

**REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF MINERAL RESOURCES
EXAMINATION FOR THE MINE SURVEYORS CERTIFICATE OF COMPETENCY**

DATE: 11 APRIL 2012
TIME: 8:30 to 11:30

TOTAL MARKS: 100
TO PASS: 50

SURVEY 1

QUESTION 1

The tonnage from two vertical shafts, each 1 000 metres deep, one a 7 metre diameter and the other a rectangular, 12 m by 3 m, is to be dumped on a square piece of ground, 200 m × 200 m, in the form of a cone with a circular base. Assuming the top of the dump to be level and the angle of repose 35°.

- (a) What will the height of the dump be if the ratio of unbroken rock to broken rock is 3 : 5?
- (b) Determine the top area of the dump.

[17]

QUESTION 2

(a) Explain very briefly the following terms:

- (i) Gyroscope
- (ii) Laser
- (iii) Magnetic poles
- (iv) Azimuth
- (v) Meridian
- (vi) Planimeter
- (vii) True north
- (viii) Latitude
- (ix) Equator
- (x) Sextant
- (xi) Vernier
- (xii) Pantograph
- (xiii) Tellurometer
- (xiv) Topography
- (xv) Contour line

(15)

(b) Mention five classifications of aberration.

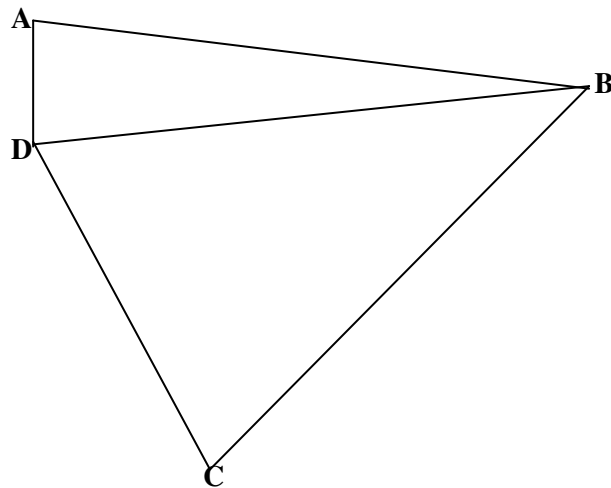
(5)

(c) Name three methods of map projection.

(3)

[23]

QUESTION 3



A and B are two beacons with co-ordinates as follows:

Y co-ordinates	X co-ordinates
A - 9 626,939	+ 39 156,072
B - 10 465,919	+ 29 340,875

It is impossible to take observations from A, but at D, 10 metres away from A, the angle is found to be $88^{\circ}20'00''$.

Given

$$\text{Angle BDC} = 58^{\circ}25'00''$$

$$\text{Angle DBC} = 66^{\circ}30'00''$$

Calculate the co-ordinates of C.

[20]

QUESTION 4

(a) Describe photogrammetry with particular reference to:

- (i) Application
- (ii) Ground control
- (iii) Pre-marking
- (iv) Post-marking

(15)

Note: photogrammetry in this question does not refer to stope width control in underground mines.
Use sketches where applicable.

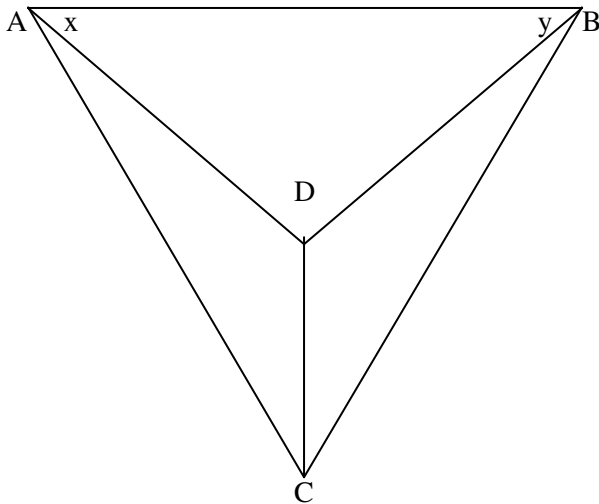
(b) Mention five sources of errors and mistakes when using a tape.

(5)

[20]

QUESTION 5

From the figure below prove: $\frac{\sin y}{\sin x} = \tan k$



[5]

QUESTION 6

(a) Name and describe the four (4) different types of levels. (10)

(b) With the help of notes and sketches describe how you would adjust a level. (5)

[15]

Total marks [100]