higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING DRAWING N3

(8090023)

4 August 2021 (X-paper)
09:00–13:00

REQUIREMENTS: A2 Drawing paper

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 8 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
BUILDING DRAWING N3
TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Use both sides of the DRAWING PAPER.
5. QUESTION 6 must be answered on the A2 DRAWING SHEET.
6. All the drawings are to be fully dimensioned and neatly finished off with descriptive titles and notes to conform with the SANS Recommended Practice for Building Drawings.
7. A balanced layout must be maintained.
8. Use your discretion where dimensions are not given.
9. All the drawings must be drawn to the required scale.
10. Refer to the mark allocation at the end of each question for the breakdown of the answers.
11. All work you do not want to be marked must be clearly crossed out.
12. Write neatly and legibly.

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QUESTION 1

The hearth on the first floor of a building is supported with the aid of a trimmer arch. The chimney breast projects 300 mm into the room and the hearth projects a further 300 mm into the inside of the room up to the trimmer joist. The wall is plastered internally on the ground floor only.

Using a scale 1:10, draw a vertical section through the centre of the hearth. Make sure you include all the specifications below. Show at least TEN layers of brickwork below the floor and TEN layers of brickwork above the floor.

Trimmer arch: Segmental (brick on edge)
Show all construction details of the trimmer arch and allow a 10 mm mortar joint between bricks at the lower side of the arch.

HINT: Use a span of 980 mm and a rise of 90 mm to construct part of the arch.

NOTE: You may show arch construction separately

SPECIFICATIONS:

Trimmer joist:	220 mm × 75 mm
Floor joist:	220 mm × 50 mm
External wall:	330 mm below the floor, reduce to 220 mm at first floor level (in line with the bottom of the floor joist)
Plaster:	19 mm
Bearer:	50 mm × 50 mm
Hardwood curb:	75 mm × 22 mm
Fireplace tiles:	300 mm × 300 mm × 20 mm cement tiles
Flooring boards:	100 mm × 22 mm
Brandering:	38 mm × 38 mm at 400mm c/c
Ceiling:	8 mm × Rhino board
Cornice:	85 mm × Coved cornice

CORRECTNESS OF ALL PARTS OF DRAWING	OVERALL IMPRESSION	TITLE	SCALE
16	2	1	1

[20]

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QUESTION 2

A brick wall is to be provided with a skeleton jamb lining to receive a flush door.

Using a scale of 1:2, draw a horizontal section through the skeleton jamb lining. The drawing must include the wall, the plaster, the jamb, the rough grounds, the stop, the backing, the architrave, the skirting and part of the door.

SPECIFICATIONS:

Brick wall:	220 mm
Plaster:	19 mm
Backing:	220 mm × 19 mm
Jamb:	258 mm × 32 mm
Rough grounds:	60 mm × 19 mm
Stop:	166 mm × 12 mm
Architrave:	100 mm × 22 mm
Skirting:	75 mm × 19 mm
Door:	44 mm

CORRECTNESS OF ALL PARTS OF DRAWING	OVERALL IMPRESSION	TITLE	SCALE
12	1	1	1

[15]

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QUESTION 3

The first floor of a building must be provided with a reinforced concrete slab which is supported at the external walls by means of an end beam (L- shape beam). The beam carries 220 mm onto the brick wall. Using a scale 1:10, draw a vertical cross section through the end beam, concrete slab and the wall.

Show FIVE courses of brickwork above the slab and FIVE courses of brickwork below the beam.

SPECIFICATIONS:

External wall:	220 mm
Slab:	100 mm thick
End beam:	300 mm deep (measured from the top of the slab) and 220 mm wide
End beam reinforcement:	THREE 20 mm diameter tensile bars, TWO 16 mm diameter compression bars, with 8 mm diameter stirrups at 300 mm centres
Slab reinforcement:	12 mm diameter main bars at 200 mm centres, with alternate bars crank up into the top of the slab over the beam, with 6 mm diameter distribution bars at 150 mm centres.
Concrete cover:	25 mm
Floor finish:	20 mm cement finish
Plaster:	19 mm both sides

CORRECTNESS OF ALL PARTS OF DRAWING	OVERALL IMPRESSION	TITLE	SCALE	TOTAL
16	2	1	1	**20**

[20]

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QUESTION 4

Using a scale 1:10, draw the following vertical sections:

Both superstructures must be provided with face brick from strip foundation up to two courses above natural ground level. The drawings must clearly show the constructional difference between the cavity construction and the solid wall construction. Both drawings must show the damp proof layers, foundations, foundation walls, floors, hard core, the face brick and natural ground levels.

Show EIGHT course of brick work above the floor level.

4.1 A vertical section through a solid wall and foundation

4.2 A vertical section through a cavity wall and foundation

SPECIFICATIONS:

Solid wall:	330 mm
Cavity wall:	380 mm
Foundations:	900 mm × 300 mm
Foundation walls:	SEVEN bricks high for solid wall NINE bricks high for cavity wall
Plaster:	19 mm both walls (on the inside and outside)
Weeping hole:	In the cavity wall only
Skirting:	75 mm × 22 mm both floors
Screed:	20 mm both floors
Concrete floors:	75 mm for solid wall 300 mm above ground level 75 mm for cavity wall 375 mm above ground level
DPC:	375 micron under both floors
Hardcore:	150 mm under both floors
Floor finish:	150 mm × 150 mm × 10 mm Ceramic tiles to both floors

4.1

Correctness of all parts of drawing	Overall impression	Title	Scale
6	2	1	1

(10)

4.2

Correctness of all parts of drawing	Overall impression	Title	Scale
6	2	1	1

(10)

[20]

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QUESTION 5

Two pre-cast, pre-stressed concrete lintels are used for a one-brick wall. The lintels are 75 mm high and the brickwork is reinforced with brick force wire in the first 4 courses above the lintels.

A wooden window frame is built centrally into the opening of the wall. The wall and opening are plastered on the inside and outside.

Draw to a scale of 1:5, a vertical section through the lintels and window head to show the following detail:

Brick work:	4 courses of brickwork above lintels 4 courses of brickwork below the lintels
Lintel:	75 mm × 110 mm pre-cast lintels
Frame:	70 mm × 100 mm Head of the timber window frame 50 mm × 65 mm Top rail of the opening sash
Glaze:	3 mm glass fixed by glazing bead

CORRECTNESS OF ALL PARTS OF DRAWING	OVERALL IMPRESSION	TITLE	SCALE
11	2	1	1

[15]

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QUESTION 6

Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–L) next to the question number (6.1–6.10) on the A2 DRAWING SHEET

COLUMN A		COLUMN B	
6.1	Bidet	A	slope of the ground exceeds the maximum slope for drains
6.2	Ventilation pipes	B	its advantage is that it cannot rust and very smooth inside out
6.3	Drainage fitments	C	they are of ceramic materials and are provided in association with WC's for perineal washing
6.4	Squatting pan	D	remove the curled-up edges after the pipe have been sawn
6.5	Ramp	E	assist in circulating fresh air
6.6	Rodding eye	F	its condition has adequate discharge capacity
6.7	Water closet	G	not suitable for old or infirm people but gives good physical posture
6.8	PVC fittings	H	used to give access to drain and clearing blockage
6.9	Cutting pipes	I	the lower edges of the roof which are projected over the external walls
6.10	Earthenware, cast iron and fibre	J	the main materials available for drain use
		K	used in brick bonding to prevent straight joints
		L	consists mainly of a pan containing water and receiving excrement

(10 × 1) **[10]**

TOTAL: 100

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