

**REPUBLIC OF SOUTH AFRICA  
DEPARTMENT OF MINERALS AND ENERGY  
EXAMINATION FOR THE MINE SURVEYORS CERTIFICATE OF COMPETENCY**

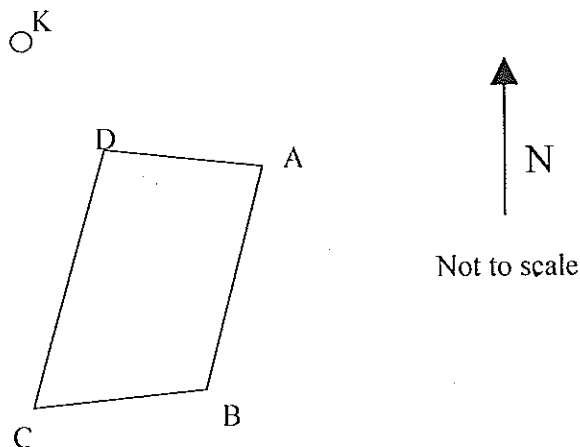
DATE: 15 October 2004 (Friday)  
TIME: 08:30 to 11:30 (3 Hours)

TOTAL MARKS: 100  
TO PASS: 50

**SURVEY II**

- Note:**
- (1) Work to 1 second of arc and 0.001m.
  - (2) All steps and checks must be shown.
  - (3) Logs and functions must be shown to six (6) decimal places.
  - (4) Sketches are not drawn to scale.
  - (5) The make and model number of your calculator **must** be written on the front cover of your answer book.

**QUESTION 1**



In connection with the sale of an industrial site, it has been agreed that the area to be sold will be 202 343 square metres in extent, and shall be defined by the existing beacons A, B and C and a point D, which will be fixed so as to be the shortest distance from the centre point K, of an electrical supply kiosk.

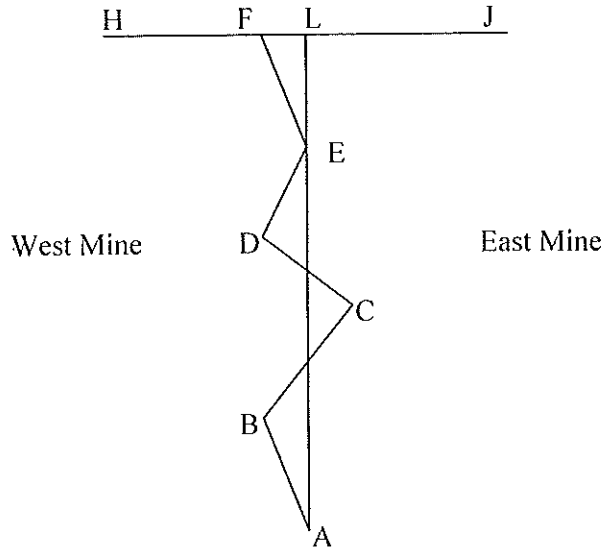
The above sketch shows the approximate position of D in relation to the fixed points, as determined graphically.

Given,	Y	X
Co ordinates		
A	+ 516,113	+ 1 015,432
B	+ 640,227	+ 1 444,251
C	+ 973,096	+ 1 396,215
K	+ 121,119	+ 696,487

- Calculate
- i) The co ordinates of D
  - ii) State briefly what final checks you would apply to ensure the correctness of the co ordinates as determined.

[24 marks]

**QUESTION 2**



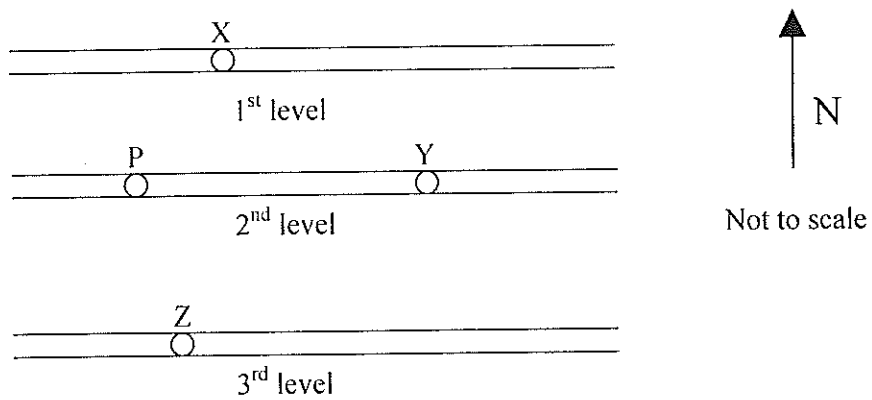
ABCDEF represents a portion of a boundary line, which needs to be straightened, by the line AL with no loss of area. Point L will fall on the common boundary line HFJ, the direction of which is due East and West.

Given,		Y	X
Co ordinates	A	Ya	Xa
	B	Yb	Xb
	C	Yc	Xc
	D	Yd	Xd
	E	Ye	Xe
	F	Yf	Xf

Find the co ordinates of point L in terms of the co ordinates of the angular points given above.

[15 marks]

**QUESTION 3**



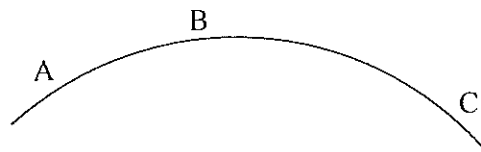
A portion of the mine plan is shown in the above sketch. X, Y and Z are three pegs in the immediate hanging of the reef and P is a fourth peg also in the immediate hanging of the reef. Peg P has exactly the same elevation as Y and the horizontal distance from Y to P is 151,592 metres.

Given,		Y	X	Elevation (AMSL)
Co ordinates	X	- 644,796	+ 657,174	1 109,121
	Y	- 746,789	+ 743,355	1 037,518
	Z	- 613,929	+ 822,423	976,729

- Calculate,
- The co ordinates of P
  - The tonnage of reef to be mined per hectare if the expected stope width is 1,5 metres, and assuming that the dip is constant through out the area shown, and the density of the ore is 2,72 t/m<sup>3</sup>.

[21 marks]

#### QUESTION 4



A, B and C lie on the circumference of a circular rail line.

Given,

Co ordinates	A	- 4 852,928	+ 27 292,989
	B	- 4 933,145	+ 27 183,192
	C	- 5 139,903	+ 27 150,882

- Calculate,
- The radius of the circular rail line
  - The length of the rail from A to C through B
  - The co ordinates of the centre point of the circular rail line.

[20 marks]

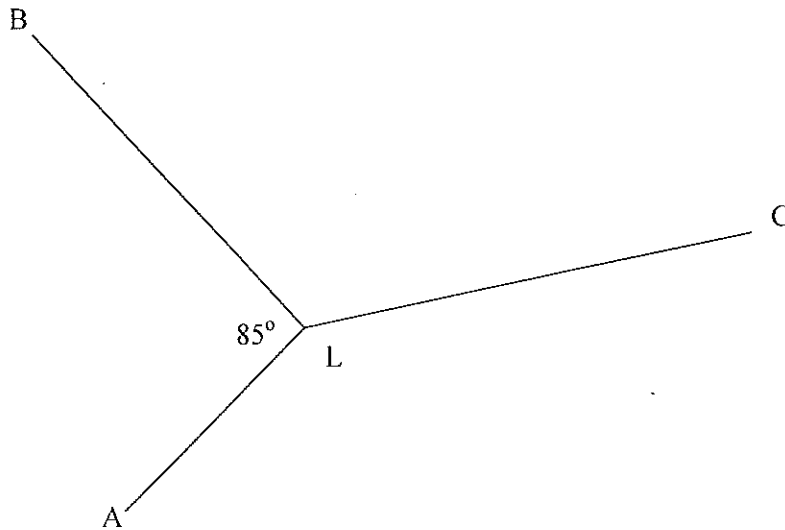
### QUESTION 5

In the sketch below L is an unknown point and only the angle ALB was surveyed.

Given,		Y	X
Co ordinates	A	+ 450,000	+ 150,000
	B	+ 400,000	- 120,000
	C	+ 158,560	- 93,970

Angle ALB = 85:00:00                      Direction CL = 46:19:20

Calculate,    i)    The Co ordinates of L.



[20 marks]

[Total 100 marks]