higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

BUILDING AND STRUCTURAL SURVEYING N4

4 APRIL 2016

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 Local heights are those to which an arbitrary height (value) has been assigned.√√

1.2 Is one at right angles to the direction of gravity at one point only.√√

1.3 Is the first sight or reading, taken after the instrument has been set up.√√

1.4 Level line is one at which every point in it is at right angles to the direction of gravity.√√

1.5 Is the line of sight defined by the optical centre of the object glass and the centre of the cross bars. √√

(5 × 2) **[10]**

QUESTION 2

2.1 Is to determine the relative position of points√ (natural or man-made) on the earth's surface√ so that they may be accurately represented on maps and plans√ and to set out√ on the ground the position of proposed construction or engineering works.√ (5)

2.2 2.2.1 The distance to points and the heights√ (vertical distances) relative to the instrument√ are measured optically.√ (3)

2.2.2 Involves the location of points√ by the measurement of distance√ and angles.√ (3)

2.2.3 The location of points√ by measurement of compass bearings√ (angles). (2)

[13]

QUESTION 3

3.1 Is a measured unit√ used to refer to the map√ and to the actual true distance it represents.√ (3)

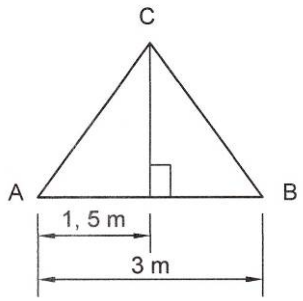
3.2 RF = 1 : 2 500
ground distance = 1 050 m
Map distance = $\frac{1050\,x\,1000}{2\,500}$ √√
= 420 mm√ (3)

3.3

	1 cm	=	2 km	
	1 cm	=	2 000 m	√
	1 mm	=	200 000 mm	√
RF	1	=	200 000	√

(3)

3.4



Central angle = 360/6 = 60º√

$\pi A = \pi B = \frac{180 - 60}{2} = 60º\surd$

$\text{Tan } 60E = \frac{\perp h}{1,5}$

$\perp h = 1, 5 \tan 60 º \surd$

Area of Δ = $^1/_2$ base x $\perp$h

= $^1/_2$ 3 × (1, 5 tan 60º)√

= 3, 897 m^2√

6 Δ's = 6 × 3,897 m^2

= 23,382 m^2√

(6)

3.5 329º√√ (2)

3.6
- sexagesimal measurement
- centisimal measurement
- radian measurement

(3 × 1) (3)

[20]

QUESTION 4

4.1
- Lines of longitude are used instead of the equator.
- The system is a rectangular grid with the y-axis running parallel to the equator.
- The x-axis runs from north to south.
- The system consists of belts 2E of longitude wide.
- Each belt consists of one central meridian which is an odd meridian and two boundary meridians which are even meridians.
- The y-axis is positive west and negative east of the central meridian.
- The x-axis is positive south of the equator.
- Zero direction is south.
- Angles are measured in a clockwise direction.

(Any 8 × 1) (8)

4.2 4.2.1
- As a fraction of a metre
- As a percentage of the graduated tape length
- As a fraction of the graduated tape length (3 × 1) (3)

4.2.2
- Fraction of a metre - for example when a tape is 0,2 m too long or too short.
- Percentage - for example when a tape is 5% too long or too short.
- Fraction of graduated length - for example a tape is 1/150th too long or too short (3 × 1) (3)

4.3
- Neat figures and legible printing.
- Clear sketches .
- Clearness in representing the points to which offsets have been taken.
- Add explanatory notes wherever necessary to avoid ambiguity.
- Cross index wherever possible.
- Keep the field book clean.
- Leave nothing to the memory. Record everything.
- Use hardish pencil (2H) and keep it sharp.
- Make a sketch to show location of stations.
- Take bearing from true or magnetic north.
- Book systematically.

(Any 5 × 2) (10)
[24]

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QUESTION 5

5.1 $$Cct = \frac{w^2 l^3}{24t^2}$$

$$Cct = \frac{(0,015)^2\left(\frac{90,6}{3}\right)^3}{24(7)^2}\ \surd$$

$$Cct = 0,005\,m\ \surd$$

$$Cct = 3\,x\,0,005\,m\ \surd$$

$$Cct = 0,015\,m\ \surd$$

Correct distance = 90, 6 – 0, 015√

= 90, 585 m√

(6 × 1) (6)

5.2 $$CT = L\ x\ E\ x\ (Tm - Ts)\ \surd$$

$$+0,006 = 53,0\,x\ 0,0000113\ (Tm - 20)\ \surd$$

$$\frac{+0,006}{53,0\,x\,0,0000113} = Tm - 20 \qquad \surd$$

$$Tm = 20 + \left(\frac{0,006}{53,0\,x\,0,0000113}\right)\surd$$

= 30EC√

(5 × 1) (5)
[11]

QUESTION 6

6.1 6.1.1 True
6.1.2 True
6.1.3 True
6.1.4 False

(4 × 1) (4)

6.2 Point the telescope at the sky.√
Focus the eye-piece for distinct vision of the cross hairs.√
Focus the telescope on an object√ and test for parallax.
Test: Focus on an object and move the eye slightly up and down.√
Relative movement between the cross hairs and the image should disappear√ to indicate the absence of parallax.√

(6 × 1) (6)

6.3 First position the telescope parallel over two foot screws√
Turn both foot screws simultaneously inwards or outwards√ to centralise the bubble.√
Next turn the telescope 90° over the third foot screw and recentralise using this foot screw only.√
Repeat by turning the next 90° again over the two foot screws and recentralise√ and ending by lastly positioning over the third foot screw to complete the circle.√

(6 × 1) (6)
[16]

QUESTION 7

- The base line should be as long as practicable.
- The base line must run through the middle of the site.
- All triangles must be based on the base line or tied back to it.
- All triangles must be provided with a check.
- Main chain lines to be as close as possible to the boundary lines in order to reduce off-set lengths.
- Lines should be as near horizontal as possible.
- Lines should be free from obstruction.
- The number of lines should be kept to a minimum.
- Triangles with an apex less than 30° or greater than 120° should be avoided.

(Any 6 × 1) **[6]**

TOTAL: 100

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