



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N6

9 April 2021

This marking guideline consists of 8 pages.

QUESTION 1

1.1

REDUCED LEVEL	WEIGHTING	RL x WEIGHTING	
85.2	1	85.2	1/2 ✓
85.1	2	170.2	1/2 ✓
83.9	2	167.8	1/2 ✓
84.1	1	84.1	1/2 ✓
85.9	2	171.8	1/2 ✓
86.0	2	172.0	1/2 ✓
85.0	2	170.0	1/2 ✓
86.3	3	258.9	1/2 ✓
84.5	1	84.5	1/2 ✓
85.2	1	85.2	1/2 ✓
86.0	2	172.0	1/2 ✓
85.1	2	170.2	1/2 ✓
86.2	2	172.4	1/2 ✓
86.1	1	86.1	1/2 ✓
Σ	24	2050.4	1/2 ✓

$$\text{Mean level} = 2\,050,4/24 = 85,43 \text{ m} \checkmark$$

$$\text{Depth of filling} = 86,5 - 85,43 = 1,07 \text{ m} \checkmark$$

$$\therefore \text{Volume} = \text{Area} \times \text{Depth of filling}$$

$$= (10 \times 10 \times 7) (1,07) \checkmark$$

$$= 749 \text{ m}^3 \checkmark$$

(10)

1.2

$$1.2.1 \quad \text{Area of triangle ACD} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{Where } s = (a + b + c)/2$$

$$\text{Substitution values } s = (76 + 60 + 78)/2$$

$$= 107 \checkmark$$

$$\therefore \text{Area of ACD} = \sqrt{(107)(107 - 70)(107 - 60)(107 - 78)}$$

$$= 2\,322,95 \text{ m}^2 \checkmark$$

(2)

$$1.2.2 \quad \text{Area of triangle ABC} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{Where } s = (a + b + c)/2$$

$$\text{Substitution values } s = (63 + 45 + 76)/2$$

$$= 92$$

$$\therefore \text{Area of ACD} = \sqrt{(92)(92 - 63)(92 - 45)(92 - 76)}$$

$$= 1\,416,45 \text{ m}^2 \checkmark$$

(1)

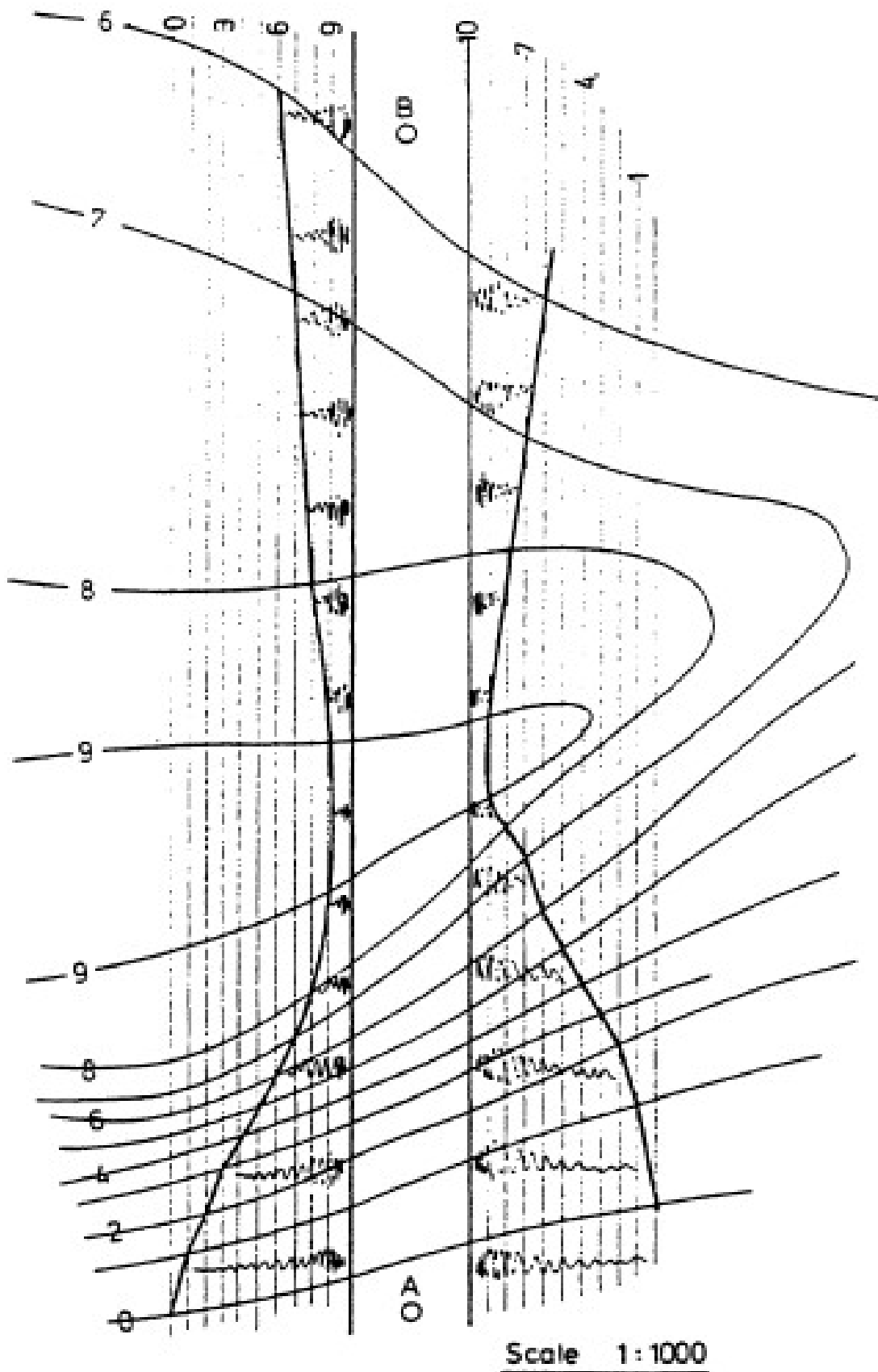
1.2.3 Area of irregular shape = $h/3 [1^{\text{st}} + \text{Last} + 4 (\text{Even offsets}) + 2 (\text{Ord offsets})]$
 $= 10/3 [0 + 13,2 + 4(4,2 + 8,1 + 11,3) + 2(6,4 + 10,3)]$
 $= 470 \text{ m}^2 \checkmark$
 (1)

1.2.4 Area of irregular shape = $h/2 [1^{\text{st}} + \text{Last} + 2 (\text{Sum of other offsets})]$
 $= 10,3/2 [0 + 9 + 2(6 + 7 + 0 - 7 - 7 + 0 + 11 + 5)] \checkmark$
 $= 200,85 \text{ m}^2 \checkmark$
 NB (the two negative ordinates are meant to subtract the portion of irregular shape along AD, which is included in the calculation of triangle ACD).
 (2)

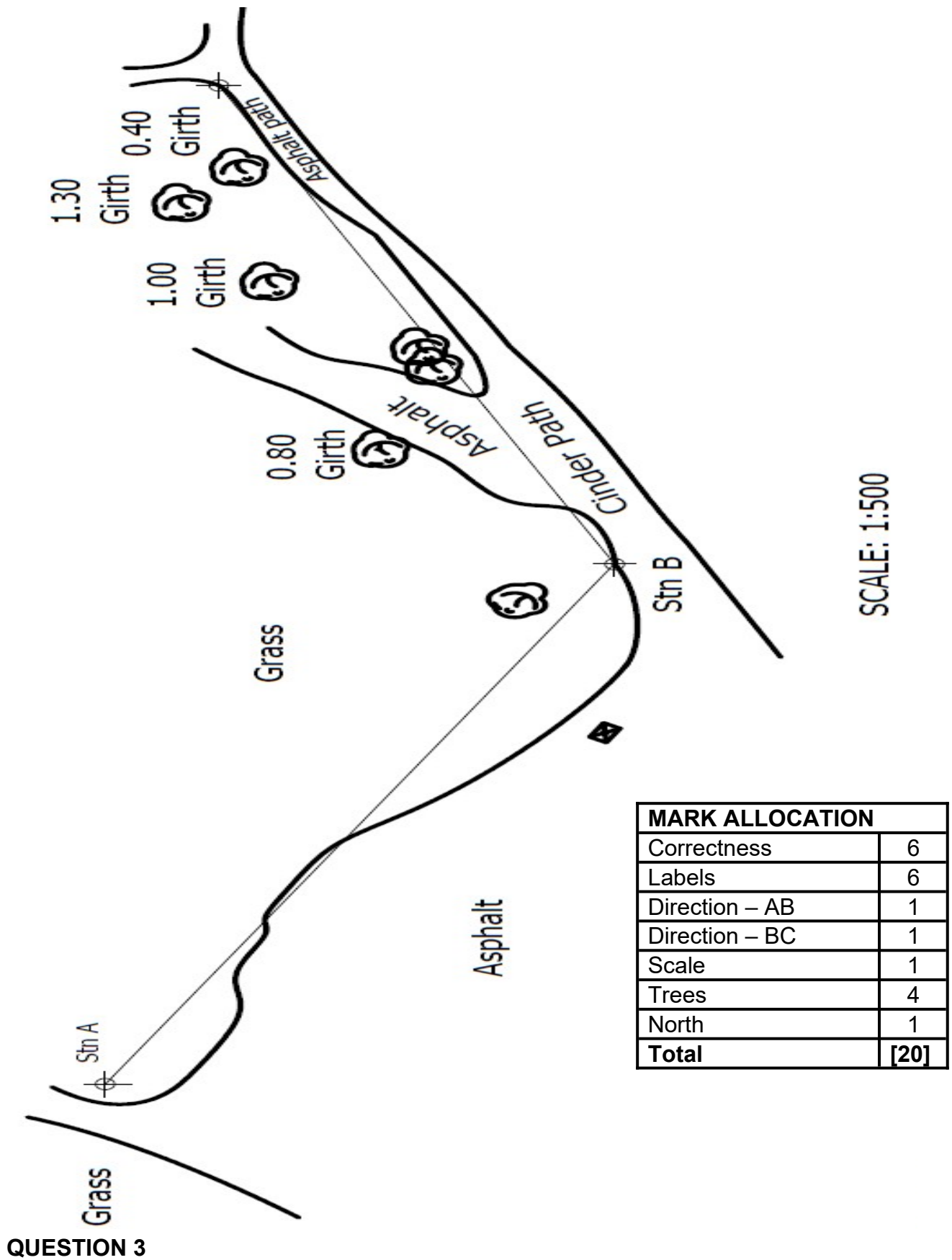
1.2.5 Area of shape X = Area of triangle = $\frac{1}{2} \text{ Base} \times \text{Height}$
 $= \frac{1}{2} \times 15 \times 5 \checkmark$
 $= 37,3 \text{ m}^2 \checkmark$
 (2)

1.2.6 Total area in Ha = $(2\,322,95 + 1\,416,45 + 470 + 200,85 + 37,3)/10\,000 \checkmark$
 $= 0,445 \text{ Ha} \checkmark$
 (2)
[20]

QUESTION 2



[20]



QUESTION 4

Given information:

Chainage of PI = 1 956,57 m

Intersection angle $\Delta = 48:20:00$

Radius of curvature 153,28 m

$$\Delta/2 = 24:10:00 \checkmark$$

$$\begin{aligned} \text{Tangent length, } T &= R \tan (\Delta/2) \\ &= 153,28 \tan(24:10:00) \\ &= 68,77 \text{ m } \checkmark \end{aligned}$$

$$\begin{aligned} \text{Arch length, } A &= \pi \Delta R / 180 \\ &= 129,30 \text{ m } \checkmark \end{aligned}$$

$$\begin{aligned} \text{Chainage of beginning of curve, } BC &= PI - T \\ &= 1\,956,57 - 68,77 \\ &= 1\,887,80 \text{ m } \checkmark \end{aligned}$$

$$\begin{aligned} \text{Chainage of end of curve, } EC &= BC + A \\ &= 1\,887,80 + 129,30 \\ &= 2\,017,10 \text{ m } \checkmark \end{aligned}$$

Deflection angles , Θ

For a = 12,2 m	$\Theta = 2:16:48.73 \checkmark$
For a = 20 m	$\Theta = 3:44:16.94 \checkmark$
For a = 17,10 m	$\Theta = 3:11:45.69 \checkmark$

(8)

CHAINAGE	CHORD DISTANCE	DEFLECTION ANGLE	OFFSET ANGLE
BC 1887.80			360:00:00 $\checkmark$
	12.20 $\checkmark$	2:16:48.73	
1900.00			357:43:11.27 $\checkmark$
	20.00	3:44:16.94	
1920.00			353:58:54.33 $\checkmark$
	20.00	3:44:16.94	
1940.00			350:14:37.39 $\checkmark$
	20.00 $\checkmark$	3:44:16.94 $\checkmark$	
1960.00			346:30:20.45 $\checkmark$
	20.00	3:44:16.94	
1980.00			342:46:03.51 $\checkmark$
	20.00	3:44:16.94	
2000.00			339:01:46.57 $\checkmark$
	17.10 $\checkmark$	3:11:45.69	
EC 2017.10			335:50:00.88 $\checkmark$

(12)
[20]

QUESTION 5

5.1

(10)

- 5.2
- Establish the line of the building from control information.
 - Set up theodolite on this line and locate two corners of the building and two offset pegs or profile boards.
 - Set up the theodolite at one corner, then sight onto the other corner or the original instrument location, whichever is furthest.
 - Turn the theodolite through 90° and establish a third corner of the building the correct distance away from the line of site, plus further offset pegs or profile boards.
 - Repeat the previous step at the second corner.
 - Check the length of the furthest side and the diagonals.
 - Set up the theodolite on the third corner, sight the fourth corner and establish the remaining offset pegs or profile boards.

(10)
[20]

TOTAL: 100