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**NATIONAL
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GRADE 12

SEPTEMBER 2024

**CIVIL TECHNOLOGY: CIVIL SERVICES
MARKING GUIDELINE**

MARKS: 200

This marking guideline consists of 15 pages.



INSTRUCTIONS FOR 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.
 - However, if for example candidate is required to explain or describe a process, we need to consider that that candidates may write a long description, not necessarily well organised. 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.
- Mark what the candidate wrote and do not interpret or predict responses.
- 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 or similar questions.
- Accept incorrect spelling in one-word answers unless the spelling changes the meaning of the answer.
- If a learner writes two or more answers separated by a slash (/) mark only the first response, unless the additional answer/s are different names for the same item e.g., Yale lock/Night latch. In this case, the answer for the response should be awarded and the slash (/) should NOT be considered as an additional answer.

2. For calculations:

- A mark is only awarded if the correct unit is written next to the answer. If the question states that the answer must be in a specific unit, a mark will ONLY be awarded if the answer has the correct unit as indicated in the question.
- Marks will only be allocated for the correct values if the candidates add instead of multiply. NO marks will be awarded for the calculations and the answer.
- Where an incorrect answer is correctly carried over, the marker must recalculate the values, using the incorrect answer from the first calculation. If correctly used, the candidate should receive the full marks for subsequent calculations.
- Alternative methods of calculations must be considered, provided that the correct answer is obtained.
- For the calculation of quantities marks will be awarded for the correct use of the dimension paper.

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.
- If the incorrect/wrong drawing was drawn, the candidate can be awarded for only what was provided for on the marking guideline.
- If a line diagram or an orthographic view instead of a pictorial drawing (isometric/oblique/perspective) is drawn, the first assessment criteria for each member will be marked wrong, but marks will be awarded for the subsequent members if TWO or more marks are awarded for the same member.
- If candidates draw/give more information than what is required, mark strictly according to the assessment criteria.

4. Incorrect numbering of questions:

- If a candidate numbered an answer incorrectly, but the answer is in the correct position according to the sequence of the questions in the question paper, circle then the incorrect numbering and mark the response.
- If questions were answered randomly not following the same sequence as in the question paper and the learner numbered incorrectly, the response should NOT be marked.

5. Duplication of responses and questions answered in the correct place:

- If a question has been answered twice, mark the first response.
- If a question should be answered on an answer sheet and the candidate answered it on both the answer sheet and in the answer book, mark the response on the answer sheet and cancel the response in the answer book.
- If the question has been answered in the answer book instead of on the answer sheet, mark the response in the answer book according to the assessment criteria on the marking guideline.

QUESTION 1: SAFETY AND MATERIAL (GENERIC)

- 1.1 1.1.1 2 (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:**
Prevent 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 shown. (1)
- 1.3.4 Fire-fighting measures must be shown. (1)
- 1.3.6 Storage instructions must be shown. (1)
- 1.4 Minimum = 30° (1) and maximum = 50° (1) (2)
- 1.5 **Similar answer:**
Aluminium conducts electricity, (1) and workers who use the 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-base – provides a hard, durable finish. (1) (2)
- 1.7 **Any THREE advantages of curing concrete:**
- Increases strength
 - Decreases permeability
 - Improves durability
 - Reduces cracks
 - Makes concrete more watertight
 - Provides volume stability
 - Concrete can carry more weight (Any 3 x 1) (3)
- 1.8 **Briefly describe the powder-coating process.**
Plastic finish in powdered form, (1) is applied by means of a compressed air spray-gun. (1) (2)

[20]

QUESTION 2: GRAPHICS, JOINING AND EQUIPMENT

2.1 Use the information on ANSWER SHEET A and complete the site plan on a scale of 1 : 200 according to the following requirements:

- 2.1.1 The site boundaries are measured from point **A**
 The site boundaries in front and back are 23 m long
 The site boundaries on the sides are 25 m long (2)
- 2.1.2 The front building line is 4 m from the site boundary
 The back and side building lines are 2 m from the site boundaries (2)
- 2.1.3 Show the site entrance, 3 m from the western site boundary (1)
- 2.1.4 Show the datum level in the north-eastern corner of the site (1)
- Complete the sewage lay-out and abbreviations of the sewage appliances according to the following requirements:
- 2.1.5 The main sewage from the bathroom to the municipal connection (2)
- 2.1.6 The branch sewage to the bathroom and kitchen (2)
- 2.1.7 Manhole on the site, before the municipal connection (2)
- 2.1.8 Rodding eyes (4)
- 2.1.9 Inspection eye (4)

- 2.2
- Length of shank
 - Diameter
 - Type of thread
 - Head size (4 x 1) (4)

2.3 When square shoulder is driven in, (1) it will resist rotation. (1) (2)

- 2.4
- A – Nut
 - B – Thread
 - C – Runout
 - D – Shank (4 x 1) (4)

- 2.5 **Any TWO requirements to which a trestle scaffold must comply.**
- Soundly constructed with a solid material.
 - Prevent spreading of supporting legs.
 - Not higher than 3 m.
 - Consists of not more than two tiers. (Any 2 x 1) (2)

- 2.6 **Name TWO precautionary measures when transporting a ladder.**
- Not protruding excessively.
 - End marked with a red or orange flag. (2 x 1) (2)

2.7 **Similar answer.**
 Paint will cover (1) weaknesses. (1) (2)

- 2.8 **Briefly describe any ONE use of the dumpy level.**
- Determine (1) height differences. (1)
 - Determine (1) levels and slopes. (1)
 - Setting out (1) of buildings. (1)
 - Transferring of (1) levels and heights. (1)
 - Determine horizontal (1) distances. (1) (Any 1 x 2) (2)

2.9 **Any TWO materials which can be detected in walls by a multi-detector.**

- Ferrous metals
- Non-ferrous metals
- WS-wiring
- Timber
- Metal pegs
- Steel rods
- Copper pipes

(Any 2 x 1)

(2)

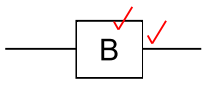
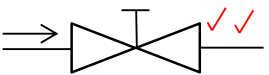
[40]

QUESTION 3: SAFETY, MATERIAL AND CONSTRUCTION (SPECIFIC)

- 3.1 **Any TWO:**
- Exposure to gases
 - Exposure to raw sewages
(Any other realistic risk.) (2 x 1) (2)
- 3.2 3.2.1 True (1)
- 3.2.2 False (1)
- 3.2.3 False (1)
- 3.3 **Similar answer:**
- Prevent material from falling into the manhole. (1)
- 3.4 When the cover is removed. (1)
- 3.5 Serves as protection against poisonous gasses. (1)
- 3.6 Zinc has a weak atomic bond with other metals (1) and it causes dezincification. (1) (2)
- 3.7 **THREE disadvantages:**
- Causes a weak metal.
 - Can cause leaks.
 - Can cause blockages. (3 x 1) (3)
- 3.8 It causes pit marks, (1) which are caused by the chemical reaction (1) between the metals. (2)
- 3.9 **Any THREE factors:**
- The difference between the electrode potential of two metals.
 - Contact resistance at the boundary between two metals.
 - Electrical resistance of the electrolyte solution.
 - Anode-to-cathode area ratio.
 - Presence of a passive film.
 - Properties of the electrolyte solution. (Any 3 x 1) (3)
- 3.10 FIGUR 3.10 on ANSWER SHEET B shows layer 1 of a double return angle in a one-brick wall in stretcher bond. Draw the alternate layer of the one-brick wall on a scale of 1 : 10 on ANSWER SHEET B. (10)
- 3.11 **Any ONE purpose:**
- Ensure that the sewage spill slide back into the channel pipe.
 - Prevent that vermin settle there. (Any 1 x 1) (1)
- 3.12 1 : 40 (1)

[30]

QUESTION 4: COLD WATER SUPPLY, WARM WATER SUPPLY AND TOOLS (SPECIFIC)

- 4.1 4.1.1 A – Stopcock
B – Water meter
C – Water main
D – Cold water supply pipe (4 x 1) (4)
- 4.1.2 Shut off water supply for maintenance / water leaks. (1)
- 4.1.3 Municipality (1)
- 4.1.4 Owner (1)
- 4.1.5 450 mm (1)
- 4.2 4.2.1 Non-return valve (1)
- 4.2.2 Locking valve (1)
- 4.2.3 B (1)
- 4.2.4 To prevent backflow in a pipe system that pumps water to a higher-lying area. (1)
- 4.3 Only allow water to flow, (1) when the sensor is triggered. (1) (2)
- 4.4 **Similar answer:**
Sandy water will damage the mechanisms (1) of pressure-reducing valves / flushing valves / taps. (1) (2)
- 4.5 In a limited space. (1)
- 4.6 4.6.1 Mixer (1)
- 4.6.2 Non-return valve (1)
- 4.6.3 Pressure-relief valve (1)
- 4.7 4.7.1  (2)
- 4.7.2  (2)
- 4.8 When water is heated, (1) it rises to the top of the geyser. (1) (2)
- 4.9 4.9.1 To lead overflow water outside. (1)
- 4.9.2 To balance the water pressure to the hot and cold-water supply. (1)

- 4.10 4.10.1 Solar geyser system (1)
- 4.10.2 A – Storage tank / Geyser
B – Cold water pipes
C – Hot water pipes
D – Collectors (4 x 1) (4)
- 4.10.3 Keep heat inside. (1)
- 4.11 **Any TWO:**
- Sudden drop in secondary supply pipes.
 - Loose jumpers in taps.
 - Pipes in walls are not properly caulked.
 - Pipes are not secured in roof spaces.
 - Draw-off pipe is bigger than the supply pipe. (Any 2 x 1) (2)
- 4.12 4.12.1 Water pressure testing pump (1)
- 4.12.2 Prevent dirt from entering the pressure system. (1)
- 4.12.3 **Any TWO:**
- Water meters
 - Plumbing lines
 - Pressure vessels
 - Solar systems
 - Sprinkler systems (Any 2 x 1) (2)
- [40]**

QUESTION 5: DRAINAGE AND QUANTITIES (SPECIFIC)

- 5.1 5.1.1 A – Branch vent
B – Wash basin
C – Trap
D – Main drainpipe
E – Vent valve
F – Vent pipe
G – Wet vent
H – Water closet (8 x 1) (8)
- 5.1.2 B – WB / WHB
H – WC (2 x 1) (2)
- 5.1.3 Prevent flooding / blockages / close off bad odours. (Any 1 x 1) (1)
- 5.1.4 **Similar answer:**
When waste water is released, it opens the valve. (1) This reduces the vacuum (1) and allows air into the system. (1) (3)
- 5.1.5 Conveys gasses from the drainpipe. (1)
- 5.2 B (1)
- 5.3 Provide access to the system (1) for cleaning / inspection purposes. (1) (2)
- 5.4 It is an underground, (1) watertight (1) tank which receives sewerage. (1) (3)
- 5.5 5.5.1 A, C, D (3 x 1) (3)
- 5.5.2 B, G (2 x 1) (2)
- 5.5.3 H (1)
- 5.6 100 mm (1)
- 5.7 5.7.1 Ensure that solid matter can be carried away easily. (1)
- 5.7.2 To prevent blockages. (1)
- 5.7.3 Prevents the pipe from damage. (1)
- 5.8 5.8.1 2 (1)
- 5.8.2 1,3 m + 1,3 m (1) = 2,6 m (2 600 mm) (1) (2)
- 5.8.3 12 m (12 000 mm) (1)
- 5.8.4 2 (1)

5.9 5.9.1 $\pi r^2 h = \frac{22}{7} \times 0,9 \times 0,9 \times 2,8 = 7,128 \text{ m}^3$

(3)

5.9.2 $7,13 \text{ m}^3 \times 1\,000 = 7\,128 \text{ l}$

(1)

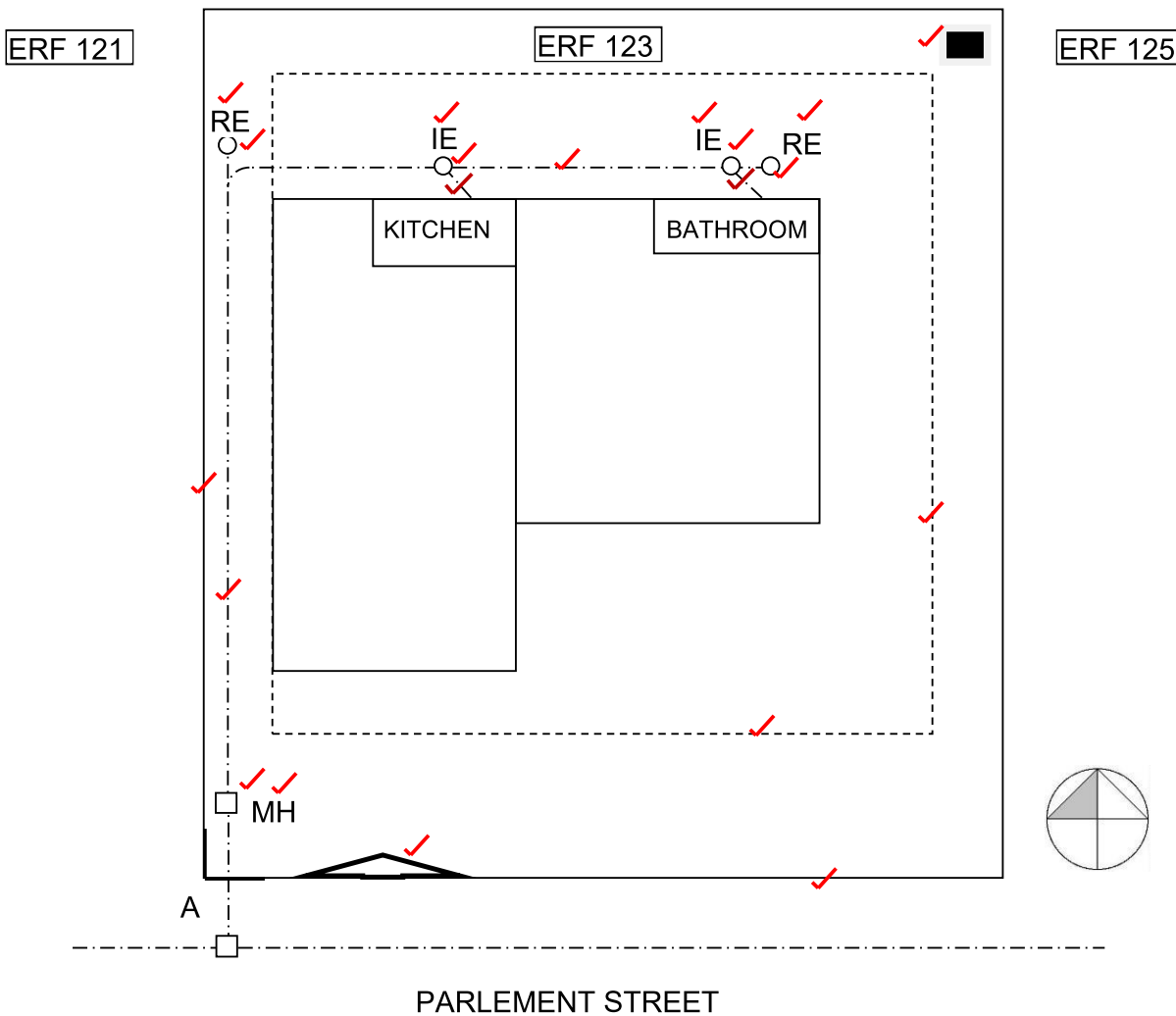
[40]

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

- 6.1 25 mm for each 4,8 m / 1 : 600 (1)
- 6.2 Keep the gutters in position. (1)
- 6.3 It serves as waterproofing (1) at junctions of walls that protrude above the roof. (1) (2)
- 6.4 **Any TWO:**
- The pitch of the roof.
 - The position of the battens and purlins.
 - The material and tools needed. (Any 2 x 1) (2)
- 6.5 6.5.1 D
- 6.5.2 E
- 6.5.3 G
- 6.5.4 F
- 6.5.5 H (5 x 1) (5)
- 6.6 **Any TWO:**
- Cleaning the solder material.
 - Prevents oxidation.
 - Promotes the flow of solder. (Any 2 x 1) (2)
- 6.7 Ensure a watertight joint. (1)
- 6.8 **FIGUUR 6.8 on ANSWER SHEET C shows a square-based truncated pyramid.
Draw on sheet ANSWER SHEET C the pattern development for the truncated pyramid.
(Refer to ANSWER SHEET C.)** (16)
[30]
- TOTAL: 200**

ANSWER SHEET	A	CIVIL TECHNOLOGY (GENERIC)	NAME AND SURNAME:	

2.1 Use the information on ANSWER SHEET A and complete the site plan on a scale of 1 : 200.



Site boundaries	2	
Building lines	2	
Site entrance	1	
Datum level	1	
Main sewerage	2	
Branch sewerage	2	
Manhole	2	
Rodding eyes	4	
Inspection eyes	4	
TOTAL:	20	

ANSWER SHEET	B	CIVIL TECHNOLOGY (SPECIFIC)	NAME AND SURNAME:	

3.10 FIGURE 3.10 on ANSWER SHEET B shows layer 1 of a double return angle in a one-brick wall in stretcher bond. Draw the alternate layer of the one-brick wall on a scale of 1 : 10 on ANSWER SHEET B.

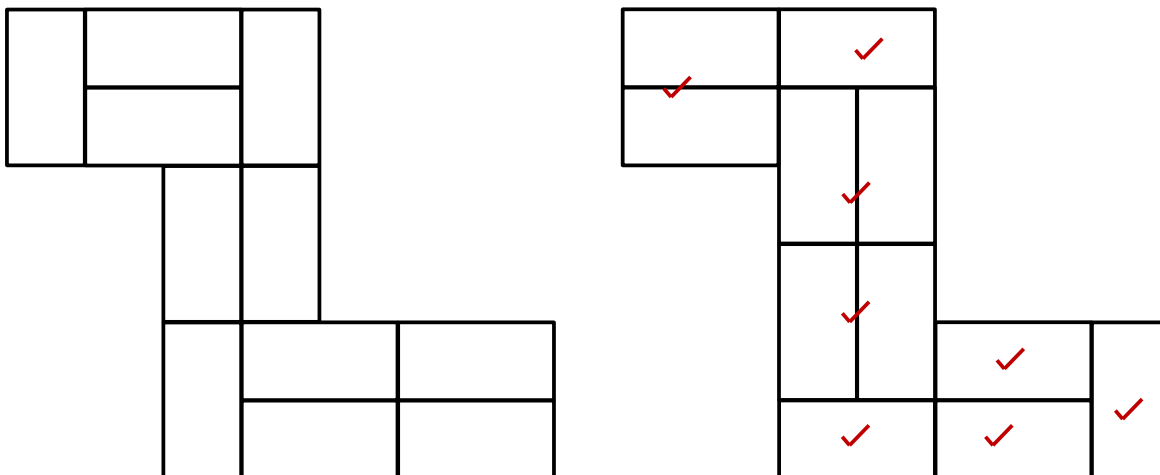


FIGURE 3.10

Brickwork	8	
Application of scale	2	
TOTAL:	10	



ANSWER SHEET	C	CIVIL TECHNOLOGY (SPECIFIC)	NAME AND SURNAME:

6.8 FIGURE 6.8 on ANSWER SHEET C shows a square-based truncated pyramid. Draw on ANSWER SHEET C the pattern development for the truncated pyramid.

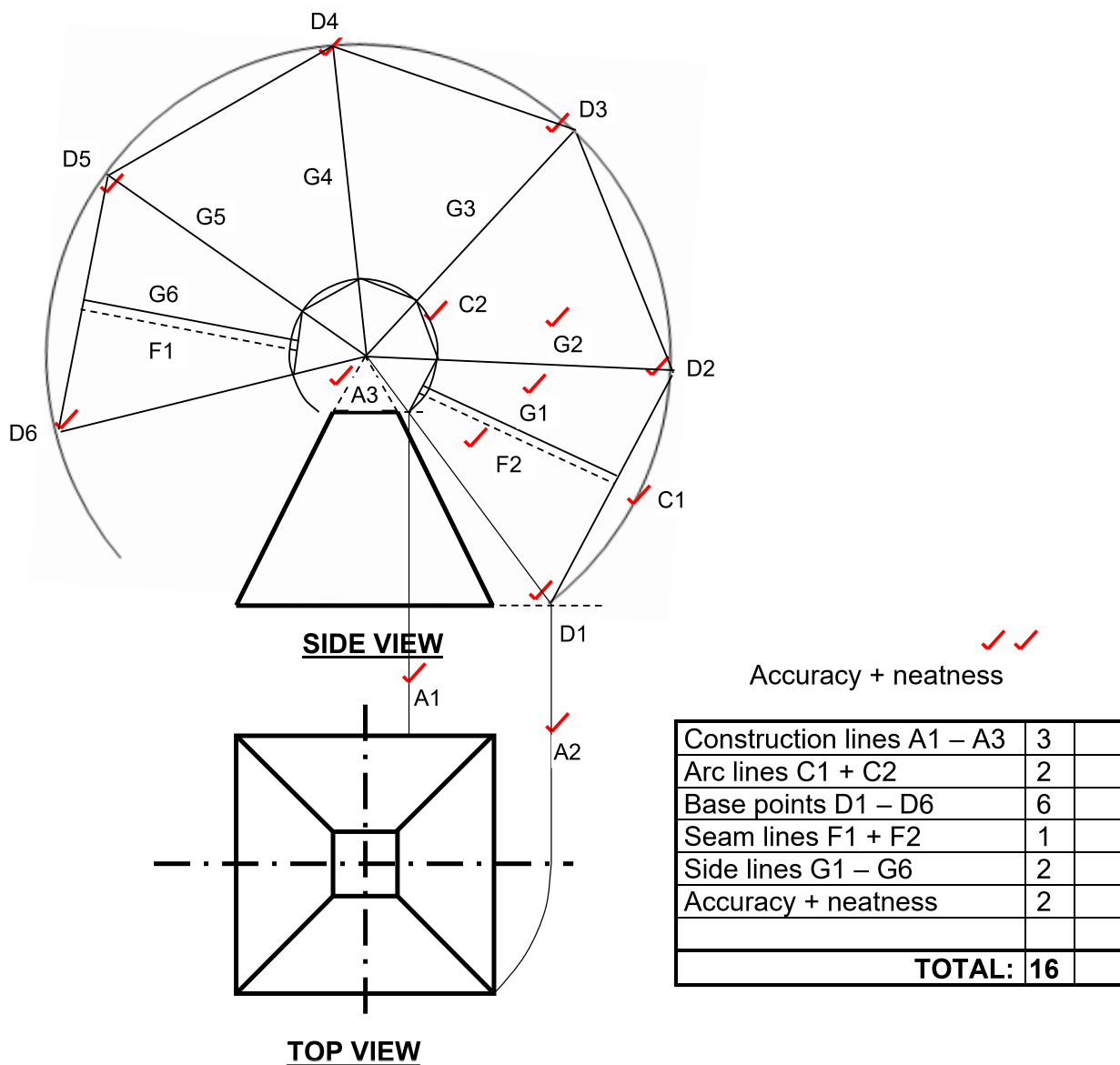


FIGURE 3.10