights accurately
1.1.3	Wing nut	C	allows a worker to climb up or down a ladder
1.1.4	Rawl bolts	D	can be tightened or loosened without using a spanner
1.1.5	Telescopic staff	E	suitable for outdoor furniture
1.1.6	Accident	F	result of an unsafe act or unsafe condition
1.1.7	Putlog scaffold	G	must not be placed where it may obstruct the access to or the exit from a building site
1.1.8	Building rubble	H	resists pull-out failure
		I	must be secured firmly when there is any sagging
		J	prevent(s) workers from falling off a scaffold
		K	disposal of waste materials and debris

(8 x 1) (8)

1.2 Explain ONE advantage of galvanising. (1)

1.3 Name the document on hazardous chemical substances which the OHS Act requires employers to provide to interested or affected persons. (1)

1.4 Describe TWO methods that can be used to move building material around the site. (2)

1.5 State TWO specific advantages of water-based paint. (2)

1.6 You were tasked to locate steel bars and copper pipes placed in a wall.

1.6.1 Name the tool you would use to detect these materials. (1)

1.6.2 Describe how you would take care of this tool after using it. (2)

1.7 FIGURE 1.7 below shows a joining fixture that is commonly used.

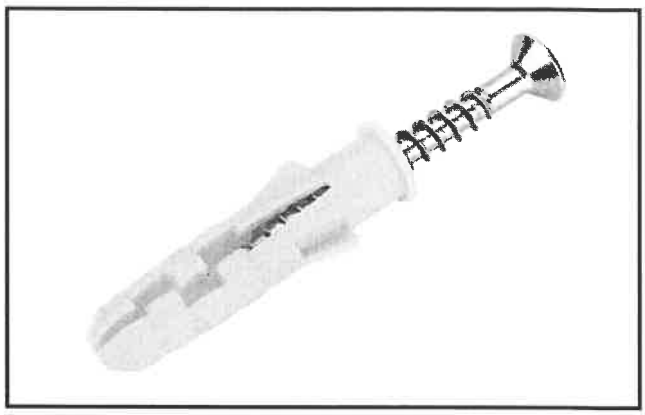


FIGURE 1.7

Explain how this joining fixture can be used to secure a bracket to a wall. (3)
[20]

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)

Start this question on a NEW page.

FIGURE 2 on the next page shows different drawings that appear on a building plan. Analyse the drawings and complete the table on ANSWER SHEET 2.

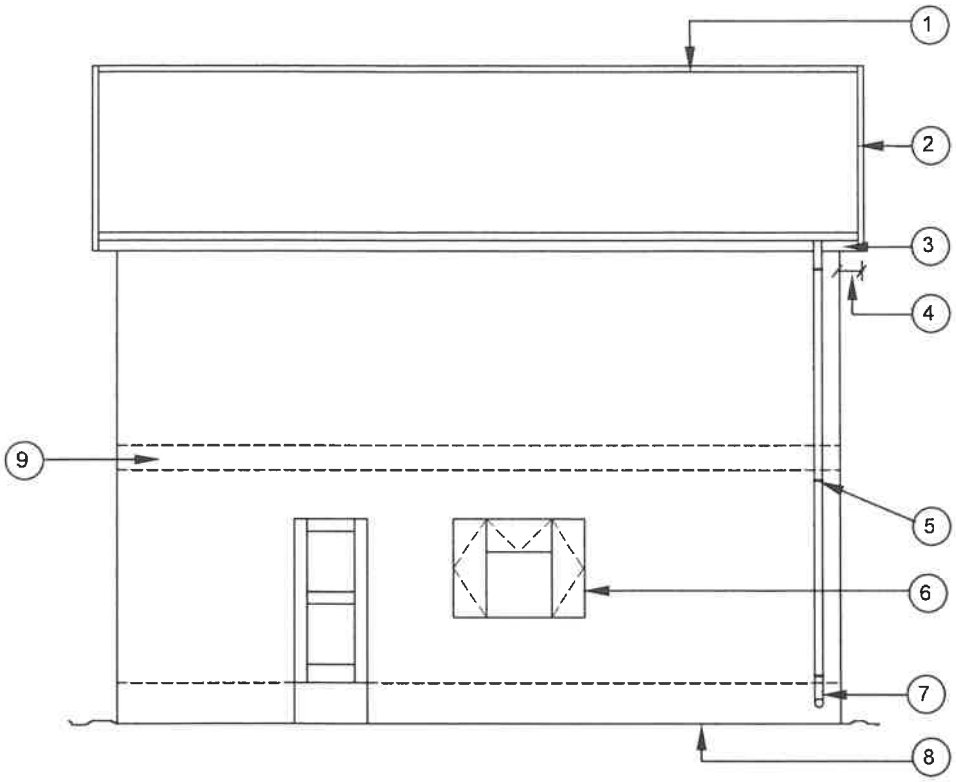


FIGURE A

SCALE 1 : 100

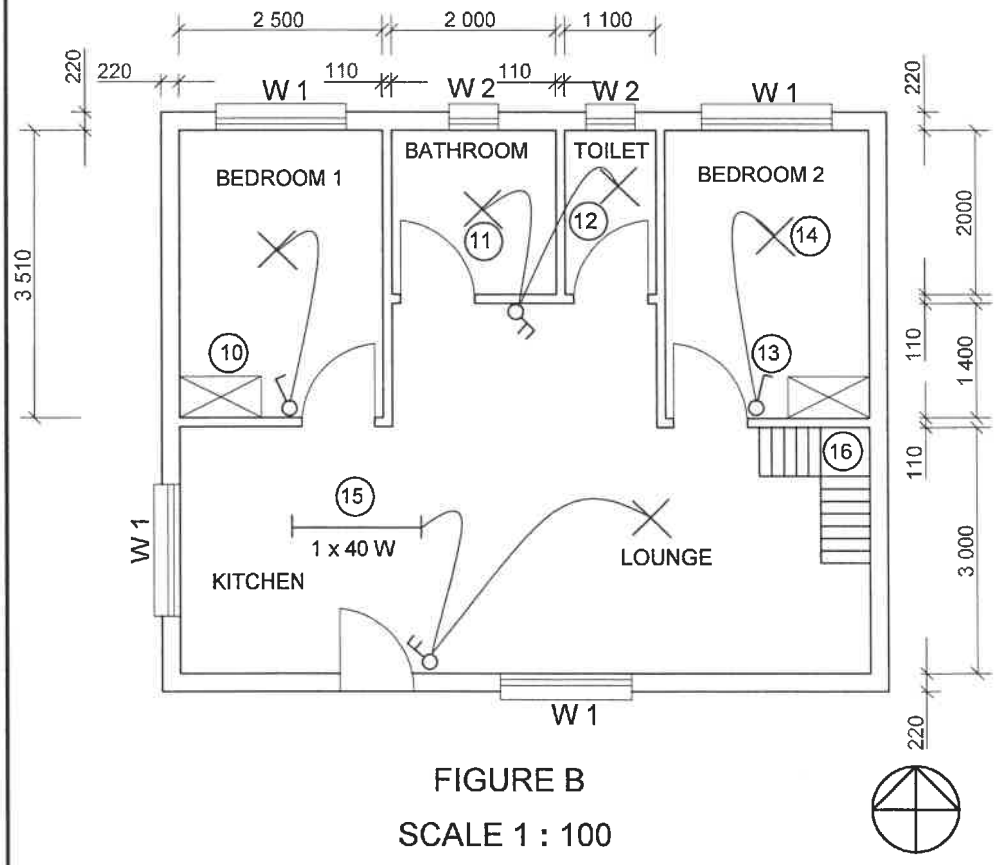


FIGURE B

SCALE 1 : 100

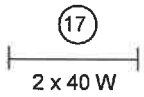
NOTES:
Contractors must verify all dimensions and levels on site before commencing work. Architects must be notified of any discrepancies immediately.

ARCHITECT'S SIGNATURE .....
CLIENT'S SIGNATURE .....

Brick force must be installed every third course up to window height. From the top of the window, brick force must be installed between every course up to wall plate height.

DPM must be fitted under the floor slab to prevent water from penetrating from the substructure.

The following electrical fittings must be installed in the kitchen:



REVISION	DATE	DESCRIPTION

PRINTED BY: MTANDO PRINTERS
DATE OF PRINT: 01/04/2020

DRAWING TITLE:
SITE PLAN STAND 101

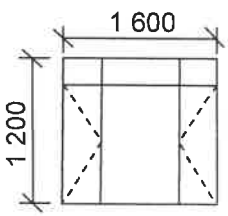
PROJECT:
PROPOSED DWELLING ON STAND 101, JABULANI STREET, CRADOCK

PROJECT NO. GR 448-210
DRAWING NO. 559P7

DATE	DRAWN	CHECKED	SCALE
27/03/2020	N DAMON	P HENSLO	1 : 100

REFERENCE CODE
QP 4-2020

WINDOW 1	WINDOW 2



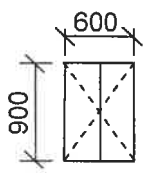


FIGURE 2 **[40]**

QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

Start this question on a NEW page.

3.1 Give ONE word/term for each of the following descriptions by choosing a word/term from the list below. Write only the word/term next to the question numbers (3.1.1 to 3.1.5) in the ANSWER BOOK, e.g. 3.1.6 114 mm x 38 mm.

760 mm; fire-proof material; corrugated iron sheets; 300 mm; 38 x 38 mm; sisalation; 1 200 mm; fibre-cement tiles; 450 mm; concrete and clay roof tiles; bitumen asphalt; 50 x 76 mm

3.1.1 The maximum spacing between roof trusses for a thatch roof (1)

3.1.2 The material that can be used as an underlay to reduce the fire hazard during the construction of a thatch roof (1)

3.1.3 The maximum spacing between the battens for a thatch roof (1)

3.1.4 The type of roof covering if the maximum space between the roof trusses is 760 mm (1)

3.1.5 The dimensions of a batten that is used in an eaves construction for corrugated iron sheet covering (1)

3.2 State ONE principle to consider when designing a staircase in terms of the following:

3.2.1 Minimum width of the staircase (1)

3.2.2 Minimum headspace (1)

3.2.3 Safety (1)

3.3 Differentiate between a *rise* and *riser* as used in a staircase. (2)

3.4 Name the template that is used to set out a staircase. (1)

3.5 State any TWO purposes of a balustrade. (2)

3.6 Use ANSWER SHEET 3.6 and draw a neat freehand sketch, in good proportion, to show how a roof truss is joined to a wall.

Use the assessment criteria on the ANSWER SHEET as a guide. (9)

3.7 Use ANSWER SHEET 3.7 and draw to scale of 1 : 10 the junction between the tie beam, king post and struts of a gang-nailed South African (Howe) roof truss. The angle between the struts and the tie beam is 30°. Label any TWO parts with the dimensions and print the title and scale below the drawing.

Use the assessment criteria on the ANSWER SHEET as a guide. (8)

[30]

QUESTION 4: EXCAVATIONS, FORMWORK, TOOLS, EQUIPMENT AND MATERIALS (SPECIFIC)

Start this question on a NEW page.

4.1 Define the term *excavations*. (1)

4.2 Describe the consequence if heavy vehicles drive close to the edge of an excavation. (1)

4.3 Predict what will happen if the sides of an excavation are not dug at the correct angle. (1)

4.4 At which part of the formwork will you start when dismantling formwork in excavations? (1)

4.5 What precautions must be taken around a trench that is deeper than 2 metres? (1)

4.6 Excavation of loose soil is necessary on a building site to reach a firm soil base.

4.6.1 The location of different types of services should be determined before excavation commences. Name any TWO of these services. (2)

4.6.2 The trenches should be inspected regularly when working in deep trenches. Explain when these inspections should take place. (1)

4.7 FIGURE 4.7 below shows a tamping rammer that is used on a building site.

FIGURE 4.7

4.7.1 Describe how one should operate the tamping rammer safely. (2)

4.7.2 Why should this machine be stored in a safe, dry place? (1)

4.8 FIGURE 4.8 below shows equipment that is used to test concrete on a construction site. Study FIGURE 4.8 below and answer the questions that follow.

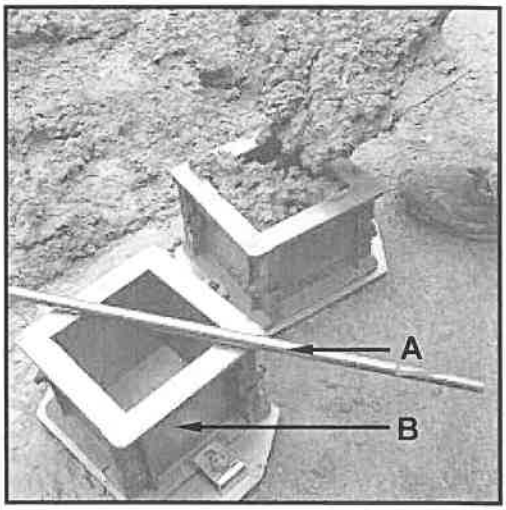


FIGURE 4.8

4.8.1 Name the test used in FIGURE 4.8. (1)

4.8.2 Identify **A** and **B**. (2)

4.8.3 Indicate the time needed before testing can take place, after the concrete has been immersed in water. (2)

4.8.4 Which property of concrete is tested during this process? (1)

4.9 State TWO properties of ductile cast iron. (2)

4.10 Name ONE material that can be used to fix cladding to a wall. (1)

4.11 Describe the function of poling boards as used in shuttering for excavations. (1)

4.12 Explain TWO functions of walling boards that are used in shuttering for excavations. (2)

4.13 How many walling boards must be used for an excavation that is 1 metre deep? (1)

4.14 Describe the spacing of poling boards for shuttering in firm soil and shuttering in loose soil respectively. (2)

4.15 FIGURE 4.15 on ANSWER SHEET 4.15 shows an incomplete drawing of the formwork for a straight flight of concrete stairs with a landing. Use ANSWER SHEET 4.15 and complete the drawing.

Use the assessment criteria on the ANSWER SHEET as a guide. (14)
[40]

QUESTION 5: PLASTER AND SCREED, BRICKWORK AND GRAPHICS AS MEANS OF COMMUNICATION (SPECIFIC)

Start this question on a NEW page.

5.1 Classify the type of finish that can be obtained by using the following:

5.1.1 A Tyrolene machine (1)

5.1.2 Hessian cloth or cement bag (1)

5.2 State TWO purposes of screed. (2)

5.3 Explain ONE method of preparing a smooth concrete floor to receive the screed. (1)

5.4 Identify the material that can be added to plaster to increase its workability and plasticity. (1)

5.5 Differentiate between a *rough arch* and a *gauged arch* in terms of the respective shapes of the mortar joints. (2)

5.6 Use ANSWER SHEET 5.6 and draw a neat sketch showing the alternate plan courses of a one-and-a-half brick pier built in stretcher bond.

Use the assessment criteria on the ANSWER SHEET as a guide. (10)

5.7 Use ANSWER SHEET 5.7 and draw to scale 1 : 10 a horizontal sectional view through a wooden door frame built into a 220 mm wall.

Use the assessment criteria on the ANSWER SHEET as a guide. (12)
[30]

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

Start this question on a NEW page.

6.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (6.1.1 to 6.1.5) in the ANSWER BOOK, e.g. 6.1.6 C.

6.1.1 Steel that is used as reinforcement in concrete is available in the following thicknesses:

A 8 mm, 25 mm and 40 mm
B 5 mm, 7 mm and 13 mm
C 9 mm, 18 mm and 28 mm
D 14 mm, 26 mm and 35 mm (1)

6.1.2 Reinforcement rods and bars are available in lengths of up to …

A 3 000 mm.
B 6 000 mm.
C 13 000 mm.
D 15 000 mm. (1)

6.1.3 Spacers are used to prevent the reinforcement from …

A bending and buckling.
B touching the sides of the formwork.
C twisting.
D All the above-mentioned (1)

6.1.4 … can be used as bars and rods for reinforcement.

A Square twisted bars
B Round bars
C Ribbed bars
D All the above-mentioned (1)

6.1.5 The purpose of minimum concrete cover is to ensure …

A adequate bonding between the steel and concrete.
B adequate protection of steel in the event of a fire.
C protection of steel against corrosion.
D All the above-mentioned (1)

6.2 Give TWO reasons for the installation of pile foundations. (2)

6.3 Draw a neat freehand sketch in your ANSWER BOOK showing the first step of the installation of a driven in-situ pile.

Show the following in the drawing:

- Steel cable
- Steel pipe-casing
- Drop hammer
- Any ONE label (5)

6.4 FIGURE 6.4 below shows a faulty installation of a rib and block floor construction.

Analyse FIGURE 6.4 and answer the questions that follow.

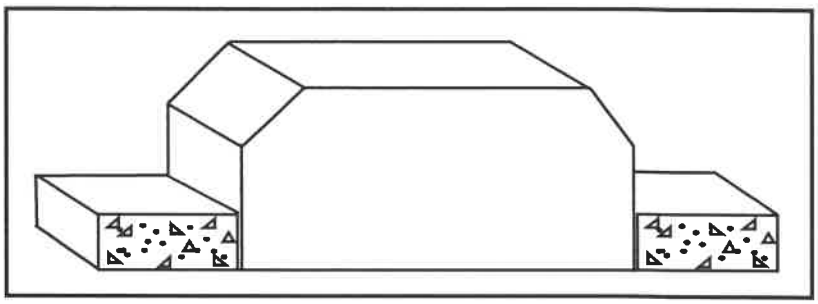


FIGURE 6.4

6.4.1 Predict TWO consequences of installing the rib and block floor as shown. (2)

6.4.2 Draw a neat freehand drawing in your ANSWER BOOK and rectify the faults in FIGURE 6.4. (6)

6.4.3 What is the minimum recommended width of the load-bearing walls that support this type of floor construction? (1)

6.5 Use ANSWER SHEET 6.5 and draw a neat sectional view of a round reinforced concrete column with eight main bars in good proportion.

Use the assessment criteria on the ANSWER SHEET as a guide. (7)

6.6 FIGURE 6.6 below shows the floor plan of a storeroom in a construction workshop. Study the floor plan and answer the questions that follow.

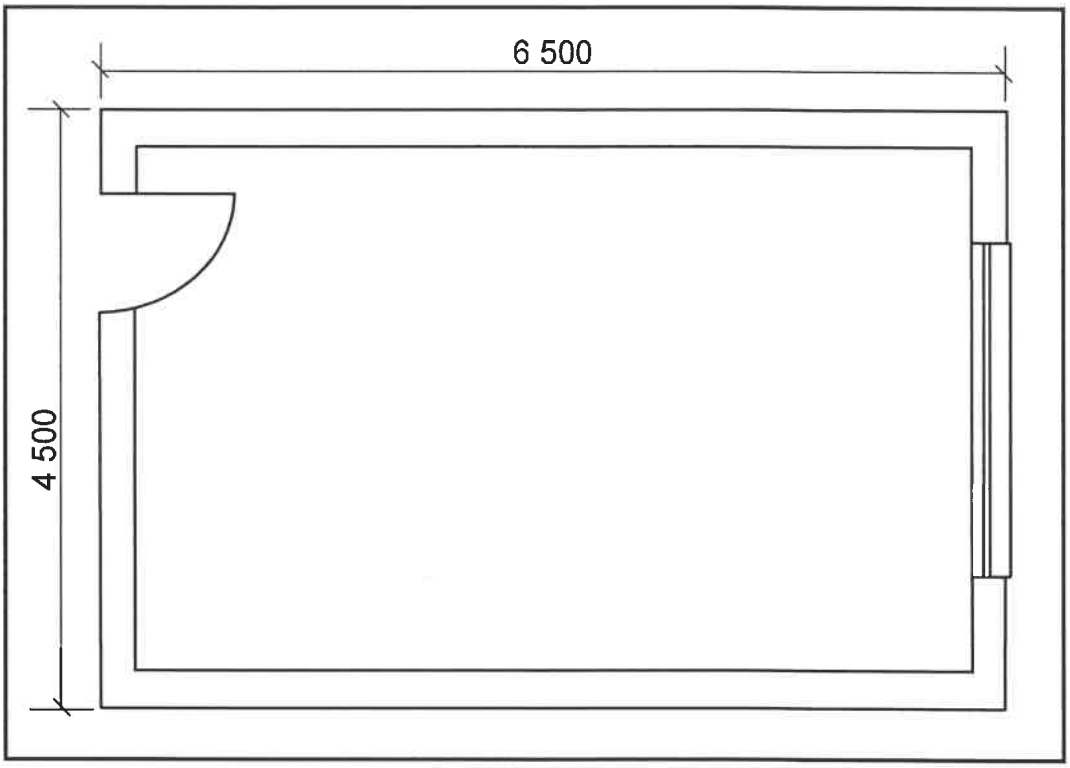


FIGURE 6.6

Use the following specifications:

- Outside measurements of the storeroom: 6 500 mm x 4 500 mm
- Size of the window opening: 2 500 mm x 600 mm
- Size of the door opening: 2 100 mm x 900 mm
- Concrete floor: 75 mm thick
- Walls: 220 mm wide
- Tiles: 350 mm x 350 mm

Use the dimension paper on ANSWER SHEET 6.6 and calculate the following:

6.6.1 The area of the floor (5)

6.6.2 The volume of concrete needed for the floor. Round off your answer to TWO decimal places. (2)

6.6.3 The number of tiles needed (5)
[40]

TOTAL: 200

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 2

NO.	QUESTION	ANSWER	MARKS
1	Identify the elevation in FIGURE A.		1
2	Describe the type of house that is indicated in FIGURE A.		1
3	Identify number 1.		1
4	Identify number 3.		1
5	Identify number 4.		1
6	Identify the fastener indicated by number 5.		1
7	Identify number 6.		1
8	Identify number 7.		1
9	Identify number 8.		1
10	What does *DPM* stand for, as indicated in the notes?		1
11	Identify number 10.		1
12	Recommend a suitable material that can be used for the manufacturing of number 2 in FIGURE A.		1
13	Name the TWO elevations on which number 2 is installed.		2
14	Describe the purpose of number 3.		1
15	Deduce ONE feature that has been omitted from the elevation in FIGURE A.		1
16	Recommend any TWO sanitary fitments carrying waste-water, other than a bath, that can be installed in the room indicated by number 11.		2

17	What sanitary fixture carrying soil water can be installed in the room indicated by number 12?		1
18	Describe the error that appears at number 6 in the elevation in FIGURE A.		1
19	State the reference code for this plan.		1
20	Which room will number 13 serve?		1
21	What does the line between numbers 13 and 14 represent?		1
22	Differentiate between number 15 in FIGURE B and number 17 in the notes.		2
23	Explain the installation of brick force from the top of the window to the wall plate, as indicated by the architect.		1
24	Recommend a possible finish for the outside walls of the house.		1
25	Deduce from FIGURE 2 which elevation does NOT have windows.		1
26	Deduce the thickness of the external wall from FIGURE 2.		1
27	Name a material that can be used to close the open sides of number 16.		1
28	Name the town in which the proposed dwelling will be build.		1
29	Calculate the area of the bathroom. Show ALL calculations. Give your answer in m^2.		3
30	Calculate the total length of the wall on the eastern side of the building. Show ALL calculations. The length must be indicated in metres.		6
		TOTAL:	**40**

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 3.6

ASSESSMENT CRITERIA	MARK	CANDIDATES MARK
Brick wall	1	
Wall plate	1	
Tie beam	1	
Rafter	1	
Hoop-iron strap	3	
Clout nails	1	
Correctness of drawing	1	
TOTAL:	**9**	

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 3.7

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Tie beam	1	
King post	1	
Struts	2	
Any ONE label with dimensions	2	
Application of scale	1	
Correctness of drawing	1	
TOTAL:	**8**	

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 4.15

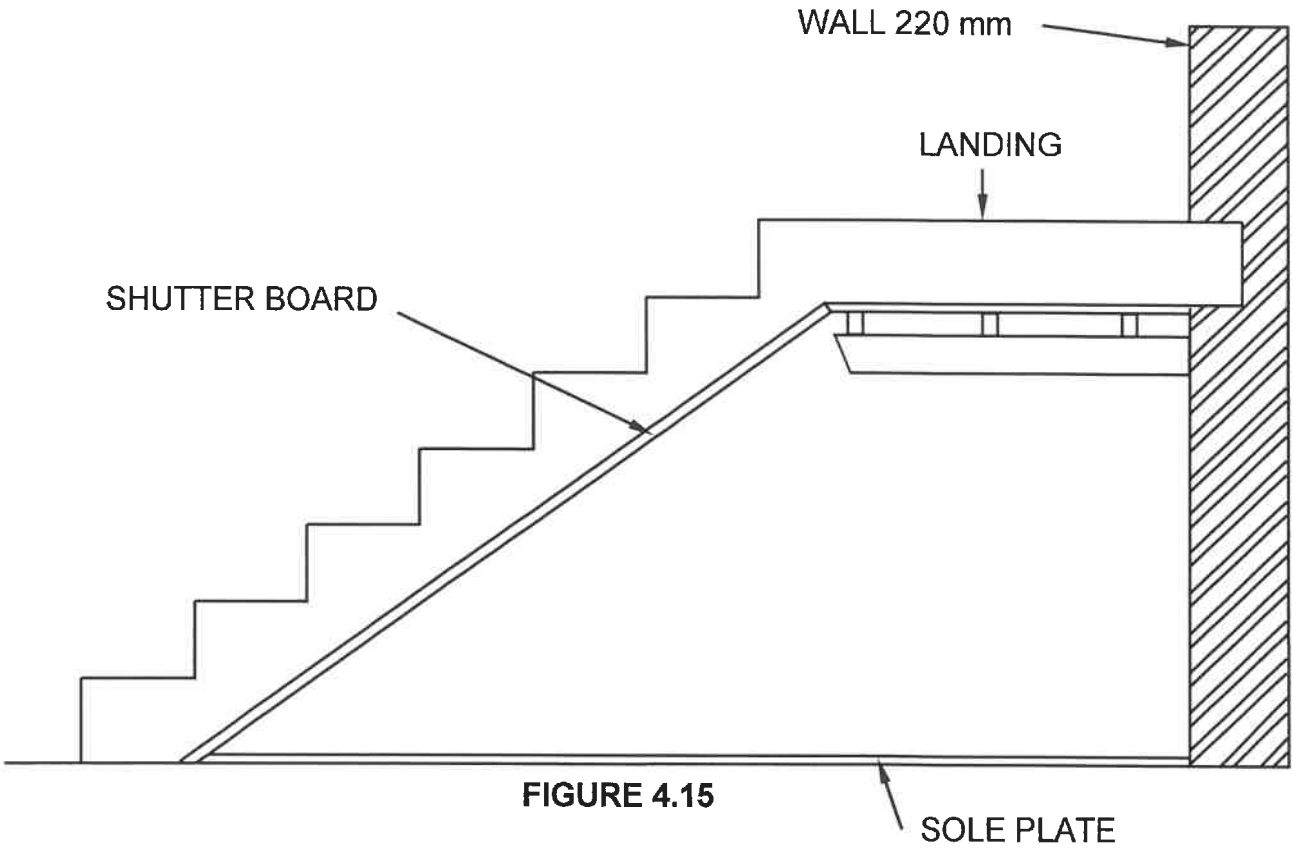


FIGURE 4.15

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Cross bearers	1	
Bearer/Joist	1	
Props	3	
Folding wedges	2	
Cleats to support props	1	
Wall string	1	
Bevelled riser	2	
Cleats	2	
Correctness of drawing	1	
TOTAL:	**14**	

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 5.6

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Strecher bond – first course	5	
Strecher bond – second course	5	
TOTAL:	**10**	

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 5.7

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Wall 220 mm	2	
Plaster 12 mm	2	
Exterior reveal	1	
Door frame 110 mm x 70 mm	2	
DPC attached to door frame	1	
Quarter rounds	2	
Any ONE label	1	
Correctness of drawing	1	
TOTAL:	**12**	

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 6.5

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Column	2	
Stirrup	1	
Main bars	2	
Cover depth indicated (min concrete cover)	1	
Correctness of drawing	1	
TOTAL:	**7**	

(7)

CENTRE NUMBER:								

EXAMINATION NUMBER:													

ANSWER SHEET 6.6

A	B	C	D

(12)