



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

**NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL SURVEYING N5**

(8060045)

**28 July 2021 (X-paper)
09:00–12:00**

Nonprogrammable calculators may be used.

This question paper consists of 6 pages, 1 addendum and 1 formula sheet.

062Q1G2128

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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BUILDING AND STRUCTURAL SURVEYING N5
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. Start each question on a new page.
 5. Only use a black or blue pen.
 6. Write neatly and legibly.
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SECTION A**QUESTION 1**

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK. In ONE sentence, substantiate each answer.

- 1.1 Distances measured on a slope need to be reduced to the ground level.
- 1.2 Measuring tapes contract with temperature rises and expand when temperature falls.
- 1.3 A change plate may be used as a temporary signal to indicate the location of a point or the direction of a line.
- 1.4 One should pull the tape out in the direction in which it is coiled.
- 1.5 After having set up the instrument, it must be correctly oriented.

(5 × 2) **[10]**

QUESTION 2

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–L) next to the question number (2.1–2.10) in the ANSWER BOOK.

COLUMN A		COLUMN B
2.1	Temperature at which the tape was standardised	A cadastral surveying
2.2	Amount by which a steel tape will expand or contract uniformly throughout its whole length for a change in temperature of 1 °C	B horizontal line
2.3	Determining the differences in the height of points on the surface of the earth	C maps
2.4	Preparation of plans showing and defining legal property boundaries	D reduced level
2.5	Force that keeps the earth in equilibrium	E standard temperature
2.6	Surface in which all planes are normal to the direction of gravity as indicated by a plumb line	F benchmark
2.7	Line on a horizontal surface and is therefore tangential to the level line at that point	G plans
2.8	Representation of the outline of the surface features of the earth onto a plane surface to a small scale	H levelling
2.9	Fixed point of known height from which the level of other points may be established	I engineering survey
2.10	Representation of the surface features of a small section of the earth's surface drawn to a large scale onto a horizontal plane surface	J gravity
		K coefficient of expansion
		L level surface

(10 × 1)

[10]

QUESTION 3

Describe the following terms used in surveying:

- 3.1 Temporary benchmark
- 3.2 Constant errors
- 3.3 Systematic errors
- 3.4 Temporary incorrect tapes
- 3.5 Permanent incorrect tapes

(5 × 5) [25]

TOTAL SECTION A: 45

SECTION B**QUESTION 4**

- 4.1 Explain the process involved in obtaining a horizontal measurement/distance across each of the items below.

Use a neat sketch to explain your answer.

4.1.1 A building (6)

4.1.2 A river (5)

- 4.2 Given the co-ordinates below, calculate the orientated direction and distance between A and B.

A – 1058,47 + 310248,17

B – 1688,04 + 309295,54 (15)

- 4.3 A base line was measured with a steel tape which was standardised at a temperature of 17 °C and was found to be 160,00 m. If the temperature during the time of measurement was 21 °C, what is the correct length of the base line?

Take the coefficient of expansion to be 0,000012 and answer to the nearest THREE decimals. (5)


- 4.4 Name the FOUR methods of measurement. (4)

- 4.5 State at least FOUR basic rules to obtain accurate orientation in relation to a plane table. (4)

[39]

QUESTION 5

The entries on ADDENDUM A (attached) were taken during a levelling survey between stations A and I. Reduce the readings using the rise and fall method.

NOTE: Do not make any corrections. 

Enter the answers in TABLE 1 on ADDENDUM A (attached). Write your student number on ADDEDNUM A and submit ADDENDUM A with the ANSWER BOOK.

[16]

TOTAL SECTION B:	55
GRAND TOTAL:	100

ADDENDUM A

EXAMINATION NUMBER:

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TABLE 1

POINT	BACK SIGHT	INTER SIGHT	FORE-SIGHT	RISE	FALL	REDUCED LEVEL	REMARKS
A	4,50						TBM 94,20
B		4,00					
C	1,05		2,05				
D	3,32		0,42				
E		2,28					
F	0,26		1,54				
G		0,98					
H	1,30		4,24				
			1,80				TBM

BUILDING AND STRUCTURAL SURVEYING N5

FORMULA SHEET

Any applicable formula may be used.

$$\Delta h = 50l \sin 2\theta + HI - MH = 100l \sin \theta \cos \theta + HI - MH$$

Or

₃

$$V = -KS \cos \theta \sin \theta$$

$$HD = 100 / \cos^2 \theta \text{ of } KS \cos \theta$$

$$C_t = L \cdot e \cdot (T_m - T_s), C_t = L \cdot e \cdot (T_m - T_s) \text{ of } L[1 + e(T_m - T_s)]$$

$$C_T = \frac{w^2 L^3}{24 \cdot T^2}$$

$$Cs = L \cdot (1 - \cos \theta)$$

$$Cs = H (\sec \theta - 1)$$

$$Ce = L \cdot H / R$$

$$\text{Slope} = \Delta h / HD$$

$$V = d/3 [(y_1 + y_n) + 2(y_3 + y_5 + \dots + y_{n-2}) + 4(y_2 + y_4 + \dots + y_{n-1})]$$