



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2018

**CIVIL TECHNOLOGY: CIVIL SERVICES
MARKING GUIDELINE**

MARKS: 200

This marking guideline consists of 15 pages, including 4 pages of answer sheets.

QUESTION 1: SAFETY AND MATERIAL (GENERIC)

- | | | | |
|-----|-------|--|-------------|
| 1.1 | 1.1.1 | Hard hat / Safety hat | (1) |
| | 1.1.2 | All building sites / construction sites | (1) |
| 1.2 | 1.2.1 | Loose clothing – Button up / Remove | (1) |
| | 1.2.2 | Type of shoes in a workshop – Non-slip / Metal point | (1) |
| | 1.2.3 | When sharp object are carried – Point downwards | (1) |
| | 1.2.4 | Dangerous moving parts of power tools – Covered by guards | (1) |
| | 1.2.5 | Number of operators who operates a machine – Only one | (1) |
| 1.3 | | Contractor | (1) |
| 1.4 | | Any FOUR safety measures which are applicable to the storage of flammable liquids. | |
| | | <ul style="list-style-type: none"> Room must be well ventilated Door must have a threshold No material that may cause a spark Liquids that may interact chemically not to be stored in close proximity Containers sealed properly | (4 x 1) (4) |
| 1.5 | 1.5.1 | Suspended concrete floors – Reinforced concrete | (1) |
| | 1.5.2 | Lintels above door openings – Precast concrete | (1) |
| | 1.5.3 | Foundations for single-storey buildings – Unreinforced concrete | (1) |
| 1.6 | | Any ONE use of screed. | |
| | | <ul style="list-style-type: none"> A finish for floors and walls Facing material Surfacing of suspended floors Insulated roof screed | (1) |
| 1.7 | | Any TWO reasons why lime can be added to a mortar mix | |
| | | <ul style="list-style-type: none"> Increases plasticity Makes mortar more workable | (2 x 1) (2) |
| 1.8 | | (1) Cheap (2) easy workable | (2) |
| 1.9 | 1.9.1 | True | (1) |
| | 1.9.2 | False | (1) |
| | 19.3 | False | (1) |
| | 1.9.4 | True | (1) |

- 1.10 (1) High hygienic properties and (2) easy to clean (2)
- 1.11 (1) Two or more metals (2) are combined to (3) form a new metal / with better properties / other properties (3)
- 1.12 Any ONE use of thermosetting plastic.
- Sewerage pipes
 - Gutters
 - Cold and hot water pipes
- (1 x 1) (1)
- [30]**

QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)

- 2.1 2.1.1 Comb hammer (1)
- 2.1.2 Steel comb, finish bricks, blocks/roughen smooth surfaces (2)
- 2.1.3 (1) Hammering on hard bricks (2) decays the comb / make comb blunt (2)
- 2.2 (1) Mitre try square
 Any THREE uses of it.(3)
- Testing squareness
 - Marking out perpendicular lines
 - Can be used as a ruler
 - Marking square lines
 - Test if surfaces are straight
 - Drawing 45° lines (4)
- 2.3 (1) Radial arm saw
 Any THREE caring measures for it.(3)
- Maintain – lubricate and adjust according to instructions
 - Clean after use
 - Repair damaged electrical cords
 - Handle with care not to damage accuracy
 - Use only for intended purpose
 - Do not force the saw
 - Avoid blunt blades
 - Keep ventilation holes open
 - Service regularly (4)
- 2.4 Any TWO caring measures for a concrete mixer.
- Clean inside after use
 - Do not leave water in the drum
 - Oil inside of drum when storing for a long time (2 x 1) (2)

- | | | | |
|-----|---|---|-------------|
| 2.5 | 2.5.1 | Site plan | (1) |
| | 2.5.2 | 124 | (1) |
| | 2.5.3 | Building boundary | (1) |
| | 2.5.4 | 2.5.B – Manhole
2.5.C – Rodding eye | (2) |
| 2.6 | FIGURE 2.6 on ANSWER SHEET A shows an incomplete section view of a single brick wall. Complete the section view on scale 1 : 20 and show the following parts with symbols and labels: | | |
| | 2.6.1 | A strip foundation of 700 x 250 mm with the invert level of 400 mm | (3) |
| | 2.6.2 | A single brick wall with a height of 2 700 mm from the floor level and 10 mm plaster work on the outside and inside | (5) |
| | 2.6.3 | The hard core filling of 250 mm | (1) |
| | 2.6.4 | The damp proof course | (2) |
| | 2.6.5 | The blinding layer of 50 mm | (1) |
| | 2.6.6 | The concrete floor slab of 90 mm | (1) |
| | 2.6.7 | A door opening with a height of 2 100 mm | (1) |
| | 2.6.8 | A concrete lintel with a thickness of 70 mm above the door opening | (2) |
| | 2.6.9 | A wall plate of 114 x 38 mm | (2) |
| | 2.10 | Show any TWO labels. | (2 x 1) (2) |
| | | | [40] |

QUESTION 3: QUANTITIES, JOINING AND GRAPHICS (GENERIC)

3.1 FIGURE 3.1 shows the foundation wall of a building. The width of the wall is 220 mm and the height 450 mm.

Use the quantity list on ANSWER SHEET B and calculate the following:

3.1.1 Determine the centre line of the foundation wall. (6)

3.1.2 Determine the quantity of bricks needed to build the foundation wall and make provision of 5% brick breakage damage. (9)

3.2 (1) Thorough description of the (2) item that was measured and (3) any preliminary calculations or sketches (3)

3.3 (1) Apply adhesive to both surfaces (2) allow to dry and (3) when almost dry, clamp parts together (3)

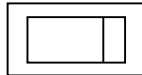
3.4 Epoxy (1)

3.5 Any TWO properties of mastic sealant. (2 x 1)

- Works well on metals
- Prevents dust penetration in joints
- Flexible, yet keeps surfaces together
- Adhesion for 5 years
- Smooth exterior
- Can be used outdoors
- Water tight
- Withstand low and high temperatures
- Not weakened by exposure to sun

(2 x 1) (2)

3.6 3.6.1 Gully



(2)

3.6.2 Check valve



(2)

3.6.3 Dressed wood



(2)

[30]

QUESTION 4: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

- 4.1 Any TWO causes of water pollution / similar answers.
• Leaking sewer systems
• Factory waste
• Dumping of sewer near rivers
• Sewage seeping into ground water (2 x 1) (2)
- 4.2 Similar answer:
(1) Sewage contains harmful micro-organisms / bacteria / viruses / parasites
(2) which are harmful / unhealthy for people (2)
- 4.3 Similar answer:
(1) To prevent (2) breathing in poisonous fumes (2)
- 4.4 Coarse aggregate – Stone / Rock
fine aggregate – Sand (2)
- 4.5 4.5.1 ... is suitable for use as sewerage pipes.
B Grey cast iron (1)
- 4.5.2 ... is ideal for use as hot-water pipes.
C Copper (1)
- 4.5.3 ... is suitable for external water taps.
A Brass or
D Copper (1)
- 4.6 Any THREE properties of thermoplastic.
• Can be reshaped
• Easy to handle
• Lightweight
• Does not break easily
• Available in variety of colours or transparent
• Maintenance is low
• Easy to cut, file, drill
• Joints are firm
• Resistant to shrinking and expansion
• Poor conductor of heat
• Low heat resistance (3 x 1) (3)
- 4.7 4.7.1 Cut sheet metal – Tin snips (1)
- 4.7.2 To form rivet heads – Ball-peen hammer (1)

4.8 Identify the tools in FIGURES 4.8.1 and 4.8.2 and name ONE use of each.

4.8.1 Universal pliers

- Gripping
- Cutting
- Bending
- Pulling wires

4.8.2 Water pump pliers

- Clamping of plumbing pipes

(2)

4.9 4.9.1 True

(1)

4.9.2 False

(1)

4.9.3 True

(1)

4.10 4.10.1 Compression joint

(1)

4.10.2 4.10.A – Compression nut
4.10.B – Ferrule

(2)

4.10.3 Copper pipe

(1)

4.11 Grooved seamed joint for sheet metal



(2)

4.12 Any ONE similar answer.

- Prevents oxidation
- Promotes flow of solder
- Assists in cleaning of solder material

(1)

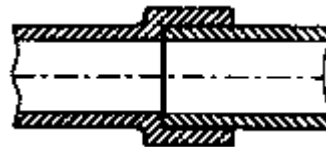
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QUESTION 5: GRAPHICS AND CONSTRUCTION IN CIVIL SERVICES (SPECIFIC)

- 5.1 FIGURE 5.1 on ANSWER SHEET C shows a 45° cut-off cylindrical pipe. Use ANSWER SHEET C and develop and draw the development of the cut-off of the cylindrical pipe to scale 1 : 1. (14)

- 5.2 5.2.1 Waste water bend (1)
- 5.2.2 Inspection eye (1)
- 5.2.3 87,5°. (1)
- 5.2.4 Waste water pipe (1)
- 5.2.5 40/50 mm (1)
- 5.2.6 135° (1)
- 5.2.7 D – Gully E – Pillar tap F – P-trap (3)

- 5.3 Illustrate a straight capillary soldering joint for copper pipes.

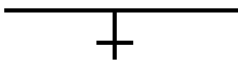

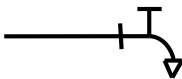




(2)

- 5.4 5.4.1 D – Curing
- 5.4.2 E – Plywood boards
- 5.4.3 C – Compacting (3 x 1) (3)
- 5.5 5.5.1 100 mm (1)
- 5.5.2 150 mm (1)

[30]

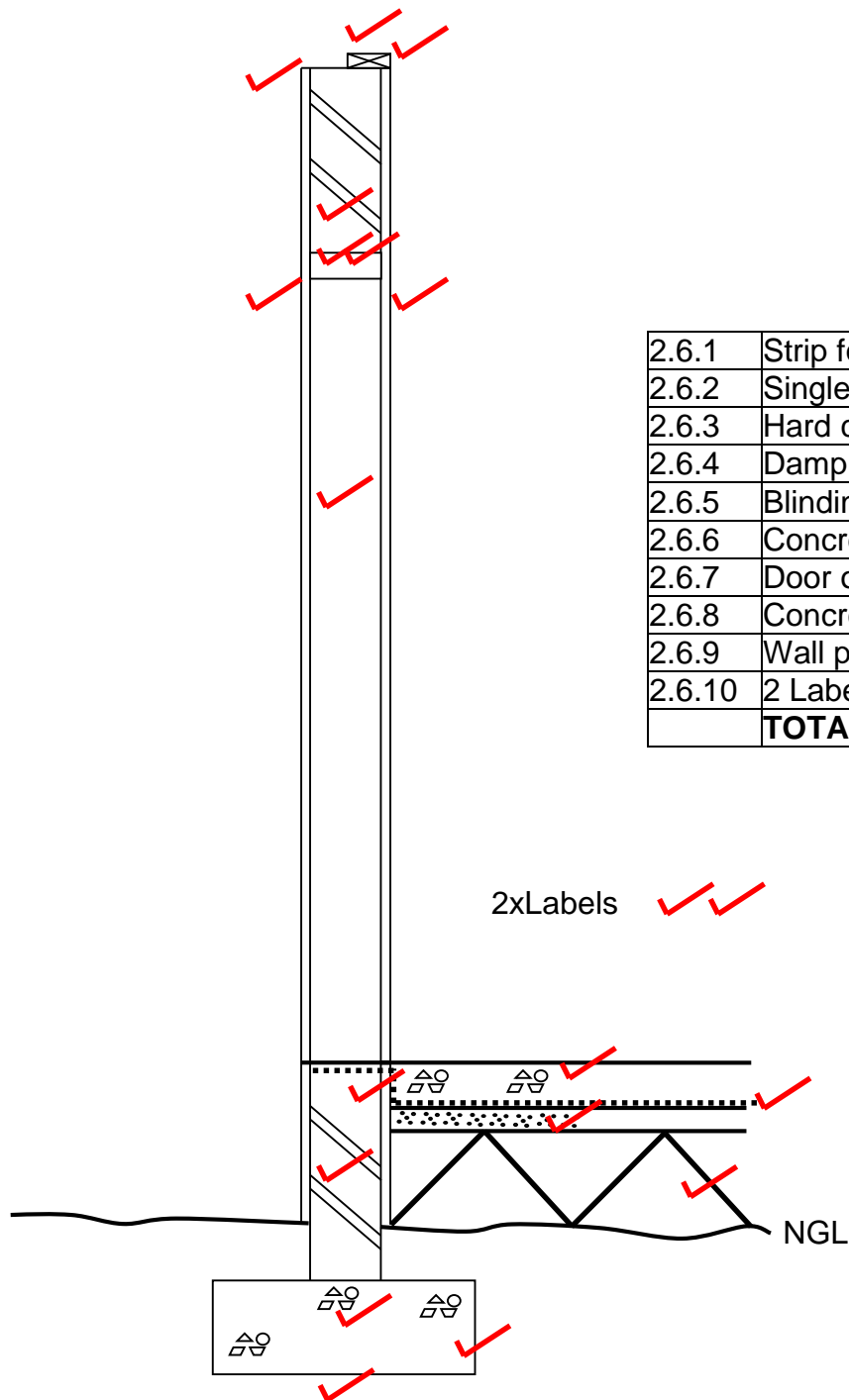
QUESTION 6: COLD AND HOT WATER SUPPLY, DRAINAGE AND SANITARY FITMENTS (SPECIFIC)

- 6.1 A Steam system / Industrial installations (1)
- 6.2 Any THREE disadvantages of stainless steel pipes.
 • Difficult to bend
 • Very expensive
 • Maintenance is expensive
 • Special welding may be required (3 x 1) (3)
- 6.3 Any THREE advantages of high-density polyethylene pipes.
 - Extended service life
 • Resistant to strong acids
 • Light
 • Resistant to rough handling
 • Easy to join
 • High rigidity and tensile strength
 • High flow capacity
 • No cracking or deformation
 • Elastic (3 x 1) (3)
- 6.4 6.4.1 Non-return valve (1)
- 6.4.2 Locking valve (1)
- 6.4.3 6.4.B (1)
- 6.4.4 To prevent backflow in pipe system that pumps water to a higher-lying area (1)
- 6.5 6.5.1 Draining tap  (2)
- 6.5.2 Float valve  (2)
- 6.5.3 External pipe.  (2)
- 6.5.4 Water meter  Or  (2)
- 6.6 Controls water temperature (1)
- 6.7 Vacuum breaker (1)

6.8	6.8.1	6.8.A – Outlet 6.8.B – Insulation 6.8.C – Flow tubes 6.8.D – Header 6.8.E – Inlet 6.8 F – Glazing	(6)
	6.8.2	Any TWO functions of part 6.8.F. • Keep dirt out • Keep heat in	(2 x 1) (2)
6.9	FIGURE 6.9 on ANSWER SHEET D shows the side elevation of the incomplete schematic representation of the sanitary fittings which must be connected to a one-pipe system. Complete on ANSWER SHEET D the following sanitary pipework by means of neat line sketches.		
	6.9.1	Discharge stack and vent pipe Indicate the vent pipe by means of a neat label.	(2)
	6.9.2	Traps for the sanitary fitments	(2)
	6.9.3	Waste water discharge pipes	(2)
	6.9.4	Soil water discharge pipe	(1)
6.10	6.10.1	Wavering – (1) Wind passing over the top over the stack (2) causes wavering out of the seal	(2)
	6.10.2	Compression – (1) When main pipe flow causes (2) a build-up of pressure at lower levels	(2)
			[40]
TOTAL:			200

ANSWER SHEET A	CIVIL TECHNOLOGY GENERIC	NAME: _____
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- 2.6 FIGURE 2.6 on ANSWER SHEET A shows an incomplete section view of a single brick wall. Complete the section view to scale 1 : 20.



2.6.1	Strip foundation	3	
2.6.2	Single brick wall	5	
2.6.3	Hard core filling	1	
2.6.4	Damp proof course	2	
2.6.5	Blinding layer	1	
2.6.6	Concrete floor slab	1	
2.6.7	Door opening	1	
2.6.8	Concrete lintel	2	
2.6.9	Wall plate	2	
2.6.10	2 Labels	2	
TOTAL		20	

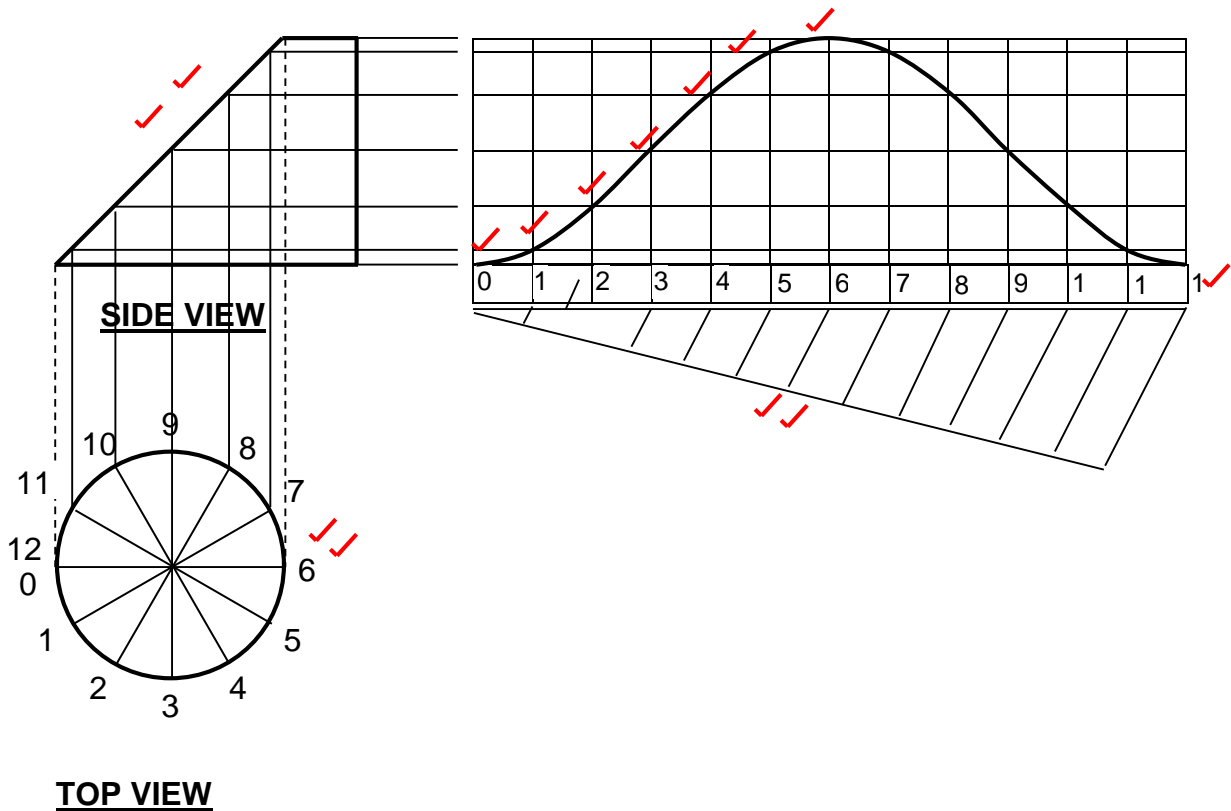
ANSWER SHEET B	CIVIL TECHNOLOGY GENERIC	NAME: _____

QUESTION 3.1

A	B	C	D
			3.1.1 CENTRE LINE: (6)
			✓
			2 x 9 m = 18 m
			✓
			2 x 6 m = 12 m
			✓
			= 30 m
			✓
			Minus: 4 x 0.22 m = 0.88 m
			✓
			TOTAL CENTRE LINE = 29.12 m ✓
			3.1.2 QUANTITY OF BRICKS: (9)
			<u>AREA:</u>
			<u>Total wall area</u>
✓ 1 —	✓ 29.12		
	0.45	13.104	Thus: Total wall area = 13.104 m ² ✓
			<u>TOTAL BRICKS</u>
	13.104		100 bricks/ m ² for single brick wall
	100	1 310.4	Thus: 1 311 bricks for total wall ✓
			<u>5% BREAKAGE</u>
			$\frac{5}{100} \times 1\,311$ ✓
			= 66 bricks ✓
			<u>TOTAL BRICKS :</u> ✓
			1 311 + 66 = 1 377 total quantity bricks

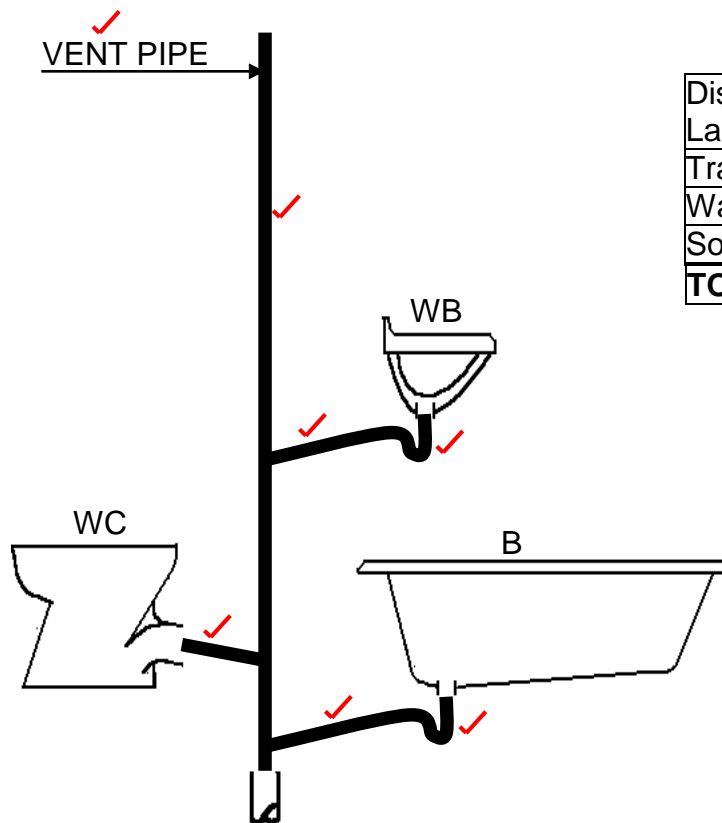
ANSWER SHEET C	CIVIL TECHNOLOGY CIVIL SERVICES	NAME: _____

- 5.1 FIGURE 5.1 on ANSWER SHEET C shows a 45° cut-off cylindrical pipe. Use ANSWER SHEET C and develop and draw the development of the cut-off of the cylindrical pipe on scale 1:1. (14)



ANSWER SHEET D	CIVIL TECHNOLOGY CIVIL SERVICES	NAME: _____

- 6.9 FIGURE 6.9 on ANSWER SHEET D shows the side elevation of the incomplete schematic representation of the sanitary fittings which must be connected to a one-pipe system. Complete on ANSWER SHEET D the following sanitary pipework by means of neat line sketches:



Discharge stack + vent pipe.		
Label	2	
Traps	2	
Waste water discharge pipes.	2	
Soil water discharge pipe.	1	
TOTAL	7	