higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NOVEMBER EXAMINATION

BUILDING AND STRUCTURAL SURVEYING N4

13 NOVEMBER 2013

This marking guideline consists of 8 pages.

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QUESTION 1

1.1 A reduced level is the vertical distance between a survey point and the adopted level datum.

1.2 Is when grid north coincides with true north

1.3 The difference between true north and magnetic north

(3 x 2) **[6]**

QUESTION 2

2.1
- Plane surveying √
- Geodetic Surveying √
- Topographical Surveying √
- Cadastral Surveying √
- Engineering Surveys

(Any 4 × 1) (4)

2.2
- 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)
[14]

QUESTION 3

3.1 Natural scales are the *relation between* the *same units of measurement* whereas engineering scales are *the relation between* two *different units of measurement.*

(4 × 1) (4)

3.2
$$Length = \frac{2\ 200\,x1\ 000}{20\,000}$$
$$Length = 110\ mm \quad \surd$$

$$Width = \frac{800\,x1\ 000}{20\,000}$$
$$Width = 40\ mm \quad \surd$$

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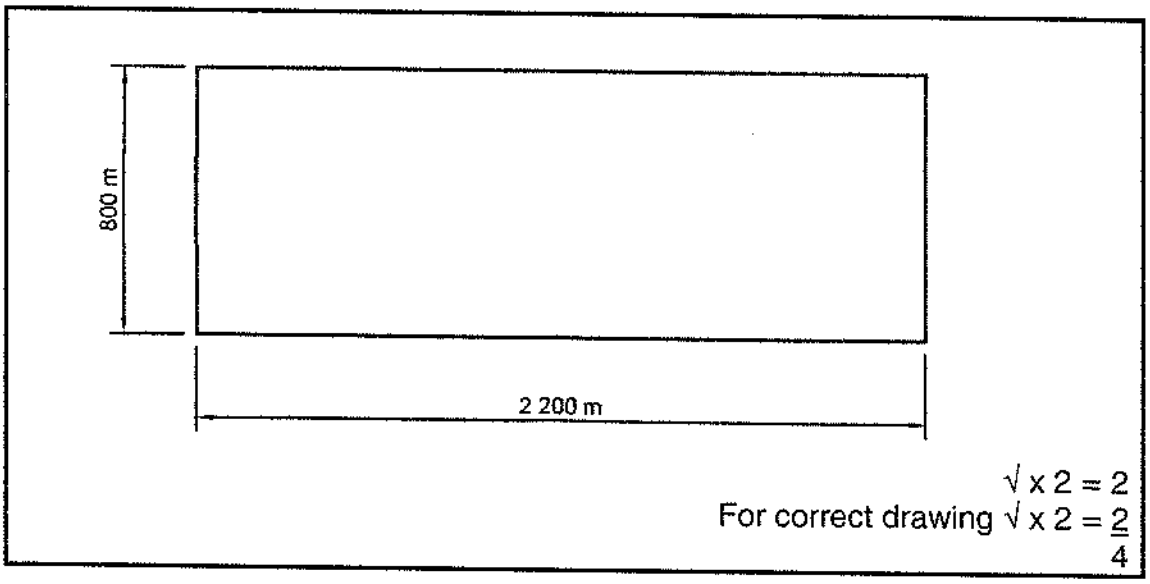

√ x 2 = 2
For correct drawing √ x 2 = 2
4 (4)

3.3 $A = L\,x\,W$

$0,98\,ha = 2W\,x\,W$ √

$0,98\,x\,10\,000 = 2W^2$ √

$2W^2 = 0,98\,x\,10\,000$

$W = \sqrt{\frac{0,98\,x\,10\,000}{2}}$ √

$W = 70\,m$ √

$L = 140\,m$ √

Perimeter = 2(70) + 2(140)

Perimeter = 420 m √ (6)

[14]

QUESTION 4

4.1
- Reading numbers incorrectly.√
- Measuring the slope of the ground instead of the slope of the tape√
- Tapes not kept on the zero mark√
- Applying excessive tension√
- Booking numbers incorrectly √
- Forgetting to book a distance √
- Booking the wrong number as a correct number. √

(Any 4 × 1) (4)

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4.2
- The tape should be drawn out in a straight line, in the direction in which it is coiled.√
- If the tape jams in the case - tap the case gently to free the tape.√
- Detach the reel from the tape when using the full length.√
- Before applying tension on the tape makes certain that no kinks are in it.√
- Do not allow vehicles to run over the tape.√
- Do not step on the tape.
- Booking the wrong number as a correct number.
- After use wipe it dry.
- Do not exceed the standard pull.
- Do not leave the tape lying on the ground longer that is necessary.

(Any 5 × 1) (5)

4.3 4.3.1 Every tape is standardised to be accurate at a certain pull (if the pull applied is greater than that of which the tape is standardised the tape will be correspondingly too long or too short). √√ (2)

4.3.2 A tape is standardised to be correct at a certain temperature. (a tape can become temporarily incorrect due to expansion or contraction caused by variation in temperature). √√ (2)

[13]

QUESTION 5

5.1 $$\cos\alpha = \frac{horisontal\ dis\tan ce}{sloping\ dis\tan ce}\ \surd$$

Horizontal distance = slope distance x cos32°26'44" √

Horizontal distance = 75,60 m x cos32°26'44" √

Horizontal distance = 63,799 m √

OR

Cs = L (1 – cosA)

= 75, 60(1 – cos32°26'44")

= 11,801 m √

CD = MD + correction

= 75,60 + (-11, 801) √

= 63,788 m √

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

$Ct = 137,\ 66\ x\ 0,0000113\ x\ (29 - 20)$ √

$Ct = 0,014\ m$ √

CD = MD + correction

= 137, 66 + 0, 014√

= 137, 674 m √

5.3 $C_{alt} = \frac{LH}{R}$

$C_{alt} = \frac{234,76\ x\ 950}{6\ 373\ x\ 1\ 000}$ √

$C_{alt} = 0,035\ m$ √

CD = MD + correction

= 234,76 + (-0, 035) √ (corrections above sea level are negative)

= 234,725 m √

(3 x 4) **[12]**

QUESTION 6

6.1 6.1.1 The last reading from an instrument position. It is taken on a fixed point or a footplate.

6.1.2
- The survey starts on a known point and ends on a known point. √√
- The survey starts and ends at the same point.

6.1.3
- The method of surveying where distances and elevation of points obtained by theodolite and staff. √√
- Distances and heights are obtained by optical means.

(Any 3 x 2) (6)

6.2 The purpose of the level/bubble tube is to set the instrument's line of sight perpendicular to the direction of gravity. (2)

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6.3
- Definition √
- Image brightness √
- Magnification √
- Size of field √

(4 × 1) (4)

6.4 6.4.1 Bubble √

6.4.2 Plaster of paris √

6.4.3 Ball joint/hinge √

6.4.4 Container √

6.4.5 Vertical axis √

6.4.6 Capstan/adjusting screws √

6.4.7 Bubble tube √

(7 × 1) (7)
[19]

QUESTION 7

7.1
- 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 horisontal 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)

7.2 Place a peg at a suitable position P. √
Set up the plane table over peg P and level the table. √
Mark of the north direction. √
Transfer P vertically to P on the plane table. √
From P draw rays to A, B, C and D. √
From P measure the distance to A. √
Scale this distance along ray PA to mark off a. √
Measure the distances PB, PC and PD and scale off Pb, Pc and Pd along their respective rays. √
Join a, b c and d. √

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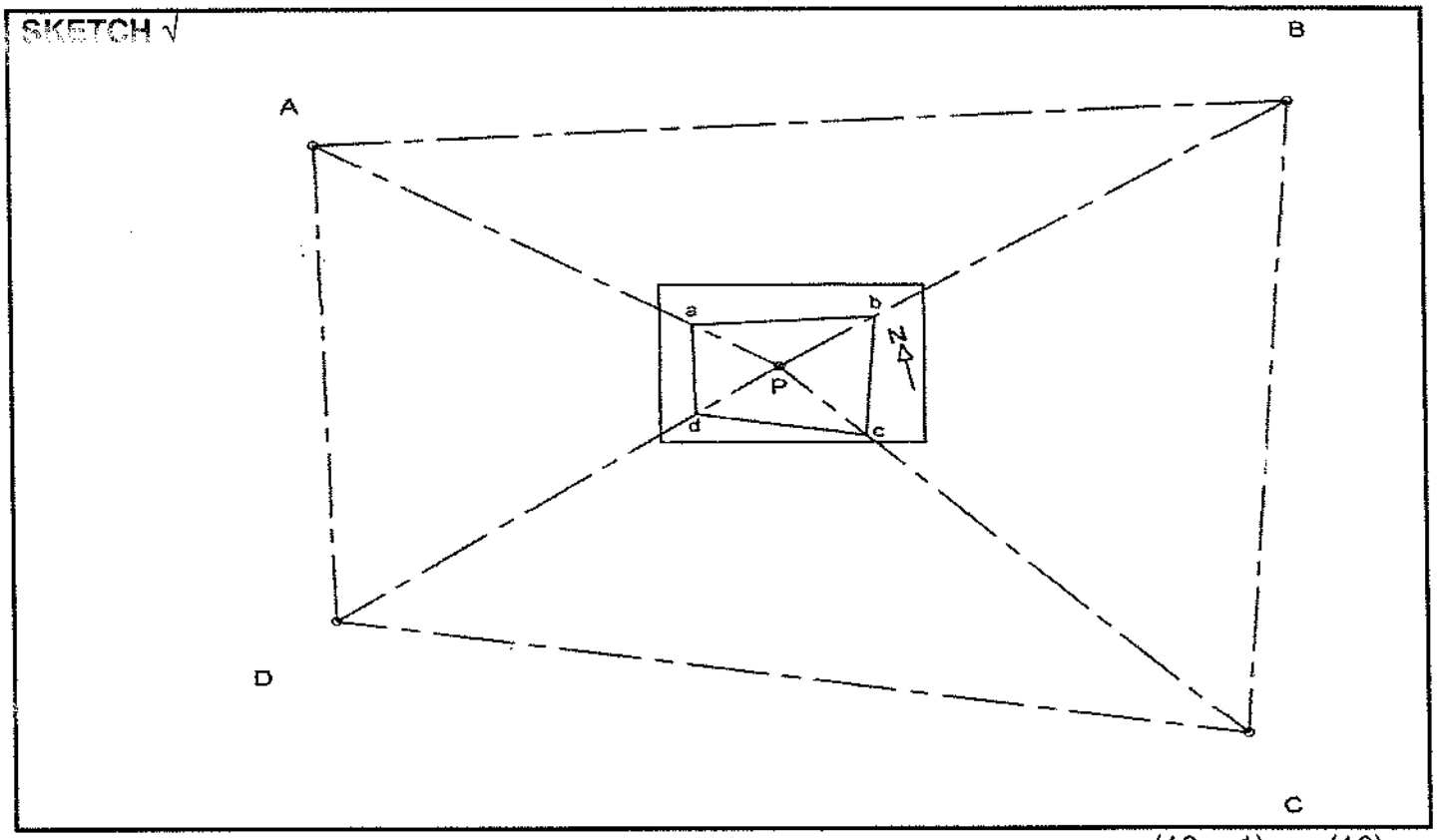
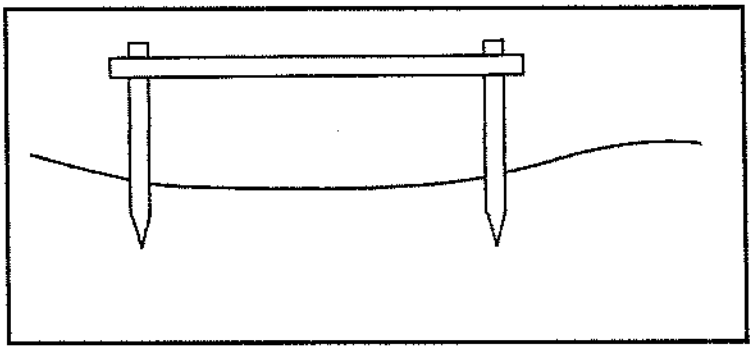


(10 × 1) (10)

7.3 7.3.1



Sketch √

Sight rails are fixed to provide the desired gradient for excavation or fill. At least two are required to provide the gradient.√

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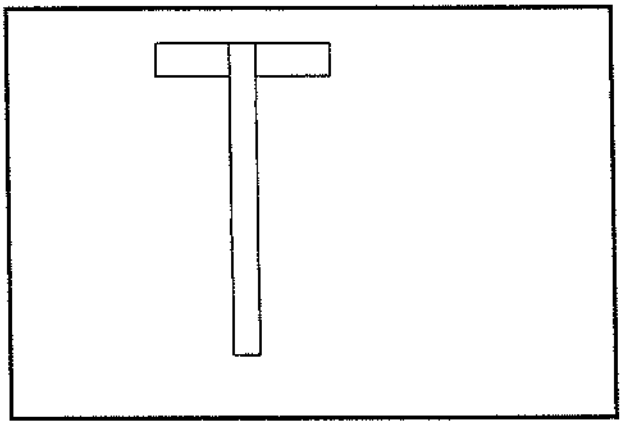
7.3.2

Sketch √

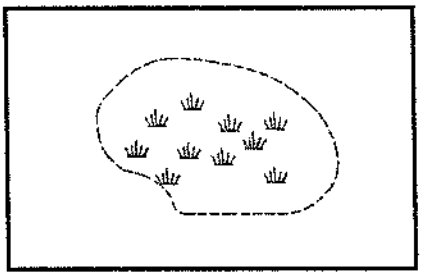


Boning rods ensure that the excavation or fill is kept uniform with the gradient. √

(2 × 2) (4)

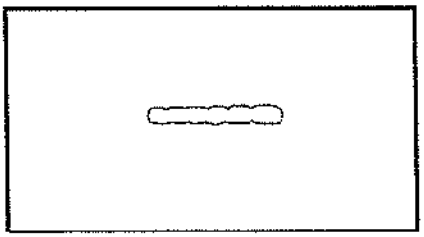
7.4 7.4.1

Sketch √



7.4.2

Sketch √



(2 x 1) (2)
[22]

TOTAL: 100

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