



mineral resources

Department:  
Mineral Resources  
REPUBLIC OF SOUTH AFRICA

## MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

### SURVEY 1

DATE: 30 SEPTEMBER 2015

TOTAL MARKS: 100  
TO PASS: 50

TIME ALLOWED: 3 HOURS  
(08h30 to 11h30)

#### NOTE:

- This question paper consists of **FOUR** pages including cover page.
- All questions must be answered.
- All answers and sketches to be presented in a neat and decipherable manner. Papers will not be marked if not decipherable.
- Restrict the use of highlighters.
- Do not use a red pen.
- Read the instructions on the front page of your answer book carefully.
- No cellular phones shall be allowed in the examination venue.
- The use of computers, laptops and palmtops is prohibited.
- **All steps** and **CHECKS** must be done.
- The make and model number of your calculator must be written on the front cover of your answer book

Question 1

When adjusting a theodolite, there are two categories of adjustments made, namely temporary adjustment and permanent adjustments. Under the two categories, name the different adjustments made and briefly describe how they are done.

[19]

Question 2

Briefly describe photogrammetry with reference to the following headings:

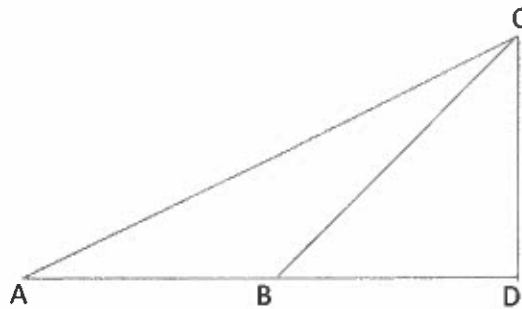
- (a) application (3)
- (b) ground control (3)
- (c) pre-marking (3)
- (d) post-marking (3)

Use sketches where applicable. (4)

Hint: Photogrammetry in this question does not refer to underground stope width control.

[16]

Question 3



Given:  $AB = 100\text{m}$

Angle  $CAB = 45^\circ$

Angle  $CBD = 30^\circ$

Calculate DC

[5]

#### Question 4

A line peg has been installed on required direction in an ore pass (box hole) about 2,0m to 3,0m up from a survey peg in a cross-cut. The total station or theodolite used got damaged and became useless. As an experienced surveyor show how you would determine the horizontal distance and the elevation difference between these two survey pegs, using a short steel tape and plumb bobs.

Clearly state the underground and office procedure. As a check in the Survey office, graphically show how to determine the chain length at the peg and the line peg at a grade of  $+55^\circ$ .

[15]

#### Question 5

The following magnetic bearings in a closed traverse of a quadrilateral ABCD have been adopted:

$\alpha A - B = N 39^\circ 45' E$

$\alpha A - D = S 81^\circ 30' E$

$\alpha C - B = N 37^\circ 40' W$

$\alpha C - D = S 25^\circ 00' W$

a) Show the sketch to indicate the quadrilateral.

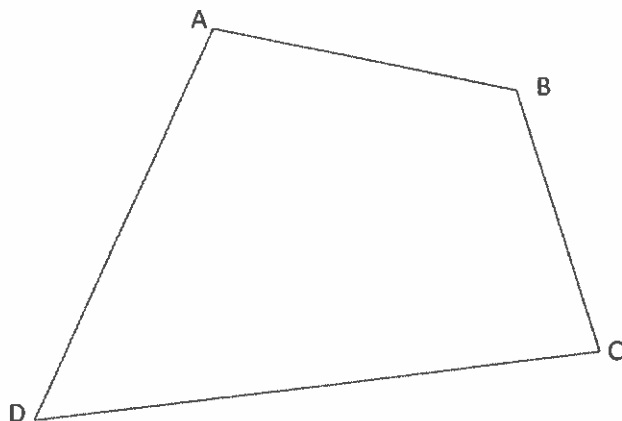
b) Calculate

1) internal angles A, B, C and D, show final checks.

2) true direction of each side assuming zero south, if magnetic declination is  $12^\circ 30'$  west of true north.

[16]

Question 6



Data given

Co ordinates		Sides (metres)	Angles	Angles of Direction
Y	X			
A:	Missing	AB: 535,497	A: Missing	AB: Missing
B: +844,011	+346,309	BC: 550,557	B: Missing	BC: 343° 10' 37"
C: + 684,670	+873,304	CD: 1121,036	C: 84° 20' 39"	CD: 78° 49' 58"
D: +1784,480	+1090,419	DA: 988,544	D: Missing	DA: Missing

Complete the missing data in the above tabulation.

[22]

Question 7

A planimeter was used to find the area of an irregular figure drawn on a plan to a scale of 1: 200. The planimeter reading was 5,376. A circle with a radius of 7,5 cm was then traced using the same planimeter and a reading of 3,126 was obtained.

Calculate the area of the irregular figure to the nearest square metre.

[7]

TOTAL [100]