



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2019

**CIVIL TECHNOLOGY: CONSTRUCTION
MARKING GUIDELINE**

MARKS: 200

This marking guideline consist of 12 pages.

QUESTION 1: SAFETY AND MATERIALS (GENERIC)

- 1.1 Personal protective equipment (1)
- 1.2 Any TWO requirements of protective footwear on a building site: (2 x 1) (2)
- Sturdy
 - Non-slip
 - Metal reinforcements in the toes
- 1.3 Safety precautions for small plant equipment:
- 1.3.1 To ensure that the equipment is in a good, working condition. (1)
- 1.3.2 Less chance of inhaling the hazardous fumes of the engines. (1)
- 1.3.3 Avoiding any possible injuries. (1)
- 1.3.4 Insufficient training could lead to injuries and damaged equipment. (1)
- 1.4 Safe stacking of material:
- 1.4.1 Ladders or any similar answer. (1)
- 1.4.2 Any TWO factors that should not be affected: (2 x 1) (2)
- Ventilation
 - Lighting
 - Fire-fighting equipment
- 1.4.3 3 x 500 mm (1) = 1 500 mm of 1,5 m (2)
- 1.4.4 Can easily hook onto or bump against protruding parts and that could cause the stack to fall over. (1)
- 1.5 Cement (1) and fine sand (2) (2)
- 1.6 Any ONE example of a fine aggregate: (1)
- Sand
 - Silt
 - Clay
- 1.7 Any ONE purpose of lime: (1)
- Increase the plasticity of the mixture
 - Makes the mixture more workable
 - Reduce wide cracks

- 1.8 Any TWO board products for panelling work: (2 x 1) (2)
- Plywood
 - Block board
 - Hardboard / Masonite
- 1.9 Any TWO uses of stainless steel
- Sinks
 - Wash tubs
 - Water taps
 - Water traps
 - Extractor fans
 - Any similar answers: (2 x 1) (2)
- 1.10 Iron (1)
- 1.11 Two or more metals, or metals and non-metals are combined (1) to form a new, permanent metal (2), with enhanced qualities. (3) (3)
- 1.12 Any TWO uses of safety glass: (2 x 1) (2)
- Sliding doors
 - Exterior doors with glass panels
 - Shower cubicle and doors
 - Bath glass screens
 - Balustrades of staircases
- 1.13 Any ONE use of a mastic sealant: (1)
- Adheres to almost any material (wood, glass, aluminium, concrete etc.)
 - For filling cracks and sealing areas exposed to water
 - Used in construction projects (roofing and brickwork)
- 1.14 Can be reshaped (1) when reheated (2). (2)
- [30]**

QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)

2.1 Name the tools in FIGURES 2.1.1 to 2.1.4 and name ONE use of each.

- 2.1.1 Claw hammer
Any ONE use:
- General carpentry / Driving in nails
 - Remove nails (2)
- 2.1.2 Plastering trowel
- Smooth finishing for walls / plaster work (2)
- 2.1.3 Club hammer
Any ONE use:
- Driving brick bolster / cold chisel
 - Where heavy hammering is needed
 - Driving pegs into the ground (2)
- 2.1.4 Angle grinder
Any ONE use:
- Cutting stone / concrete / tiles / metals
 - Can be used as a grinder (2)

2.2 2.2.1 Bench grinder (1)

2.2.2 Portable circular saw / Radial arm saw (1)

2.3 Identify the tool in FIGURE 2.3 and name TWO uses of it.

Plate compacter

Any TWO uses:

- Compacting disturbed / loose soil up to 150 mm
- Tampering fillings for hardcore layer
- Compacting soil for paving bricks (3 x 1) (3)

2.4

- Wipe clean after use
- Do not allow mortar / concrete / screed to dry on it
- Store in a dry place (Any 2 x 1) (2)

2.5 Similar answer:
The jaws of the universal pliers cannot open big enough (1)

2.6 2.6.1 Section view (1)

- 2.6.2
- 2.6.A – Purline
 - 2.6.B – Beam filling
 - 2.6.C – Rafter
 - 2.6.D – Window sill
 - 2.6.E – Foundation
 - 2.6.F – Wall plate
 - 2.6.G – Wall tie
 - 2.6.H – Lintel
 - 2.6.I – Damp proof coarse
 - 2.6.J – Hard core (10)

2.6.3 114 x 38 (2)

2.6.4 Bind 2 wall leaves (1)

- 2.7
- Pitch of roof
 - Type of roof covering
 - Barge board
 - Facia board
 - Gutters
 - Downpipes
- (Any 4 x 1) (4)

2.8 2.8.1 Plaster  (2)

2.8.2 Undressed wood  (2)

2.8.3 Invert level  (2)


[40]

QUESTION 3: QUANTITIES, JOINING AND GRAPHIC (GENERIC)

3.1 Make neat sketches to illustrate the following symbols on a floor plan:

3.1.1 Grease trap  (2)

3.1.2 DPC (Damp-proof course)  (2)

3.1.3 Staircase  (2)

3.2 Use ANSWER SHEET 1 (12)

- 3.3
- Basic sealant against air and leakage
 - Enhance materials
 - Used in aviation
 - Construction repairs
- (Any 3 x 1) (3)

- 3.4
- Apply enough adhesive to both sides of the areas to be bonded
 - Allow to dry
 - After drying, hold the two pieces of material together or clamp, roll or press them together
- (3)

- 3.5
- Joins PVC pipes
 - Clear / transparent
 - Dries quickly
- (Any 1 x 1) (1)
- 3.6
- To allow light into a building
 - To prevent rain, wind, dust and insects from entering
 - Enhance the aesthetic qualities of a structure
- (3)
- 3.7
- Polythene: strong and light / becomes brittle when exposed to sunlight / can be used in underground waterproofing / can be reshaped / remoulded after heating
 - Polyvinyl chloride: can be reshaped / solid material / two types available flexible and rigid / good insulating properties / not dissolved by alcohol.
- (2)
[30]

QUESTION 4: MATERIALS, EQUIPMENT AND JOINING (SPECIFIC)

- 4.1 4.1.1 F – Cavities make up less than 25% of the brick volume (1)
- 4.1.2 E – Inclined to crack owing to shrinkage (1)
- 4.1.3 A – Can be laid without mortar (1)
- 4.1.4 C – Better grip for plaster (1)
- 4.2 Any TWO disadvantages of solid concrete bricks: (2 x 1) (2)
- Not colourfast and will fade in time
 - More porous – absorbing 2 to 3 times more moisture than clay bricks
 - Cannot be cut by using a trowel or brick hammer – angle grinder
- 4.3 4.3.1 One day (1)
- 4.3.2 To keep the bricks moist / To wet the bricks (1)
- 4.3.3 Seven to ten days (1)
- 4.4 Limestone (1) and clay (1). (2)
- 4.5 Define the properties of steel:
- 4.5.1 Toughness: The ability to resist (1) shock loads (1). (2)
- 4.5.2 Plasticity: The ability to change shape (1) permanently (1). (2)
- 4.6 4.6.1 Portable concrete vibrator (1)
- 4.6.2 Any ONE use of the portable concrete vibrator: (1)
- Removing voids from wet concrete
 - Ensuring that concrete flows into all the corners of the formwork
 - Preventing honeycombing
- 4.7 4.7.1 4.7.A – Guard rail (1)
- 4.7.B – Kick board (1)
- 4.7.C – Horizontal transom (1)
- 4.7.D – Base plate (1)
- 4.7.2 Prevents material / tools from falling off. (1)
(*Similar answer*)

- 4.8 Any TWO reasons why aluminium is the most popular choice:
- Requires no paint
 - Requires no maintenance
 - Available in various different colours
- (*Similar answer*) (2)
- 4.9 Wall ties:
- 4.9.1 4.9.A – Double triangle pattern (1)
- 4.9.1 4.9.B – Butterfly pattern (1)
- 4.9.2 Must be rust / corrosion resistant (1)
- 4.10 Cavity wall construction:
- 4.10.1 50 mm (may not exceed 100 mm) (1)
- 4.10.2 Three metres (1)
- 4.10.3 For the removal of excess (wasted) mortar in the wall (1)
- [30]**

QUESTION 5: EXCAVATIONS, FOUNDATIONS AND STEEL (SPECIFIC)

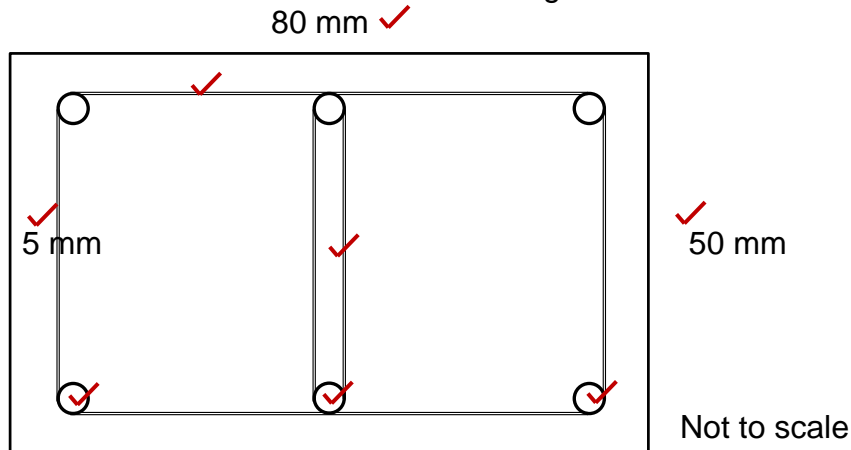
- 5.1 5.1.1 300 mm (1)
- 5.1.2 Any TWO methods of checking the depth of excavations:
- Spirit level
 - Boning rods (measuring stick)
 - Dumpy level (2 x 1) (2)
- 5.1.3 Ensuring that the concrete is level and poured to the correct depth. (1)
- 5.1.4 150 mm (below the edge of the trench) (1)
- 5.2 All heights on a building site are determined from the datum peg. (1)
- 5.3 5.3.1 False (1)
- 5.3.2 True (1)
- 5.3.3 True (1)
- 5.4 Any THREE causes of trench accidents.
- Excavated earth on the edge of the trench (may cause a collapse)
 - Poor soil conditions
 - Buildings, utilities or heavy traffic routes nearby (vibrations)
 - Soil disturbed previously
 - Proximity of streams, old sewer and underground cables
 - Absence of sufficient equipment, protective gear, shoring materials, warning signs and lights (3 x 1) (3)
- 5.5 5.5.1 Firm / Hard / Dry soil (1)

| | | | |
|-------|---|---|-------------|
| 5.5.2 | 5.5.A | – Formwork boards / vertical plank / boards | (1) |
| | 5.5.B | – Strut | (1) |
| | 5.5.C | – Yoke / waling | (1) |
| | 5.5.D | – Wedge | (1) |
| 5.6 | 5.6.1 | D – Carries the load of brick wall | (1) |
| | 5.6.2 | F – High compressive strength | (1) |
| | 5.6.3 | A – Carries the load of pier | (1) |
| | 5.6.4 | E – Maximum depth of 15 metres | (1) |
| 5.7 | Any TWO materials with which to fill holes of piles. | | (2 x 1) (2) |
| | <ul style="list-style-type: none">• Reinforced concrete• Tarred poles• Prefabricated piles | | |
| 5.8 | Any THREE advantages of piles. | | (3 x 1) (3) |
| | <ul style="list-style-type: none">• Can be used in poor soil• Can be used anywhere, even in water• Larger base ensures stability• Relatively quick and easy to install, if equipment is available• If prefabricated piles are used, much time is saved• Resists tensile stress well• Quick and less expensive to produce• Can be manufactured elsewhere beforehand• Installation can continue, even in poor weather conditions• Length of piles can easily be adjusted, depending on circumstances• Offers sound resistance against moving soil | | |
| 5.9 | 5.9.1 | 5.9.A – I-beam | (1) |
| | | 5.9.B – U-channel | (1) |
| | | 5.9.C – Angle iron | (1) |
| | 5.9.2 | 5.9.C – Angle iron | (1) |

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QUESTION 6: CONCRETE, FORMWORK, BRICKWORK, STAIRS AND ROOFS (SPECIFIC)

- 6.1 6.1.1 High tensile steel (1)
- 6.1.2 10 mm (1)
- 6.1.3 8 Bars (1)
- 6.1.4 $12 \times \text{main bar diameter} = 12 \times 10 (1) = 120 \text{ mm} (1)$ (2)
- 6.2 Section sketch of reinforcement for a rectangular column. (8)



- 6.3 6.3.1 To resist compressive forces. (1)
- 6.3.2 Any ONE: (1)
 - Join the main bars together
 - Resist shear stress forces
- 6.3.3 To resist tensile forces. (1)
- 6.4 6.4.1 True (1)
- 6.4.2 True (1)
- 6.4.3 False (1)
- 6.5 Any THREE properties of a good formwork:
 - Sturdy enough to bear the mass of wet concrete without collapsing
 - Strong enough to provide sufficient support, without deflection
 - Easy to repair on site
 - Erected accurately
 - Sealed properly – no leaking and forming of honeycombing / fins
 - Free of dirt (sawdust / release agents)
 - Quick and simple to erect (hand / mechanical)
 - Correct depth for reinforcing – prevent failure
 - Easy to remove
 - Close-fitting along joints and seams
 - Made of recyclable components (3 x 1) (3)

| | | | |
|------|--------|--|-------------|
| 6.6 | 6.6.1 | Column | (1) |
| | 6.6.2 | 6.6.A – Wedge | (1) |
| | | 6.6.B – Clamp | (1) |
| | | 6.6.C – Yoke | (1) |
| | | 6.6.D – Plank / formwork boards | (1) |
| 6.7 | 6.7.1 | Cavity wall | (1) |
| | 6.7.2 | 270 mm | (1) |
| | 6.7.3 | 6.7.A – Weep hole | (1) |
| | | 6.7.B – Grout | (1) |
| | 6.7.4 | Extraction of moisture / water in the wall. | (1) |
| 6.8 | | The bricks are placed in wedge-shaped mortar joints (1) and plastered (1). | (2) |
| 6.9 | | Any THREE properties of a roof underlay. | |
| | | • Excellent tear and puncture resistant properties | |
| | | • Waterproof | |
| | | • Dustproof | |
| | | • UV and heat stabiliser | |
| | | • Superior wind uplift strength | |
| | | • Vapour-resistant | |
| | | • High tensile resistance | |
| | | • Cost-effective | |
| | | • High heat resistance | (3 x 1) (3) |
| 6.10 | 6.10.1 | Tread | (1) |
| | 6.10.2 | Baluster | (1) |
| | 6.10.3 | Landing | (1) |
| | | | [40] |
| | | TOTAL: | 200 |

| | | |
|-----------------------|--|-------------|
| ANSWER SHEET 1 | CONSTRUCTION CIVIL TECHNOLOGY | NAME: _____ |
|-----------------------|--|-------------|

- 3.2 Calculate the volume of concrete needed to cast the floor slab between the external walls. (12)

| A | B | C | D |
|------|---------|-------------------------|---|
| | | | Internal measurements of long walls |
| | | | = 9 000 mm – 220 mm ✓ – 220 mm ✓ |
| | | | = 8 560 mm ✓ (3) |
| | | | |
| | | | Internal measurements of short walls |
| | | | = 5 000 – 220 mm ✓ – 220 mm ✓ |
| | | | = 4 560 mm ✓ (3) |
| | | | |
| | | | Volume of concrete needed |
| 1/ ✓ | 8,56 ✓ | | Length of floor slab = 8 560 mm |
| | 4,56 ✓ | | Width of floor slab = 4 560 mm |
| | 0,085 ✓ | 3,318 m ³ ✓✓ | Thickness of floor slab = 85 mm (6) |
| | | | (12) |