



**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2022**

**CIVIL TECHNOLOGY: CIVIL SERVICES  
MARKING GUIDELINE  
(EXEMPLAR)**

**MARKS: 200**

---

This question paper consists of 17 pages, including 3 answer sheets.

---

**INSTRUCTIONS FOR THE MARKERS****1. Markers should:**

- Familiarise themselves with the question and answer before evaluating the responses of candidates.
- Always interpret the responses of the candidates within the context of the question.
- Consider any relevant and acceptable answer during pre-marking but should strictly adhere to the answers after finalisation of the marking guideline.
- There are two approaches to answering questions, these are (1) to describe and (2) to explain.
- If a candidate is required to explain e.g., a process in 4 steps, only the first 4 responses should be considered.
- If, however a candidate is required to e.g., explain or describe how to transfer heights from one point to another using a transparent pipe level we need to consider that candidates may write a long description not necessarily well organised as an intellectual response may do. In this case the marker needs to evaluate the complete statement to judge if the candidate explained the required outcome satisfactorily and allocate marks on merit. The marker should apply his/her professional judgement with these types of questions.
- Mark what the candidate wrote and do not award marks for answers that the marker thinks the candidate meant with what was written.
- Indicate the tick or cross right at the position where the mark needs to be awarded or where the candidate made the error.
- Accept the letter corresponding with the correct answer as well as the answer written in full in multiple-choice questions.
- Accept incorrect spelling in one-word answers unless the spelling changes the meaning of the answer.

**2. For calculations:**

- A mark is only awarded if the correct unit is written next to the answer.
- If TWO marks are awarded ONE mark is awarded for the answer and ONE mark for the correct unit.
- Where the candidate made a principle error e.g. added instead of multiplying, no marks will be awarded for the steps. If the answer is correct according to what the candidate did, the mark for the answer can be awarded for the application of skills.
- Where an incorrect answer could be carried over to the next step, the first answer will be deemed incorrect. However, should the incorrect answer be carried over correctly, the marker has to recalculate the values, using the incorrect answer from the first calculation. If correctly used, the candidate should receive the full marks for subsequent calculations.
- Markers should consider when and where a candidate has rounded off in a calculation, as well as the subsequent effect it has on the final answer obtained. The calculation should therefore be awarded marks on merit.
- Alternative methods of calculations must be considered, provided that the correct answer is obtained.

**3. When marking drawings:**

- The member for which the mark should be awarded should be drawn correctly in the correct position to receive a mark.
- A member incorrectly drawn but wrongfully repeated in another position will be awarded the mark for the repeated incorrect member provided that the marking guideline provide for TWO or more marks for that member (positive marking).
- Marks can only be awarded for a label if the label is correctly indicating the correct member.
- Scale drawings should always be marked using an appropriate mask.

**When a candidate drew the wrong drawing e.g.:**

- A horizontal section instead of a vertical section, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- An orthographic view instead of sectional view, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- An orthographic view instead of an isometric view, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- If the incorrect drawing was drawn, the candidate can be awarded for only what was asked but mark/s for the correctness of the drawing will not be awarded e.g., if a King Post roof truss was asked in the question, and candidate drew SA-Howe Truss.

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

- 1.1 Gum boots (1)
- 1.2 Under what circumstances will the following personal protective equipment be used?
- 1.2.1 Safety glasses  
When working with a bench grinder, drills, electrical saws, etc. or any electrical equipment. (1)
- 1.2.2 Earplugs  
When noise levels are high. (1)
- 1.3 Loose clothing can be pulled (1) into the machine by its moving parts (1). (2)
- 1.4 Describe the safety precaution that is applicable with the following hand tools:
- 1.4.1 Hammer heads  
Should fit snugly into the handle and be wedged in properly. (1)
- 1.4.2 Sawing equipment  
Should be sharp and clean. / Handles should be properly attached. (1)
- 1.4.3 When carrying chisels.  
Carry the blade facing downwards. (1)
- 1.5 The petrol fumes can be harmful, (1) when inhaled. (1)  
(Similar answer.) (2)
- 1.6 Any TWO requirements for the storing of cement:
- Store on a pallet / planks / damp proof course. (Similar answer.)
  - Store under cover / inside a building.
  - No contact with water. (Any 2 x 1) (2)
- 1.7 Any ONE similar answer:
- Warning people against overhead work / dangers.
  - To show that the wearing of a hard hat is compulsory. (1)
- 1.8 Any FOUR requirements for storing hazardous material in the workplace:
- The room must be well ventilated.
  - The door must have a threshold.
  - Material that may cause a spark must not be stored here.
  - Liquids that may interact chemically must not be stored in close proximity.
  - Containers must always be sealed or properly closed.
  - Never store other flammable material with hazardous material. (Any 4 x 1) (4)

1.9 THREE ingredients to mix screed:

- Cement (1)
- Sand (1)
- Water (1)

(3 x 1) (3)

1.10 Any THREE uses for screed:

- Finish for floors and walls.
- Facing material
- Levelling layer for suspended floors.
- Levelling layer for floor covering.
- Infill to accommodate various levels.
- Insulated roof screed.

(Any 3 x 1) (3)

- 1.11
- Aggregate is too coarse.
  - Aggregate too big for a mortar joint.
  - Rough parts will give a weak finish.
  - Similar answer.

(Any 1 x 1) (1)

1.12 Identify the type of board products that will be used for the following work:

- 1.12.1 Backs of cupboards  
Hard board or plywood

(1)

- 1.12.2 Formwork for concrete  
Shutter board

(1)

1.13 Stock bricks:

No attractive appearance / Must be plastered / Not good quality (1)

Face bricks:

Attractive appearance / Require no plaster / Good quality (1)

(2)

1.14 Any TWO uses of cast iron:

- Manhole covers
- Sewerage pipes and fittings
- Baths
- Wash basins
- Tools
- Hinges
- Similar answer

(Any 2 x 1) (2)

**[30]**

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

2.1 Round shovel cannot shape the corners / square edges / straight lines (similar answer). (1)

2.2 Any THREE hand tools that can be used to dress / cut bricks:

- Comb hammer
- Cold chisel
- Club hammer
- Brick hammer (Any 3 x 1) (3)

2.3 2.3.1 Hand hawk (1)

2.3.2 Straight edge (1)

2.3.3 External corner trowel (1)

2.3.4 Nose trowel (1)

2.4 The rip saw is used for cutting with the grain of the wood. (1)  
The cross-cut saw is used for cutting across the grain of wood. (1) (2)

2.5 2.5.1 Sliding bevel (1) (1)

Any ONE use:

- Drawing inclined / oblique lines.
- Drawing angles other than 90°.
- Copying angles to transfer them to other surfaces. (1 x 1) (1)

2.5.2 Bench grinder (1). (1)

Any ONE use:

- Sharpening tools
- Grinding
- Wire brush attachment can be installed. (Any 1 x 1) (1)

2.5.3 Electrical drill (1) (1)

Any ONE use:

- Drilling holes.
- Can be used as a screwdriver.
- Sanding / buffing / cutting accessories attached to drill. (Any 1 x 1) (1)

2.6 2.6.1 Plate compactor (1)

2.6.2 Any ONE use:

- Compacting disturbed or loose soil up to 150 mm.
- Tamping fillings for a hard-core layer under concrete floors.
- Compacting soil before paving bricks are laid.
- Similar answer. (Any 1 x 1) (1)

2.7 See ANSWER SHEET 1. (13)

2.8 Part of the structure is enlarged (1) to include more information to the drawing. (1) (2)

2.9 Any THREE particulars of a site plan:

- Boundaries of property
- Building line
- Erf numbers of plot and adjacent plots
- Services and connections
- Name of street
- Driveway
- Trees / boulders
- Measurements
- Existing buildings
- Contours
- North arrow
- Scale

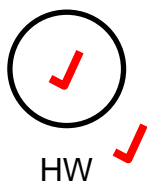
(Any 3 x 1) (3)

2.10 2.10.1 Water closet



(2)

2.10.2 Hot-water cylinder

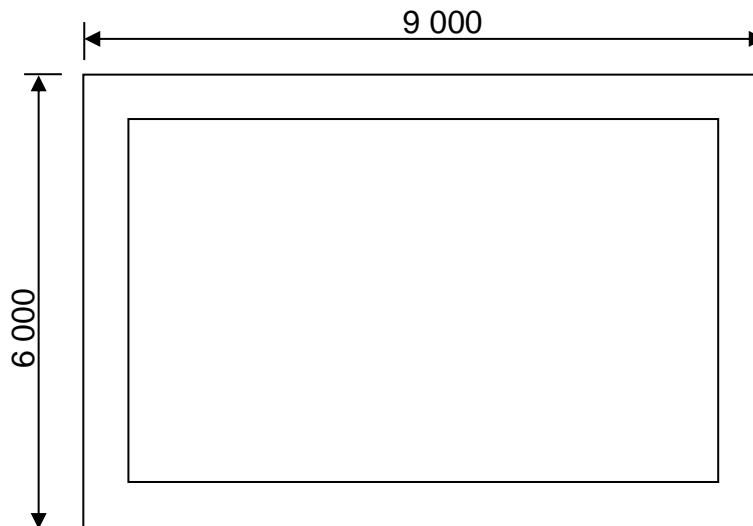


(2)

**[40]**

**QUESTION 3: QUANTITIES, JOINING AND GRAPHICS**

- 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.



- 3.1.1 Determine the centre line of the foundation:

$$2 \times 9\,000 = 18\,000$$

$$2 \times 6\,000 = 12\,000$$

$$20\,000$$

$$4 \times 600 = 2\,400$$

$$17\,600$$

$$= 17,6\text{ m}$$

(5)

- 3.1.2 Determine the volume of concrete needed:

$$17,6 \times 0,6 \times 0,2 = 2,112\text{ m}^3$$

- 3.2 A one brick wall of 1,2 m high and 12 m long.  
Determine the amount of bricks needed:

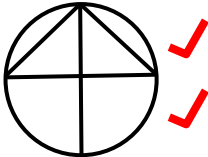
Area of wall:

$$12\text{ m} \times 1,2\text{ m} = 14,4\text{ m}^2$$

$$14,4\text{ m}^2 \times 2 \times 50 = 1\,440\text{ bricks}$$

(5)



- 3.3 Apply a thin layer of PVC glue (1) to the fitting and the pipe. (1)  
Push the parts into position (1), while twisting. (1) (4)
- 3.4 3.4.1 True (1)  
3.4.2 False (1)  
3.4.3 False (1)  
3.4.4 True (1)  
3.4.5 True (1)
- 3.5 Any TWO safety precautions when using epoxy:  
• Apply with care – cleaning excess/overruns is difficult once dry.  
• Be careful – the fumes may be toxic.  
• Join surfaces firmly together, before the compound dry (Any 2 x 1) (2)
- 3.6  (2)
- 3.7 Bottom (1) right-hand corner (1) of the drawing page. (2)
- 3.8 3.8.1 Fluorescent light (1)  
3.8.2 Wall light (1)
- [30]**

**QUESTION 4: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)****4.1 Any FOUR precautionary measures:**

- Wear suitable personal protective equipment.
- Avoid hand-to-face contact.
- Cover open wounds.
- Wash immediately after removing protective equipment.
- Wash protective equipment.
- Adequate first-aid equipment should always be available.
- Thoroughly clean equipment.
- Make sure immunisations are up to date. (Any 4 x 1) (4)

**4.2** To prevent inhalation of fumes / Fumes are dangerous. (1)

**4.3** (1) Non-flammable / cotton clothing. (2) To prevent clothing from burning you when solder is splashing. (2)

**4.4 Any TWO properties:**

- Hard
- Brittle
- Resistant to high temperatures. (Any 2 x 1) (2)

**4.5 Identify the type of tools in FIGURES 4.5.1 to 4.5.3 and name ONE use of each**

**4.5.1** Tin snips – Cutting sheet metal

**4.5.2** File – Smoothing / shaping metal surfaces

**4.5.3** Groover / Seaming tool – Straightening a rolled seam joint (3 x 2) (6)

**4.6 4.6.1** Guillotine. (1)

**4.6.2** A – Pressure plate  
B – Working surface  
C – Extension bar  
D – Base  
E – Push-down pedal (5)

**4.6.3 Any TWO caring measures:**

- Oil moving parts.
- Keep blades sharp.
- Maintain the service programme.
- Do not cut round bars. (Any 2 x 1) (2)

**4.7 4.7.1** Ratchet cutter (1)

**4.7.2** To cut polythene pipes. (1)

4.8 (1) Chemical resin base and (2) a hardening agent. (2)

4.9 9.4.1 C

9.4.2 D


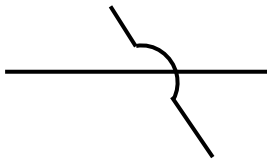
9.4.3 A

(3 x 1) (3)  
**[30]**

**QUESTION 5: GRAPHICS, CONSTRUCTION AND QUANTITIES (SPECIFIC)**

- 5.1 FIGURE 5.1 on ANSWER SHEET 2 a 45° cut-off cylindrical pipe.  
Use ANSWER SHEET 2 and develop and draw the development of the cut-off of the cylindrical pipe on scale 1 : 1. (14)
- 5.2 Compacting (1)
- 5.3 Any THREE factors:
- Ramps must be erected before placing of concrete.
  - Place all concrete needed in one day.
  - Start in the corner furthest from the concrete mixer.
  - Every new batch must be placed near the preceding one.
  - Pour the concrete higher than needed.
  - Concrete must fill all holes and corners.
  - Concrete surface must be levelled.
  - Leave the concrete for seven days before building on it. (Any 3 x 1) (3)
- 5.4 5.4.1 150 mm (1)
- 5.4.2 50 mm (1)
- 5.5 5.5.1 Soldier course (1)
- 5.5.2 Sailor course (1)
- 5.6 Use the quantity list on ANSWER SHEET 3 and determine the volume of concrete needed for a floor of 6 m long, 3 m wide and 75 mm thick. (3)
- 5.7 Use the quantity list on ANSWER SHEET 3 and determine the number bricks needed for a cavity wall with a length of 4 m and a height of 2,4 m. (5)
- [30]**

### QUESTION 6: COLD AND HOT WATER SUPPLY, DRAINAGE, STORMWATER AND SANITARY FITMENTS (SPECIFIC)

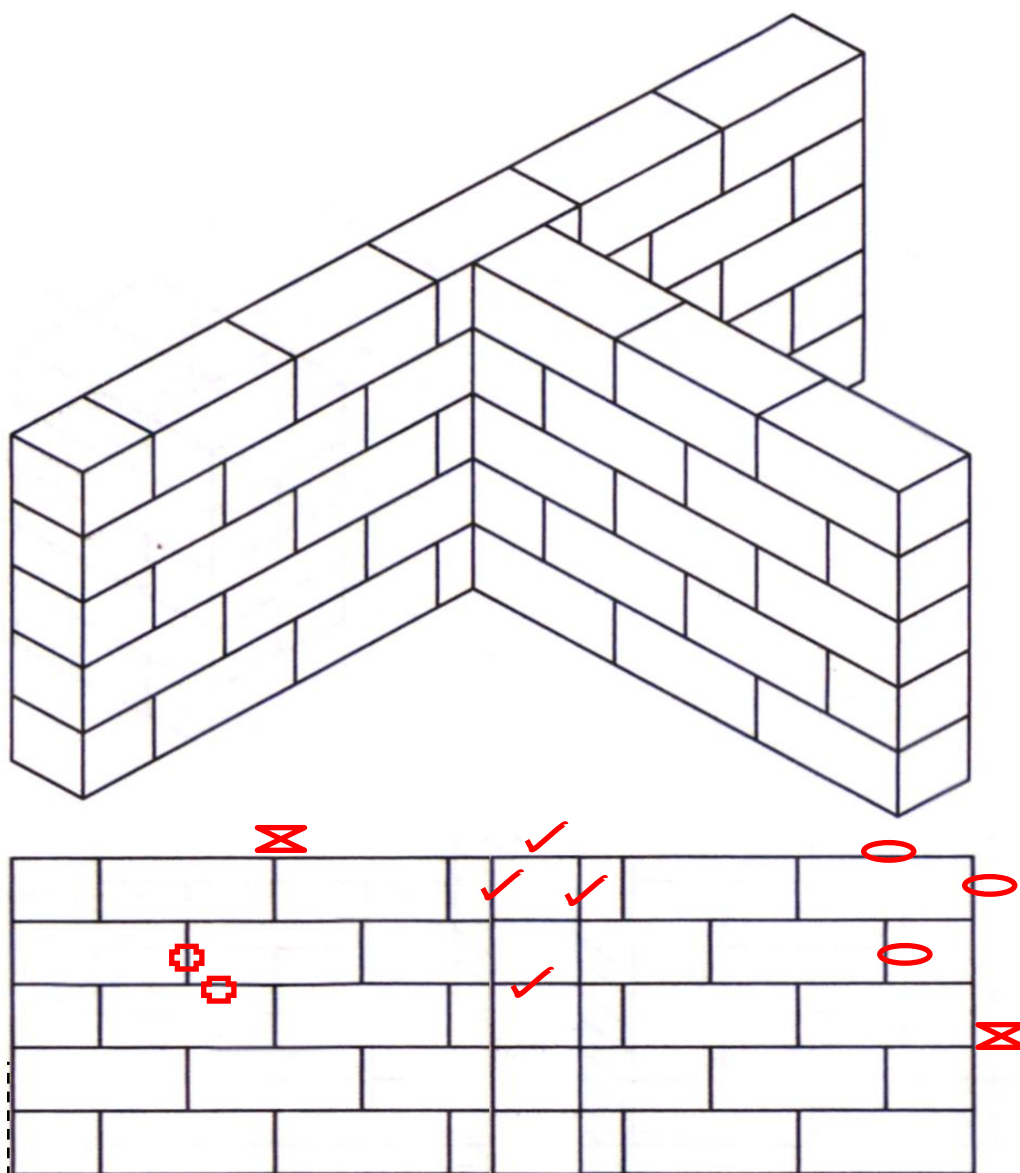
- 6.1 6.1.1 True (1)
- 6.1.2 True (1)
- 6.1.3 False (1)
- 6.1.4 False (1)
- 6.2 6.2.1 Stopcock (1)
- 6.2.2 A – Shank  
B – Gland nut  
C – Housing  
D – Jumper (4)
- 6.2.3 E (1)
- 6.3 (1) Control the water level (2) in cisterns and supply tanks. (2)
- 6.4 Any TWO requirements:  
 • Pipes must be housed in builders' work ducts / wall chases.  
 • Pipes must be laid in continuous lengths.  
 • Joints must be located within access ports. (Any 2 x 1) (2)
- 6.5 6.5.1 Flow switch (2)
- 
- 6.5.2 Pipe crossing (2)
- 
- 6.6 6.6.1 Bath tap (1)
- 6.6.2 Pressure-control valve (1)
- 6.7 Any TWO:  
 • Thermal expansion.  
 • Excess system pressure.  
 • Low temperature relief.  
 • Too high setting on the water heater. (Any 2 x 1) (2)
- 6.8 The (1) collector and the main tank (2) are a unit. (2)
- 6.9 Low pressure in taps. (1)

- 6.10 The north side is the most exposed to sunlight. (1)
- 6.11 (1) Transparent tube that allow light rays through with (2) minimal reflection. (2)
- 6.12 1 : 80 (1)
- 6.13 6.13.1 G (1)
- 6.13.2 WC (1)
- 6.13.3 SP (1)
- 6.14 Any TWO:
- Fewer connections.
  - Only one gully is needed.
  - Fewer vent pipes.
  - Pipe arrangement is simplified. (Any 2 x 1) (2)
- 6.15 2,1 m (1)
- 6.16 6.16.1 Flush valve (1)
- 6.16.2 Flush of a water closet, etc. / In the place of a cistern. (1)
- 6.16.3 Any THREE:
- Parts can be expensive.
  - Difficult to fix.
  - Sand grains can prevent it to work properly.
  - Moving parts can become defective.
  - Leakage can prevent it from working effective. (Any 3 x 1) (3)

**[40]**

<b>ANTWOORDBLAD</b> <b>ANSWER SHEET</b>	<b>1</b>	<b>CIVIL SERVICES</b>	<b>NAAM:</b> _____
			<b>NAME:</b> _____

- 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)

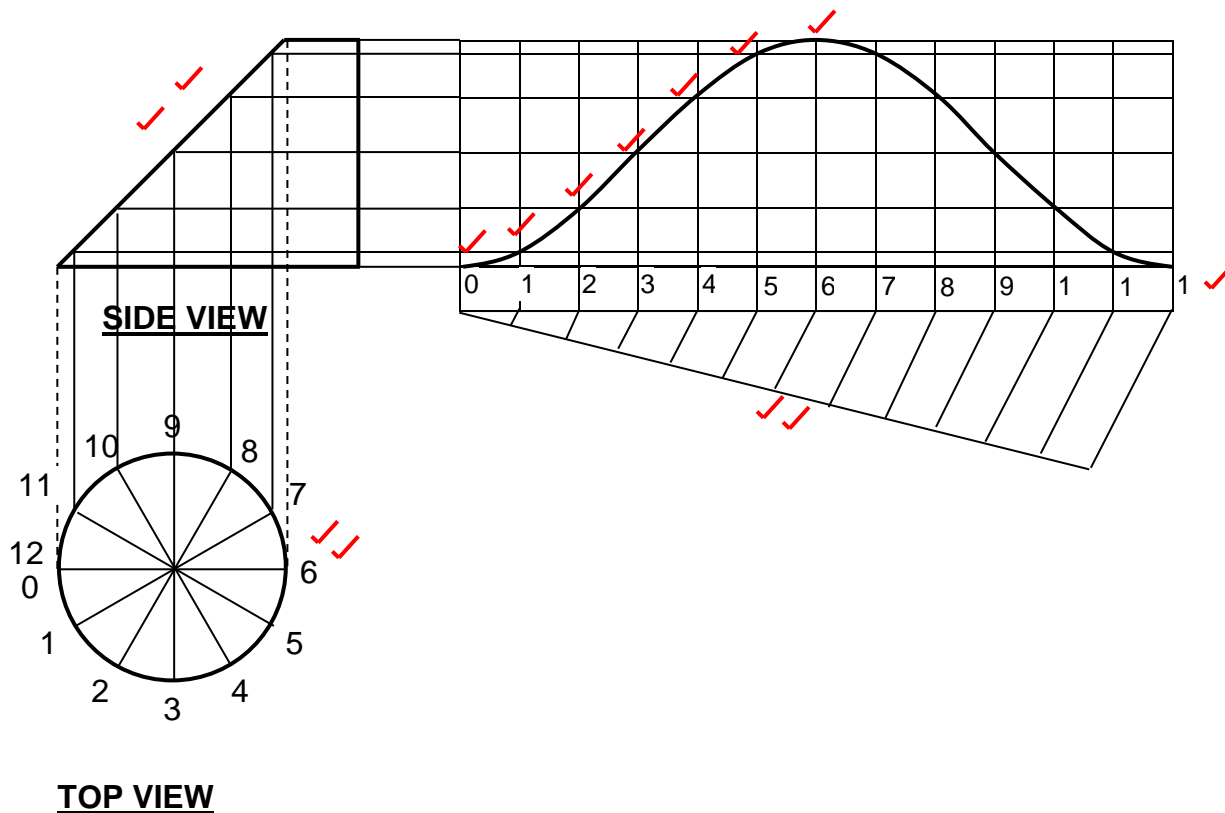


T-junction	4	✓
Brick sizes / Scale	3	✓
Height and length	2	✓
Stretcher bond	2	✓
Line work / Neatness	2	✓
<b>TOTAL:</b>	<b>13</b>	

<b>ANTWOORDBLAD</b> <b>ANSWER SHEET</b>	<b>2</b> <b>CIVIL SERVICES</b>	<b>NAAM:</b> _____ <b>NAME:</b> _____
--	-----------------------------------	--

- 5.1 FIGURE 5.1 on ANSWER SHEET 2 a 45° cut-off cylindrical pipe.  
 Use ANSWER SHEET 2 and develop and draw the development of the cut-off of the cylindrical pipe on scale 1 : 1.

(14)





<b>ANTWOORDBLAD</b> <b>ANSWER SHEET</b>	<b>3</b>	<b>CIVIL SERVICES</b>	<b>NAAM:</b> _____
			<b>NAME:</b> _____

5.6 Use the quantity list on ANSWER SHEET 3 and determine the volume of concrete needed for a floor of 6 m long, 3 m wide and 75 mm thick. (3)

5.7 Use the quantity list on ANSWER SHEET 3 and determine the number bricks needed for a cavity wall with a length of 4 m and a height of 2,4 m. (5)

A	B	C	D
			<u>5.6</u>
1/	✓ 6		Volume concrete: 6 m x 3 m x 75 mm.
	✓ 3		
	<u>0,75</u>	<u>13,5</u>	Thus: 13,5 m <sup>2</sup> concrete needed for the floor.
			<u>5.7</u>
✓ 1/	✓ 4	✓	Quantity bricks: 4 m x 2,4 m.
	<u>2,4</u>	<u>9,6</u>	Wall area. = 9,6 m <sup>2</sup>
	9,6		
	✓ <u>100</u>	<u>960</u>	Thus: 960 bricks needed for wall.