REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF MINERAL RESOURCES

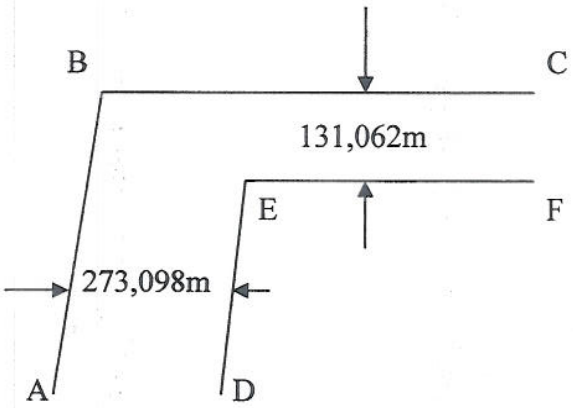
EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF COMPETENCY

DATE: 11 October 2012 (Thursday) TOTAL MARKS: **100**
TIME: 8:30 to 11:30 (3 Hours) 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



AB and BC form the Western and Northern boundary lines of a mine, B being the North – West corner.

The railway administration is expropriating an area inside the mine boundary bordered by lines DE and EF. DE is parallel to and 273,098 metres (measured perpendicular) east of AB and EF is parallel to and 131,062 metres (measured perpendicular) south of BC.

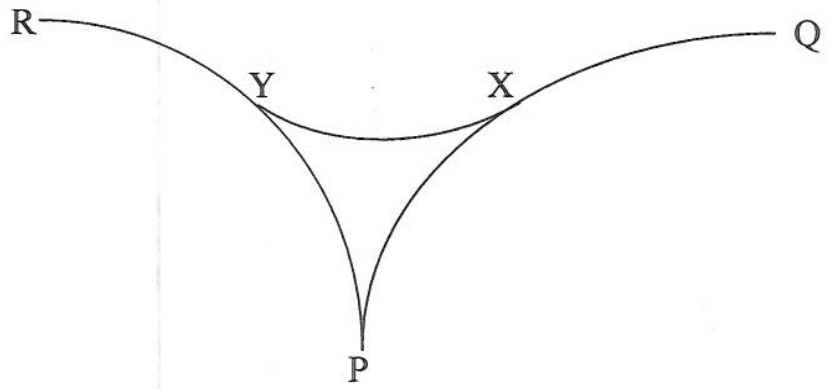
	Y	X
The co-ordinates of B are:	- 217,900	- 5 720,576

The directions BA and BC are 4°01′30″ and 267° 25′ 00″ respectively

Calculate the co-ordinates of E.

[18 marks]

QUESTION 2



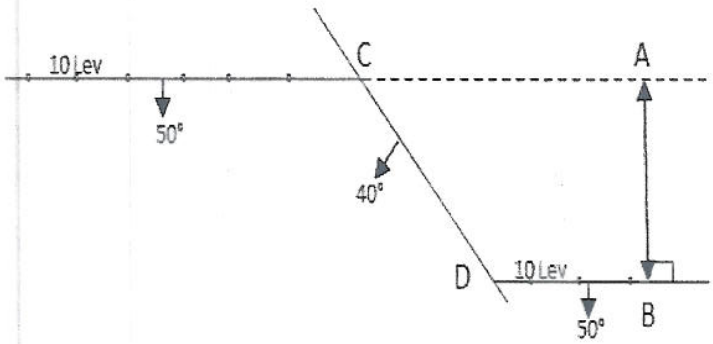
Two circular curves PQ and PR, which have a common tangent point at P, are to be connected by a circular curve XY, which touches PQ and PR at X and Y respectively
Given:

Length of chord PX = 111,976m
Radius of curve PQ = 146,304m
Radius of curve PR = 106,680m

Calculate:
The radius of the curve XY
The chord length XY

[15marks]

QUESTION 3



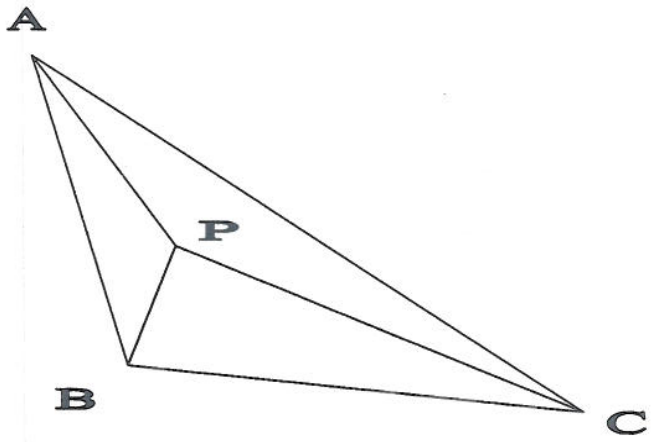
The plan shows two reef strike lines on the tenth level of a mine. A fault has dislocated the reef as shown on the plan.

The reef is known to strike in a direction of 250°30'00" and dips at 50° in a southerly direction.
The fault is known to strike in a direction of 165°45'00" and dips at 40° in a westerly direction.
The direction of movement on the fault plane is 278°00'00"
The true amount of movement on the fault is 35,0m.

Calculate:
The direction of the reef / fault line of intersection.
The dip along the reef / fault line of intersection.
The horizontal displacement [A] to [B] as shown on the plan.

[20 marks]

QUESTION 4



It is required to sub-divide the Owners Reservation ABC from common point P so that the areas ABP, APC and BPC are in the ratio 1:2:3.

Given the co-ordinates:

	Y	X
A	+ 1 217,420	- 1 123,600
B	+ 963,322	- 1 037,840
C	+ 762,177	- 1 317,151

Calculate the co-ordinates of P.

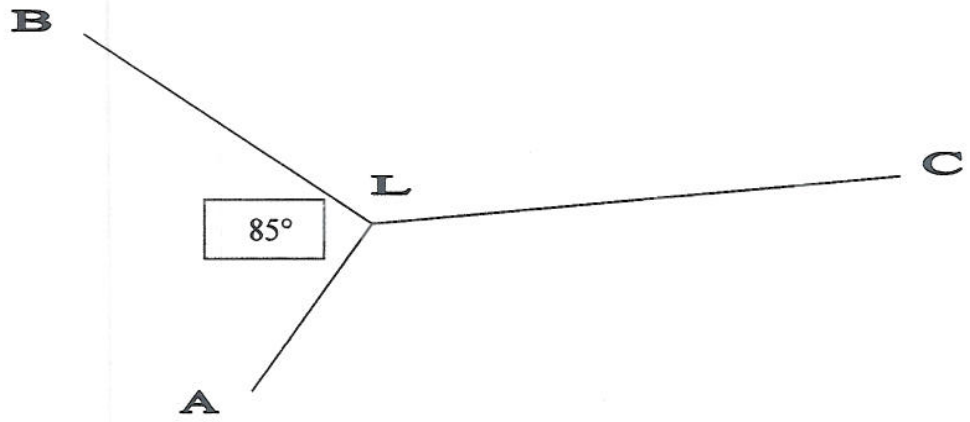
[17 marks]

QUESTION 5

Given : Co-ords	Y	X
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 co-ordinates for L



[20 marks]

QUESTION 6

An abandoned mine, in which a considerable amount of development has been done, is completely flooded. No records are available but a development dump situated on level ground and consisting of all the rock from the mine has been left undisturbed. A contour plan of this dump has been plotted to a scale of 1: 1000 and the height of the dump was found to be 10m.

The following areas were planimetered :

Area of the level top of the dump	= 31.0cm²
Area covered by the dump	= 234.8cm²
Area enclosed by the 5m contour	= 107.7cm²

Estimate how long it would take to de-water the mine by means of pumping units having a total capacity of 136 380 litres per hour, assuming 15 hours net pumping per day.

Assume the relative density of rock in situ	= 2.78t/m³
Ratio of solid rock to broken	= 12 : 20
Therefore the relative density of broken rock	= 1.67t/m³

[10 marks]

[Total marks 100]