

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

DATE : 15 April 2010
TIME : 08h30 to 11h30

TOTAL : 100
TO PASS : 50

SURVEY 1

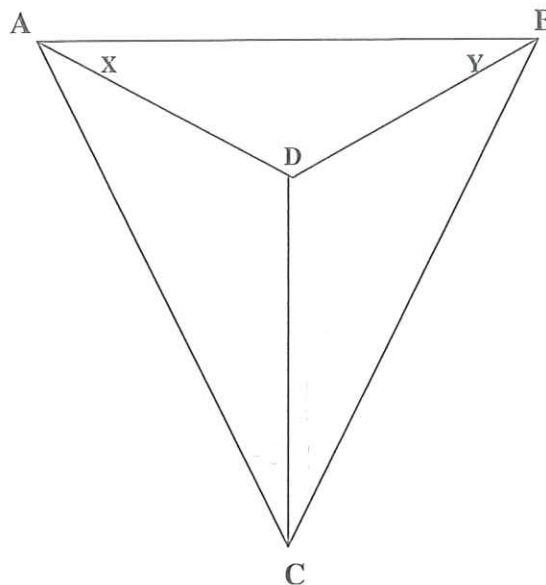
QUESTION 1

- a) Name and briefly describe the three classes of errors in surveying.
- b) Briefly describe the South African co-ordinate system. Illustrate your answer using a sketch.

[10]

QUESTION 2

- a) From the figure below prove $\frac{\sin y}{\sin x} = \tan K$



[5]

- b) State the sequence of corrections when measuring distances using incorrect tapes.

[5]

QUESTION 3

A shaft with a cross-sectional area of $8,75\text{m} \times 3,15\text{m}$ was sunk $920,61$ metres. The debris, which was augmented by 35% of its original volume after excavation, was deposited in the form of a pyramid whose base consists of a regular hexagon, the sides of which slope at 32° .

Calculate the length of a side of the hexagonal base and height of the dump. Show all checks.

[20]

QUESTION 4

- a) Name the corrections applied to Electronic Distance Measurements.
- b) Calculate the instrument constant for an EDM that measured the following distances:-

$$AD = 271,512 \text{ m}$$

$$AC = 150,405 \text{ m}$$

$$AB = 50,476 \text{ m}$$

$$BC = 100,066 \text{ m}$$

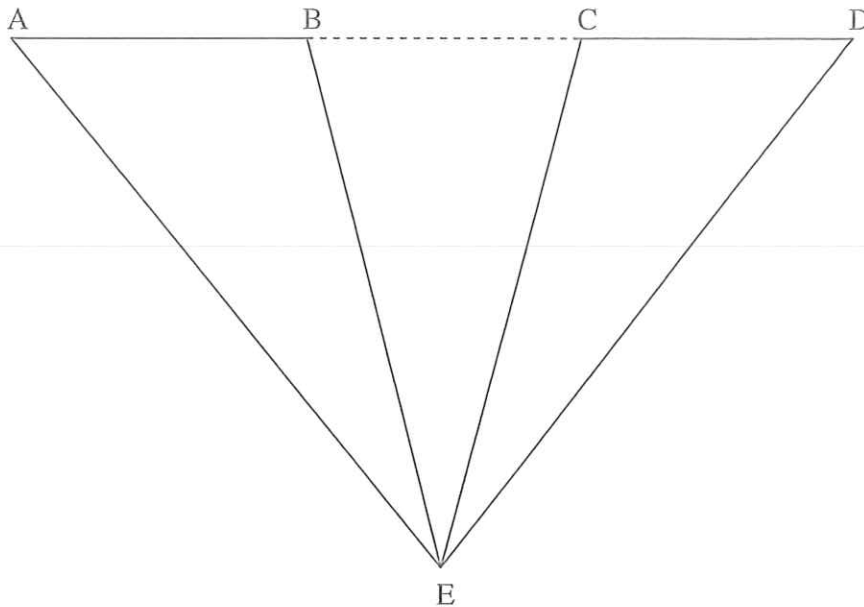
$$CD = 121,252 \text{ m}$$

[9]

QUESTION 5

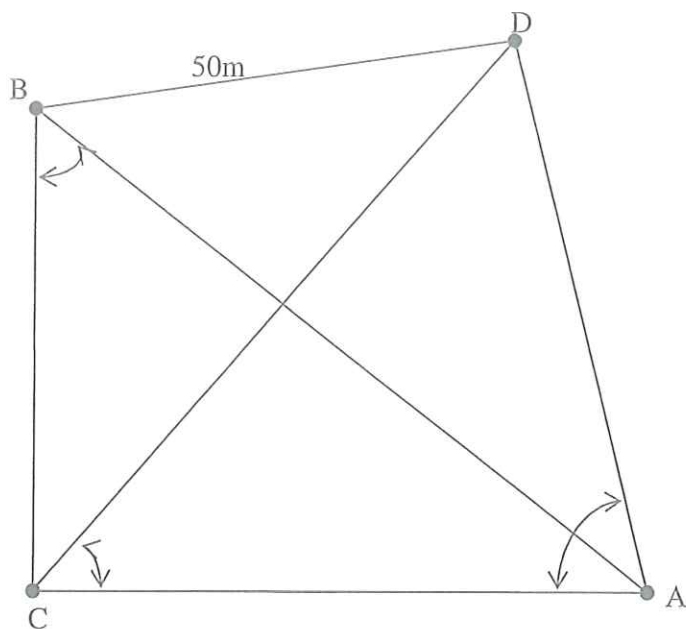
AB and CD are two portions of a base line separated by the portion BC which cannot be directly measured. An instrument is set up at E, and readings are taken to A, B, C, D. (A, B, C and D are on a straight line).

Derive a formula to calculate distance BC.



[15]

QUESTION 6



Calculate the co-ordinates of B

Given: Side $BD = 50\text{m}$
 Angle $ABC = 64^{\circ}55'00''$
 $CAD = 54^{\circ}20'00''$
 $DCA = 61^{\circ}10'00''$

Co-ordinates

	Y	X
A:	+650,233	+760,110
C:	+716,450	+1 520,840

QUESTION 7

a) Briefly describe the following terms

- i. Isogonic lines
- ii. Prime meridian
- iii. Meridian Convergence
- iv. Azimuth
- v. Agonic lines

[6]

b) Briefly describe the following terms

- i. Stereometer
- ii. Optical plummet
- iii. Gyro-theodolite
- iv. Optical square

[8]

[100]