higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N5

28 July 2021

This marking guideline consists of 5 pages.

SECTION A

QUESTION 1

1.1 False✓ – Measurements have to be reduced to horizontal for survey calculations and accuracy.✓

1.2 False✓ – Steel tapes expand with rise and contract with fall of temperature.✓

1.3 False✓– A change plate is flat and not visible from a distance.✓

1.4 True✓ – It is brittle can break easily, and for accuracy.✓ Correct

1.5 True✓ – It must be oriented for accurate measurement.✓

(5 × 2) **[10]**

QUESTION 2

2.1 E
2.2 K
2.3 H
2.4 A
2.5 J
2.6 L
2.7 B
2.8 C
2.9 F
2.10 G

(10 × 1) **[10]**

QUESTION 3

3.1 Temporary benchmark – is a benchmark set up by a surveyor✓ for his own use on a particular job.✓ The temporary benchmark height may be established from a permanent benchmark✓ of MSL so that levels on the site may be referred back to the temporary benchmark✓ without having to check the permanent MSL benchmark every time.✓

3.2 Constant errors – these are errors in all measurements✓ that are made under the same circumstances,✓ have the same magnitude and algebraic✓sign. The tape can be too long or too short.✓ A collimating error in the theodolite or dumpy level will produce a constant error.✓

3.3 Systematic errors – these occur according to some system which, when known, can be expressed by some functional relationship.✓It follows a pattern which will be duplicated if the measurement is repeated under the same conditions.✓The system underlying a systematic error may depend on the observer,✓ the instrument used✓ and the physical or environmental conditions✓ at the time that the measurement is made.✓

3.4 Temporary incorrect tape – a tape can become temporary incorrect due to the expansion or contraction✓ caused by variations in temperature.✓ The measurement is adjusted each time the tape is used✓ and the degree of error varies according to the changing temperatures✓ above or below that at which the tape was standardised.✓

3.5 Permanent incorrect tape – permanent stretching✓ of the tape due to an excessive amount of pull,✓ or permanent shrinking✓ due to defects in the materials and a short piece breaking off.✓ This will result in an overlap when the tape is repaired.✓

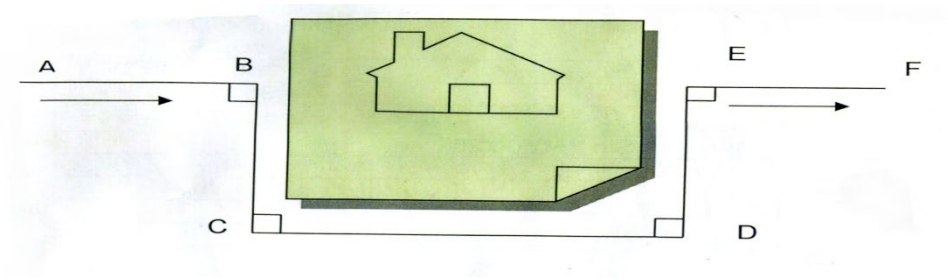
(5 × 5) **[25]**

TOTAL SECTION A: 45

SECTION B

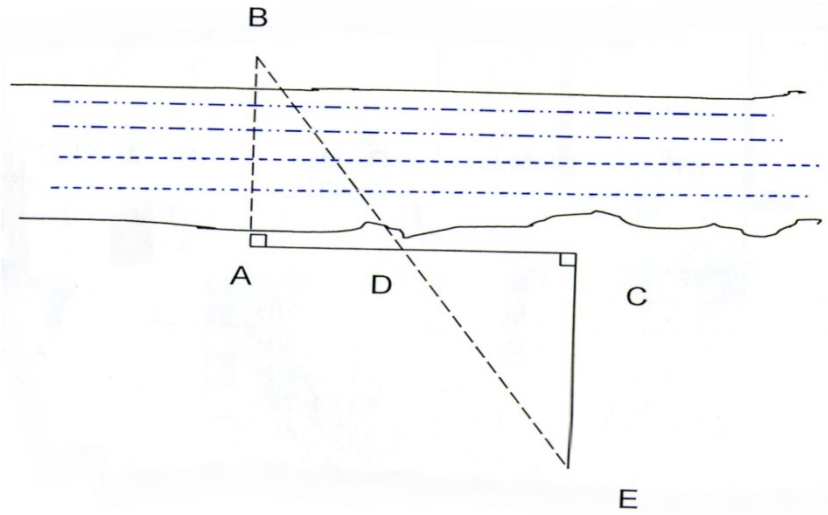
QUESTION 4

4.1 4.1.1



From two points, A and B, erect a perpendicular line BC,✓ on line BC erect another perpendicular line CD✓ to clear the obstacle. On CD, erect a perpendicular line,✓ DE, equal in length to BC✓ and on DE set off a right angle EF.✓ EF is the extension of the survey line; distance CD = BE.✓ (6)

4.1.2



Erect line AC at right angles to AB,✓ measure AD equal to DC,✓ locate point E✓ by sighting from E through D to B;✓ CE is thus equal to AB.✓ (5)

4.2

Station	Y	X	Calculations	Direction/Distance
A	-1058,47✓ -1688,04✓	+310248,17✓ +309295,54✓	$\tan^{-1}\ ^{-629,57}/_{952,63}$✓ = 33°27'35" ✓	D = 360 – 33°27'35" ✓ 326° 54' 02''✓
	-629,57✓	-952,63✓		
			Check	S = 1106,28 m✓
			1106,28 Cos326° 54' 02''✓ = -952,63✓	
			1106,28 Sin326° 54'02''✓ =-629,57✓	

(15)

4.3 Correction = M.N × C.E.O × (T2 – T1)
= 160 × 0,000012 × (21 – 17) ✓
= 160 × 0,000012 × 4 ✓
= 0,008 metres ✓

Correct distance = 160 + 0,008 metres ✓
= 160,008 metres ✓ (5)

4.4
- Horizontal distance
- Horizontal angle
- Vertical distance
- Vertical angle (4)

4.5
- The best orientation is to the longest and clearest point.
- The orientation must be checked onto another point.
- The best positional fix is done from the nearest control point.
- The orientation should be checked periodically while at the station and always before leaving the station. (4)

[39]

QUESTION 5

ADDENDUM A **TABLE 1**

POINT	BACK SIGHT	INTER SIGHT	FORE SIGHT	RISE	FALL	REDUCED LEVEL	REMARKS
A	4,50					✓94,20	TBM 94,20
B		4,00		✓0,50		✓94,70	
C	1,05		2,05	✓1,95		✓96,65	
D	3,32		0,42	✓0,63		✓97,28	
E		2,28		✓1,04		✓98,32	
F	0,26		1,54	✓0,74		✓99,06	
G		0,98			✓0,72	✓98,34	
H	1,30		4,24		✓3,26	✓95,08	
TBM			1,80		✓0,5	✓94,58	
	10,43		**10,05**	**4,86**	**4,48**	**-0,38**	

10,43 4,86
-0,38 -0,38 **[16]**

TOTAL SECTION B: 55
GRAND TOTAL: 100