



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N5

17 November 2020

This marking guideline consists of 5 pages.

SECTION A**QUESTION 1**

- 1.1 True
- 1.2 True
- 1.3 True
- 1.4 False
- 1.5 False

(5 × 1) **[5]****QUESTION 2**

- 2.1 Zero end
- 2.2 Eye
- 2.3 The Abney
- 2.4 Distance
- 2.5 Chainmen
- 2.6 Applied
- 2.7 Booked
- 2.8 Tape
- 2.9 Recorded
- 2.10 Tension

(10 × 1) **[10]****QUESTION 3**

- 3.1
 - The greater the radius of the curve
 - The lower the viscosity and surface tension of the liquid
 - The greater the diameter of the tube
 - The length of the vapour bubble
 - The smoother the inner surface of the tube
- 3.2

(i) First calculate the correct reading on staff 1 from B. ✓ Using the tilting screws, bring the central cross hair to this calculated reading. ✓ This will result in the bubble moving off centre ✓. Centre the bubble carefully again by means of its own adjusting screws ✓ and the operation is complete ✓. Repeat check and adjust if necessary. ✓ (5)

(ii) Calculate what the staff reading on B1 should be ✓, assuming there is no error in reading B2 ✓. (there will be an error in B2, but for practical purposes it may be ignored.) Move the bubble in the telescope ✓, using the adjusting screws fitted, ✓ until the central horizontal cross-hair cuts staff 1 at the computed true reading. ✓ Check and repeat if necessary. ✓ (10)

[20]**TOTAL SECTION A: 35**

SECTION B

QUESTION 4

4.1

SOURCE	TO ELIMINATE
a) Error in reading the staff✓	Care and experience✓
b) Error in booking the reading✓	Adopt the correct procedure✓
c) Collimation error in the level✓	Adjust the level✓
d) Play in tripod✓	Tighten all screws✓
e) The staff is not vertical✓	Use a hold - on bubble✓
f) The staff moves on the change plate✓	Use a change plate or peg on firm ground✓
g) Mud or dirt on peg or staff✓	Clean✓
h) The staff is held on wrong point✓	Check identification of point✓
i) Wind causes movement of instrument or staff	Keep sights short. Do not read high up on staff.
j) Heat of sun causes unequal expansion	Use an Umbrella
k) Earth curvature	Short sights (50m for road work) Make B.S. = F.S.
l) Refraction by atmosphere causes bending of light rays	Do not read the staff close to the ground (not lower than 30cm). Avoid grazing rays. Make B.S =F.S. Short sights.

(Any 8×2) (16)

4.2

4.2.1 Reconnaissance – is the preliminary examination✓ to familiarise yourself with the area✓ and see where to position the control points. ✓ The construction and protection of control points is very important✓

(4)

4.2.2 Vertical Control – this is the establishment of known heights, relative to an agreed datum, to all control points, major, secondary and tertiary so that they can serve as Bench marks as well.

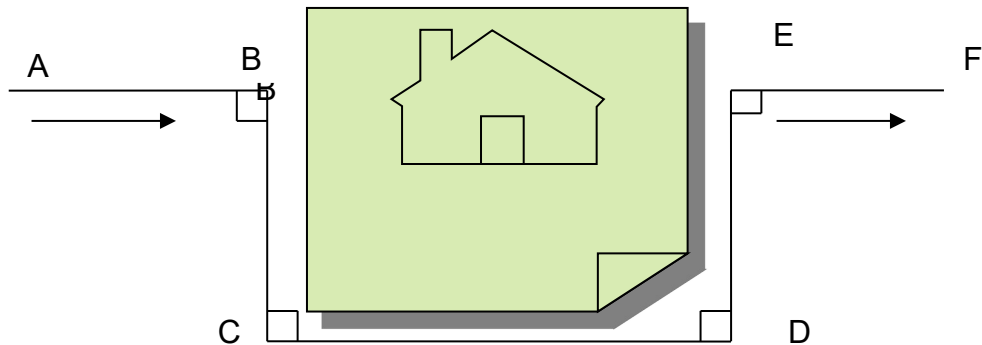
(4)

4.2.3 Slope in degrees = $\tan^{-1} 3.64/100 \checkmark$
 $= 2.085^\circ \checkmark$
Horizontal Dist. = $136.57\text{m} \cos 2.085^\circ \checkmark$
 $= 136.48\text{m} \checkmark \checkmark$

(5)
[29]

QUESTION 5

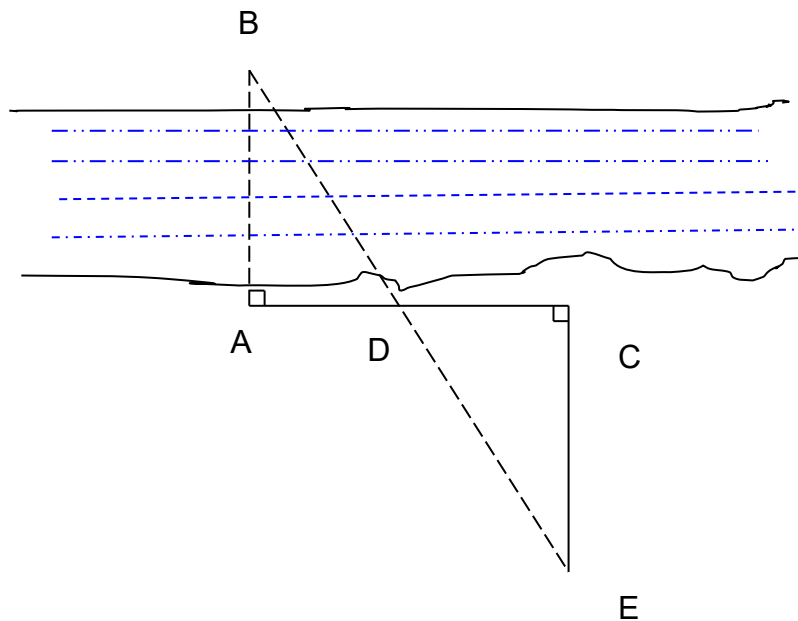
5.1 5.1.1



At two points A and B erect perpendicular line BC, ✓ At line BC erect another perpendicular line CD, ✓ to clear the obstacle. At CD erect a perpendicular line DE and equal in length ✓ to BC and at DE set of a right-angle EF. ✓ The direction EF is the extension of the survey line and distance $CD = BE$. ✓

(5)

5.1.2



Erect line AC right angle to AB, ✓ measure AD equal to DC, ✓ locate point E by sighting ✓ from E through D to B, ✓ thus CE is equal to AB. ✓

(5)

5.2

JOIN CALCULATIONS				
	Y	X	Calculations	Direction/D and Distance/S
C	+31202.170	-10585.470	$=\tan^{-1} 1110.00/-6299.570$ ✓	D = 360 - 9°59'35"
D	+30092.170	-16885.040	= 9°59'35"✓	= 350°00'25"✓✓
	+1110.00✓	-6299.570✓✓	Check:	S = 6396.615m✓✓
			6396.615 Sin 350°00'25"	
			= 1110.00✓	
			And:	
			6396.615 Cos 350°00'25"	
			= -6299.570✓	

(11)
[21]**TOTAL SECTION B: 50****SECTION C****QUESTION 6**

POINT	BACK SIGHT	INTER SIGHT	FORE SIGHT	RISE	FALL	REDUCED LEVEL	REMARKS
A	0.49						TBM 1180.880
B	0.27		3.29		2.800✓	1178.08✓	
C	0.39		3.77		3.500✓	1174.58✓	
D	3.72		3.59		3.200✓	1171.38✓	
E		1.11		2.610✓		1173.99✓	
F	3.56		0.82	0.290✓		1174.28✓	
G	3.89		1.36	2.200✓		1176.48✓	
				5.100✓	9.500	4.400✓	
					5.100✓		

**TOTAL SECTION C: [15]
GRAND TOTAL: 100**