



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**BUILDING AND STRUCTURAL SURVEYING N5**

**24 JULY 2018**

**This marking guideline consists of 4 pages.**

**QUESTION 1**

- 1.1 True  
 1.2 False  
 1.3 True  
 1.4 True  
 1.5 True

(5 × 2) [10]

**QUESTION 2**

- 2.1
- |           | Y  | X                 |
|-----------|--|-------------------|
| A+10      | 148,250  | +10 156,324       |
| B+10      | 000, 000   | +10 000, 000✓     |
|           | <u>ΔY-148,25✓</u>                                      | <u>Δ-156,324✓</u> |
| Distance  | =✓[(-148,25) <sup>2</sup> + (-156,324) <sup>2</sup> ]✓ |                   |
|           | = <u>215,442 m</u> ✓✓                                  |                   |
| Direction | = $\tan^{-1}-148.25/-156,324$ ✓                        |                   |
|           | = 43°28'53" ✓  |                   |
|           | = 180+43°28'53"✓                                       |                   |
|           | = <u>223°28'53"</u> ✓✓                                 |                   |
| Checking: | 215,442 × Cos 223° 28'53"✓                             |                   |
|           | = -156,324 ✓   |                   |
| OR        | 215,442 × Sin 223° 28'53"✓                             |                   |
|           | = -148,25✓   |                   |
- (15)
- 2.2 Set up the theodolite on the survey station S.✓ Calculate the direction SA and SB✓ and find the angle between SA and SB.✓ Orientate zero degrees on ranging rod A✓ and hence swing to unknown B✓ by directing the assistant with a ranging rod. (5)
- 2.3 At two points A and B erect perpendicular line BC,✓ at line BC erect another perpendicular line CD✓ to clear the building (obstacle). At CD erect a perpendicular line DE and equal in length to BC,✓ and at DE set off a right angle EF.✓ The direction EF is the extension of the survey line and distance CD = BE. (5)
- Total length without obstruction = AB + CD + EF.✓ [20]

**QUESTION 3**

- 3.1 Each side =  $16 \text{ m}^2$   
       = 4 m  
       = 4000 mm✓✓  
       Thus  $\frac{4000}{150}$ ✓✓  
       = 26,667 mm✓✓ (6)
- 3.2
- The contours are further apart when the terrain is gentle.
  - The contours are closer together when the terrain is a steep slope. (2 × 2) (4)
- 3.3 From the site boundaries measure out the proposed building, increasing the area by plus-minus 1 m.✓✓ Punch in two pegs (plus-minus 2 m long pegs)✓✓ 1 m away from each corner in line with the building line in all four corners.✓✓ Because of the length of the pegs, a traveller of 1,5 m would be appropriate.✓✓ The formation level, plus-minus the benchmark, plus the length of the traveller will give the staff reading on all the eight pegs' sight rails.✓✓ (10)  
**[20]**

**QUESTION 4**

- 4.1 C1-C2 = ✓  $[(-75263,37 - -75243,16)^2 + (3649\ 934,32 - 3650\ 011,00)^2]$ ✓  
       = ✓  $[(-20,21)^2 + (-76,68)^2]$ ✓  
       = 79,300 m✓
- C1-C3 = ✓  $[(-75292,89 - -75243,16)^2 + (3650010,66 - 3650011,00)^2]$ ✓  
       = ✓  $[(-49,73)^2 + (-0,34)^2]$ ✓  
       = 49,73 m✓
- C3-C4 = ✓  $[(-75309,79 - -75292,89)^2 + (3649946,55 - 3650010,66)^2]$ ✓  
       = ✓  $[(-16,900)^2 + (-64,11)^2]$ ✓  
       = 66,30 m✓
- C3-C7 = ✓  $[(-75316,13 - -75292,89)^2 + (3650016,75 - 3650010,66)^2]$ ✓  
       = ✓  $[(-23,24)^2 + (6,13)^2]$ ✓  
       = 24,033 m✓
- C7-C6 = ✓  $[(-75333,84 - -75316,13)^2 + (3649966,33 - 3650016,79)^2]$ ✓✓✓✓  
       = ✓  $[(-17,71)^2 + (-50,46)^2]$ ✓✓✓✓  
       = 53,477 m✓✓✓✓
- TOTAL = 73,30✓ + 49,73✓ + 66,30✓ + 24,033✓ + 53,477  
       = 272,84 m✓ (25)

4.2      Correction = MD × COE × (T<sub>2</sub>-T<sub>1</sub>)  
              = 348 × 0,00012/°C × (32 °C – 16°C)  
              = 0,668 m✓✓

Correction slope = MD(1-CosΘ)  
                      = 348 (1-Cos5°50')  
                      = 1,802 m✓✓

Correct distance = 348 + 0,668 – 1,802  
                      = 346,866 m✓

(5)  
**[30]**

### QUESTION 5

5.1      Area =  $\frac{10}{2}[(75+80)/2 + 85 + 95 + 105 + 125 + 110 + 110 + 100 + 98]$ ✓✓✓  
              = 4527,50 m<sup>2</sup>✓✓

(5)

5.2      5.2.1      Placing of pegs in the ground to define position of pegs✓  
                      beacon/survey station, mark out the limits of a structure, and refer  
                      to a vertical height.✓

5.2.2      Plane surveying can be regarded as covering a relatively small  
                  area.✓ The area to be surveyed is so small that the effect of the  
                  curvature of the earth may be neglected.✓

5.2.3      This is the entering of measurements in a field book,✓ and should  
                  be arranged in a systematic, logical manner✓ so that any  
                  draughtsmen can produce a map or a plan from the recorded data.

5.2.4      A scale is a proportional representation on paper/drawing✓ of the  
                  actual dimension of a horizontal distance on the ground.✓

5.2.5      A plan is a true scale representation✓ to display accurate detailed  
                  information.✓

(5 × 2)      (10)  
**[15]**

**TOTAL:      100**