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**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2020

**CIVIL TECHNOLOGY: CIVIL SERVICES
MARKING GUIDELINE**

MARKS: 200

This marking guideline consists of 12 pages.

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QUESTION 1: SAFETY AND MATERIALS (GENERIC)

- 1.1 1.1.1 2 **Downloaded from eduresourceza.com** (1)
- 1.1.2 228 mm (1)
- 1.1.3 900 mm (1)
- 1.1.4 150 mm (1)
- 1.1.5 Non-slippery layer (1)
- 1.2 Similar answer:
Prevents horizontal movement between the platform and structure (1)
- 1.3 Identify THREE of the following requirements that are applicable to the supplier of hazardous chemical substances:
- 1.3.1 First-aid measures must be indicated
- 1.3.4 Fire-fighting measures must be indicated
- 1.3.6 Storage instructions must be indicated (3 x 1) (3)
- 1.4 Minimum = 30° (1) and maximum = 50° (1) (2)
- 1.5 Similar answer:
Aluminium conducts electricity (1) and workers who use a ladder could be shocked (1) (2)
- 1.6 Describe the difference between the surface finish of a water-based paint and an oil-based paint:
- Water-based – provides an elastic, flexible finish (1)
- Oil-based – provides a hard, durable finish (1) (2)
- 1.7 Any THREE advantages of the curing of concrete:
- Increases strength
 - Decreases permeability
 - Improves durability
 - Reduces cracks
 - Makes concrete more watertight
 - Provides volume stability
 - Concrete can carry more weight (3 x 1) (3)
- 1.8 Briefly describe the powder coating process:
- Plastic finish in powder form (1) is applied through a compressed air spray-gun (1) (2)

[20]

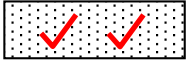
QUESTION 2: GRAPHICS, JOINING AND EQUIPMENT (GENERIC)

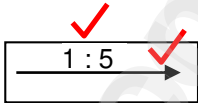
2.1 Answer the following questions with regard to the site plan on ANSWER SHEET A:

2.1.1 See ANSWER SHEET A (10)

2.1.2 See ANSWER SHEET A (6)

2.2 2.2.1 Undisturbed earth  (2)

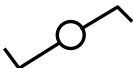
2.2.2 Plaster  (2)

2.2.3 Ramp with a slope of 1 : 5  (2)

2.2.4 Electrical meter  (2)

2.2.5 Sink unit – double  (2)

2.3 2.3.1  Unfinished wood (1)

2.3.2  Two-way switch (1)

2.4 When driven into place (1) it cannot be turned (1) (2)

2.5 Prevents backing off **OR** it acts as a lock nut (1)

2.6 18 mm (1)

2.7 2.7.1 1,35 m (1)

2.7.2 $1,412 - 1,285 = 0,127 \times 100 = 12,7 \text{ m}$ (0,1 m leeway allowed) (3)

2.7.3 Minimum = 30 m (1) and maximum = 200 m (1) (2)

2.8 It can affect the measuring function of the tool. (1)

2.9 Batteries must be removed. (1)

[40]

TOTAL SECTION A: 60

QUESTION 3: SAFETY, MATERIAL AND CONSTRUCTION (SPECIFIC)

- 3.1 Respirator / Extractor / Blower (1)
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- 3.2 3.2.1 Safety signage must be displayed. (1)
- 3.2.2 Safety rope and belt must be used. (1)
- 3.3 (1) Above openings where persons work (1) to prevent falling objects from injuring workers (2)
- 3.4 Contractor (1)
- 3.5 White powder / Brass turns red (1)
- 3.6 Corrosion (1)
- 3.7 (1) When an electrochemical process takes place between (1) two dissimilar metals or alloys (2)
- 3.8 Any THREE:
- Electrically insulating the two metals
 - No contact with an electrolyte
 - Applying an antioxidant paste to copper and aluminium surfaces
 - Choosing metals with similar electrode potential
 - Connecting a DC supply to oppose the corrosive galvanic current (3 x 1) (3)
- 3.9 FIGURE 3.9 on ANSWER SHEET B shows layer 1 of a combination corner of a half brick wall in stretcher bond. Draw the alternative layer of the half brick wall on scale 1 : 10 on ANSWER SHEET B. (10)
- 3.10 (1) Benching is built with a slope / an incline (1) to ensure that sewage spills slide back into the channel pipe and (1) rats / vermin cannot settle there (3)
- 3.11 Bottom of the benching can be reached safely (1)
- 3.12 1 : 40 (1)
- 3.13 (1) When water runs down trenches, (1) it causes erosion / weak sides / water in trenches (2)
- [30]**

QUESTION 4: COLD-WATER SUPPLY, HOT-WATER SUPPLY AND EQUIPMENT (SPECIFIC)

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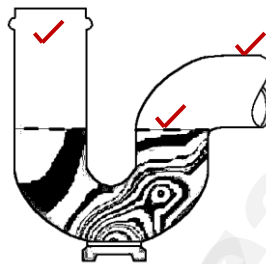
- 4.1 4.1.1 Stopcock (1)
- 4.1.2 Full-way valve (1)
- 4.1.3 Ball valve (1)
- 4.1.4 Non-return valve (1)
- 4.2 FIGURE 4.2 on ANSWER SHEET B shows a bibcock with three missing parts. Use the sketch on ANSWER SHEET B and draw the three missing parts. Supply labels to identify the three parts. (6)
- 4.3 (1) The cool water that runs out before (1) the hot water when (1) a hot water tap is opened (3)
- 4.4 (1) The red water is diverted to a storage tank / garden / rainwater tank etc. (1) so that the water does not get wasted / thus no ongoing waste of costs (2)
- 4.5 Any TWO requirements:
- Smooth cut
 - Straight cut
- (2)
- 4.6 4.6.1 A Johnson coupling (1)
- 4.6.2 Galvanised mild steel pipe work (1)
- 4.7 It protects the geyser against corrosion. (1)
- 4.8 4.8.1 False (1)
- 4.8.2 True (1)
- 4.8.3 True (1)
- 4.8.4 True (1)
- 4.8.5 False (1)
- 4.9 4.9.1 4.9.A – Vacuum tube
4.9.B – Pressurised inner tank
4.9.C – Reflector (3)
- 4.9.2 It operates (1) according to an open-vented or gravity-fed system under a pressure of (1) under 0,5 bar. (1) The higher the system is installed above the tap, (1) the higher the pressure will be. (4)

- 4.10 55 °C (1)
- 4.11 Any THREE advantages of a heat pump:
• Moves heat instead of generating it
• More energy efficient
• Powered by electricity
• Saves electricity
• Best for moderate climates (3 x 1) (3)
- 4.12 Compressed-air test apparatus (1)
- 4.13 Any THREE maintenance measures for drain-cleaning rods.
• Clean the drain rods after use.
• Hose down the rods and then wash them in a solution of warm water, washing-up liquid and Jeys Fluid.
• Coil spring rods can be cleaned using a jet wash.
• Allow the rods and tools to dry before storing them. (3 x 1) (3)
- [40]**

QUESTION 5: DRAINAGE AND QUANTITIES (SPECIFIC)

- 5.1 5.1.1 $\varnothing 10 \text{ mm}$, $\varnothing 50 \text{ mm}$ (2)
- 5.1.2 90° (1)
- 5.1.3 135° (1)
- 5.1.4 Inspection eye (1)
- 5.1.5 (1) Access opening to (1) allow the cleaning of pipes (2)

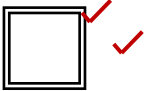
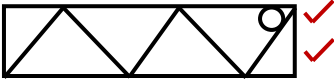
- 5.2 Make a neat sketch to illustrate the shape of a P-trap. Also indicate the water level of the water lock in the trap.



(3)

- 5.3 (1) Vent pipe / ventilation pipe / vent valve / anti-siphon pipe (1) are connected vertically to the (1) lowest point of the main sewer system (1) and extends above the roof (Vent valve extends $\pm 1 \text{ m}$ above the ground level) (4)
- 5.4 5.4.1 False (1)
- 5.4.2 True (1)
- 5.4.3 True (1)
- 5.4.4 False (1)
- 5.5 Any TWO disadvantages:
- Heavy
 - Difficult to work with
- (2 x 1) (2)

- 5.6 5.6.1 C (1)
- 5.6.2 F **Downloaded from eduresourceza.com** (1)
- 5.6.3 A (1)
- 5.6.4 B (1)
- 5.7 (1) The system will be saturated (1) resulting in pollution / contaminated (2)

- 5.8 5.8.1 Gully  (2)
- 5.8.2 Urinal  (2)
- 5.8.3 Invert level  (2)

- 5.9 5.9.1 22 mm cold water pipe: $6 \text{ m} + 1,5 \text{ m} + 5 \text{ m} = 12,5 \text{ m}$ (1)
- 5.9.2 15 mm cold water pipe: $2 \times 1 \text{ m} + 1,2 \text{ m} = 3,2 \text{ m}$ (1)
- 5.9.3 22 mm elbow 90° : 2 (1)
- 5.9.4 22 x 15 mm reducing elbow 90° : 1 (1)
- 5.9.5 15 mm elbow 90° : 2 (1)
- 5.9.6 22 x 22 x 15 mm Reducing tee: 1 (1)

5.10 $\pi r^2 h = \frac{22}{7} \times 0,9 \times 0,9 \times 2,8 = 7,128 \text{ m}^3$ ✓ (2)

[40]

QUESTION 6: GRAPHIC COMMUNICATION, ROOF WORK, STORM WATER AND JOINING (SPECIFIC)

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- 6.1 6.1.1 Soil pipes – brown (1)
- 6.1.2 Stormwater drains – not coloured (1)
- 6.1.3 All existing drains – black (1)
- 6.2 6.2.1 VP – Vent pipe (1)
- 6.2.2 IO / IE – Inspection eye (1)
- 6.2.3 IL – Invert level (1)
- 6.2.4 NGV / NGL – Natural ground level (1)
- 6.3 FIGURE 6.3 on ANSWER SHEET C shows the top and front elevation of a pyramid with a square base. Draw the development of the pyramid according to the radial-line method on ANSWER SHEET C. Show all construction lines. (10)
- 6.4 6.4.1 A – Gutter and bracket
B – Offset
C – Holderbat
D – Downpipe
E – Rain-water shoe (5)
- 6.4.2 25 mm for each 4,8 m / 1 : 600 (1)
- 6.5 (1) To withstand the force (1) of the flowing water (2)
- 6.6 To keep solids out of the stormwater pipe (1)
- 6.7 5 m (1)
- 6.8 6.8.1 Spring toggle fixing (1)
- 6.8.2 Any TWO uses:
 - Hanging of brackets against plasterboard
 - Fixing in hollow-core brick fittings
 - Fixing lights to the ceiling
(2 x 1) (2)

[30]

TOTAL: 200

ANSWER SHEET A	CIVIL TECHNOLOGY GENERIC	NAME: _____
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2.1 Answer the following questions with regard to the site plan on ANSWER SHEET A:

2.1.1 Any TEN particulars that are not shown according to the checklist:

- Plot no. 31 is not shown
- Depth measurement of plot is not shown
- Street name is not shown
- Branch sewage at S is not shown
- Connecting manhole (1,5 m inside plot boundary) is not shown
- Measurements of southern building boundary is not shown
- Structure measurements are not shown
- RE (rodding eye) symbol is not shown
- IE symbols are not shown
- VP and symbol are not shown at WC
- Entrance to plot is not shown
- No datum level is shown

(10)

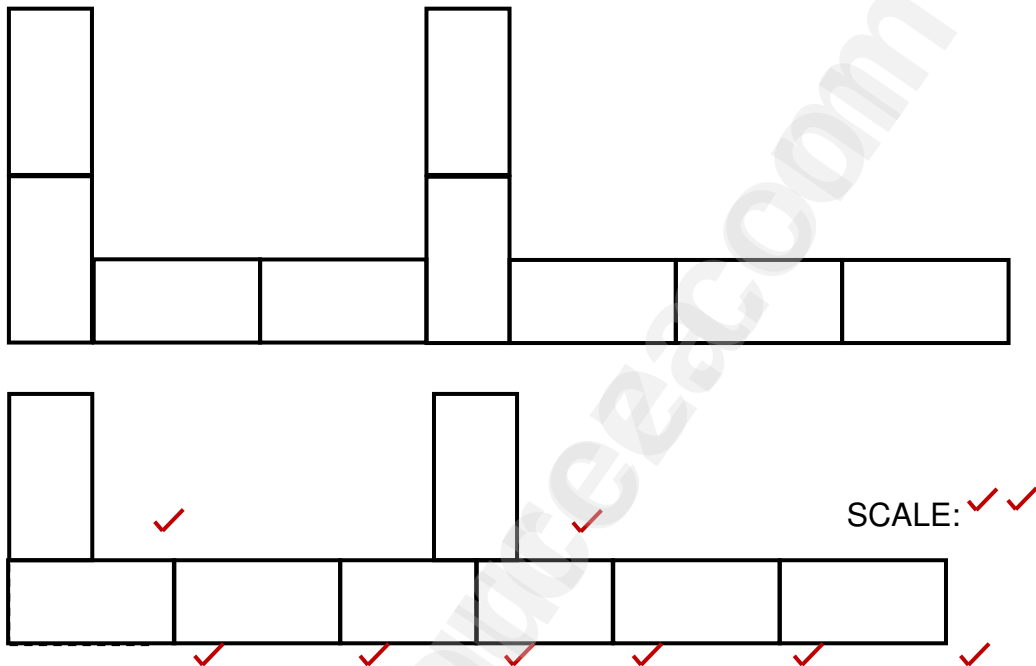
2.1.2 Identify SIX particulars that are incorrectly indicated on the site plan:

- Construction is over the building boundary on the west side
- North arrow must be right-hand side, at the bottom of the page
- Scale is wrongly shown
- Corner of branch sewage at WB is wrong
- RE and symbol missing at the change of direction in sewage line
- House depth measurements are not shown

(6)

ANSWER SHEET B	CIVIL TECHNOLOGY CIVIL SERVICES	NAME: _____
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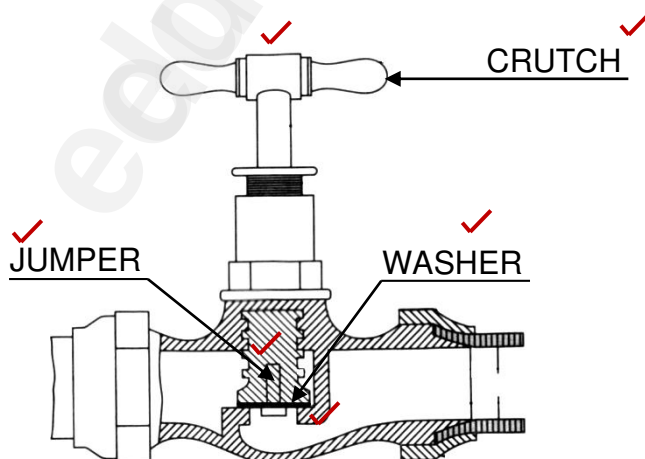
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SCALE: ✓✓

Brickwork	8	
Application of scale	2	
TOTAL:	10	

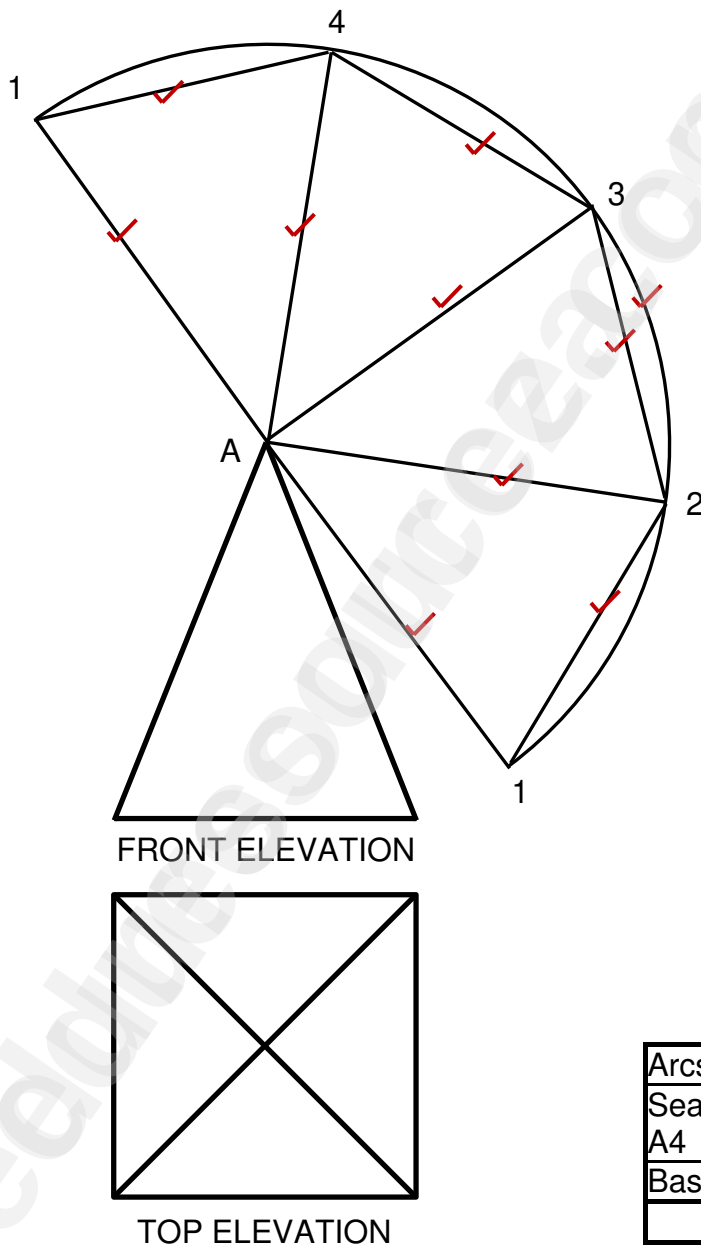
- 4.2 FIGURE 4.2 on ANSWER SHEET B shows a bibcock with three missing parts. Use the sketch on sheet B and draw the three missing parts. Supply labels to identify the three parts. (6)



Parts	3	
Labels	3	
TOTAL:	6	

ANSWER SHEET C	CIVIL TECHNOLOGY CIVIL SERVICES	NAME: _____
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- 6.3 FIGURE 6.3 on ANSWER SHEET C shows the top and front elevation of a pyramid with a square base. Draw the development of the pyramid according to the radial-line method on ANSWER SHEET C. Show all construction lines. (10)



Arcs 1, 2, 3 and 4	1	
Seam lines A1 to A4	5	
Base lines 1–4	4	
TOTAL:	10	