



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T160(E)(A7)T

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

7 August 2018 (X-Paper)
09:00–12:00

Calculators and drawing instruments may be used.

This question paper consists of 5 pages, 1 diagram sheet and 1 formula sheet.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL SURVEYING N4
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
 2. Read ALL the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Write neatly and legibly.
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QUESTION 1

Define each of the following survey terms:

- 1.1 Plumb bob
- 1.2 Levelling staff
- 1.3 Plan
- 1.4 Compass surveying
- 1.5 Optical square
- 1.6 Abney level
- 1.7 Steel tape
- 1.8 Plane table
- 1.9 Theodolite
- 1.10 Automatic level

(10 × 2) [20]

QUESTION 2

The following refers to the South African National Coordinate System.

Complete the following paragraph by using the words in the list below. Write only the missing word or words next to the question number (2.1–2.10) in the ANSWER BOOK.

2°; x-axis; y-axis; boundary; even; odd; longitude; central

Lines of (2.1) ... are used instead of the equator. The system is a rectangular grid with the (2.2) ... running parallel to the equator. The (2.3) ... runs from north to south. The system consists of belts (2.4) ... of longitude width. Each belt consists of one (2.5) ... meridian which is an (2.6) ... meridian and two (2.7) ... meridians which are (2.8) ... meridians. The (2.9) ... is positive west and negative east of the central meridian. The (2.10) ... is positive south of the equator.

(10 × 1) [10]

QUESTION 3

- 3.1 Name THREE main operations of a surveyor in the field. (3)
- 3.2 State FOUR basic rules for setting up a plane table. (4)
- 3.3 Explain the setting-up procedure for a dumpy level. (10)
- [17]**

QUESTION 4

- 4.1 An angle force of 35 N acts at 36° above the horizontal to the left.
Calculate the horizontal and vertical components. (6)
- 4.2 A tree is 29,5 cm away from a pylon on a 1:2 000 map.
What is the actual distance on the ground? (5)
- 4.3 The sides of a square are 6 m.
Calculate the area in m^2 . (3)
- [14]**

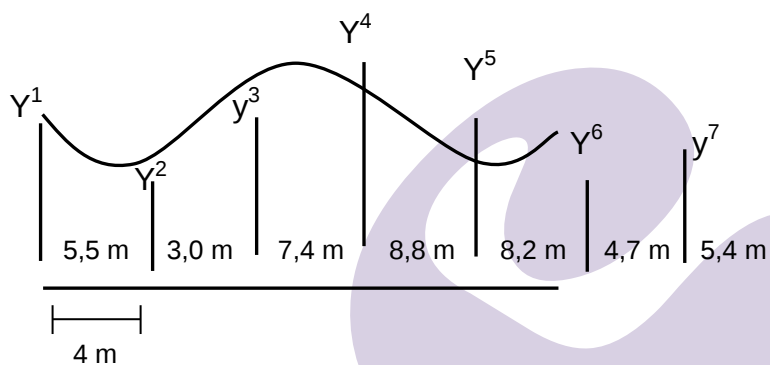
QUESTION 5

- 5.1 Name TEN parts of a theodolite. (10)
- 5.2 Give FIVE advantages of steel tapes. (5)
- 5.3 Name FOUR main methods of surveying in plane table. (4)
- [19]**

QUESTION 6

- 6.1 The FIGURE shows a piece of land. The off-sets from the survey line to the boundary line are indicated on the sketch. The distance between the off-sets is 4 m.

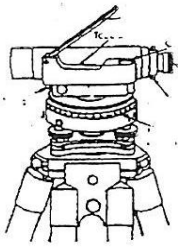
Calculate the area between the survey line and the boundary line, using the trapezoidal rule.

**FIGURE****(10)**

- 6.2 Name the surveying instruments shown on the attached DIAGRAM SHEET. Write only the answer next to the question number (6.2.1–6.2.10) in the ANSWER BOOK.

(10)**[20]****TOTAL: 100**

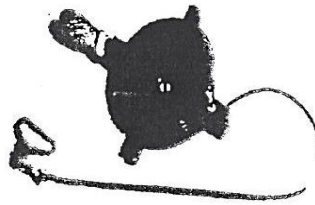
DIAGRAM SHEET



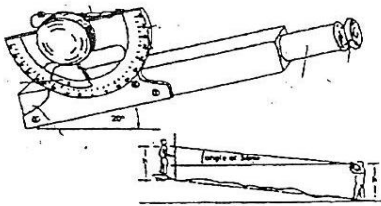
6.2.1



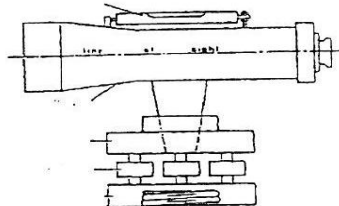
6.2.2



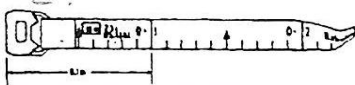
6.2.3



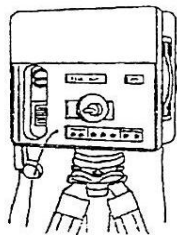
6.2.4



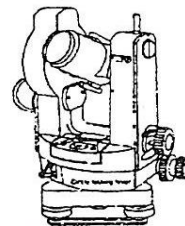
6.2.5



6.2.6



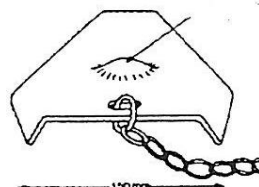
6.2.7



6.2.8



6.2.9



6.2.10

FORMULA SHEET

Any other applicable formula may also be used.

$$1. \quad A = \frac{1}{2} b \times \perp h$$

$$2. \quad A = \sqrt{s(s-a)(s-b)(s-c)}, \frac{a+b=c}{2}$$

$$3. \quad A = \frac{(a+b) \times h}{2}$$

$$4. \quad A = a \times h$$

$$5. \quad A = \frac{d}{3} [(y_1 + y_n) + 2(y_3 + y_5 + \dots + (y_n - 2)) + 4(y_2 + y_4 + \dots + y_{n-1})]$$

$$6. \quad A = d \left[\left(\frac{y_2 + y_n}{2} + y_2 + y_3 + \dots + y_{n-1} \right) \right]$$

$$7. \quad C = L \times e \times (t_m - t_s)$$

$$8. \quad C = \frac{W^2 L^3}{24 T^2}$$

$$9. \quad C = L (1 - \cos \theta)$$

$$10. \quad C = H (\sec - 1)$$

$$11. \quad C = \frac{LH}{R}$$

$$12. \quad A = \frac{1}{2} ab \sin C$$