

REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF MINERAL RESOURCES

EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF  
COMPETENCY

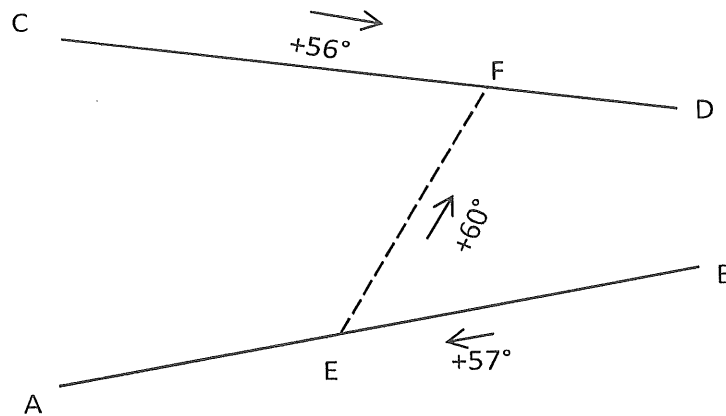
DATE: 30<sup>th</sup> April 2010 (Friday)  
TIME: (3 Hours)

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



AB represents a part of an ore-pass and CD represents a part of an old waste-pass. Due to the reopening of old workings, it was decided to utilize the old waste-pass CD by connecting it to the ore-pass AB, with development carried out at a dip of  $+60^\circ$  from a point E (in the ore-pass AB) to a point F (in the old waste pass CD). The ore to be tipped at D will then flow through sections DF, FE and EB. (The old waste-pass will be sealed off below F, along FC)

Given :

Dip of ore-pass from B to A is  $+57^\circ$   
 Dip of waste-pass from C to D is  $+56^\circ$   
 Direction AB is  $262^\circ 37' 50''$   
 Direction CD is  $281^\circ 39' 40''$

	Y	X	Elevation
Co-ordinates of [B]	-109,867	+1 111,603	-1 077,379
Co-ordinates of [C]	- 92,968	+1 086,709	-1 066,798
Co-ordinates of [E]	-106,626	+1 112,022	-1 072,347

Calculate :

- The co-ordinates and elevation of F.
- The length of ore-pass portion EF.

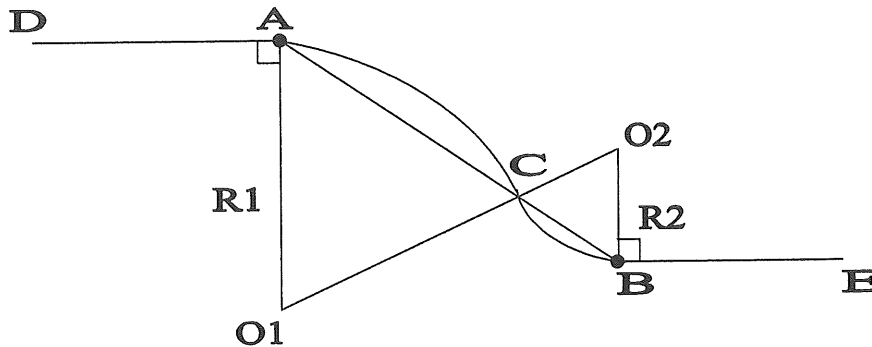
[25marks]

### QUESTION 2

Given:

	Y	X
Co-ordinates of [A]	+ 1 038,560	+ 12 809,470
Co-ordinates of [B]	+ 982,740	+ 12 789,620

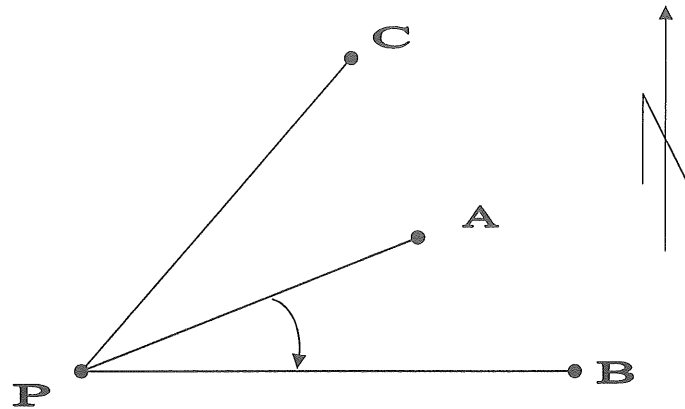
The direction of tangent  $DA = BE = 242^\circ 50' 40''$   
 The Radius  $R1 = 47,0m$



Calculate the radius  $R2$  and co-ordinates of the common tangent point [C]

[15 marks]

**QUESTION 3**



From the following information calculate the co-ordinates of the unknown point [P] given:

Horizontal clockwise angle APB =  $25^{\circ}09'50''$

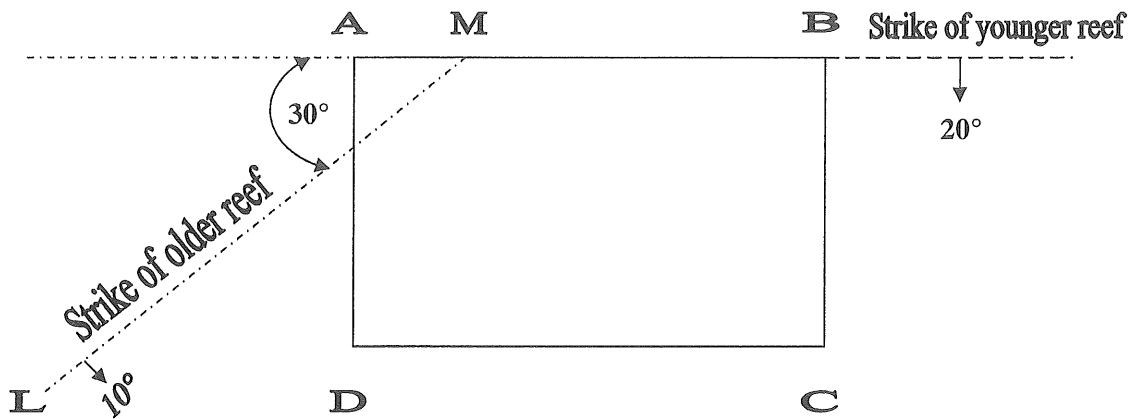
The direction from [C] to [P] =  $24^{\circ}32'04''$

	Y	X
Co-ordinates of [A]	-7 459,925	+8 039,770
Co-ordinates of [B]	-7 919,807	+9 400,679
Co-ordinates of [C]	-6 862,734	+4 516,853

Calculate the co-ordinates of point [P]

[25 marks]

QUESTION 4



A rectangular block of ground ABCD contains two unconformable reefs. AB is the strike of the younger reef at a certain elevation and LM is the strike of the older reef at the same elevation, lying unconformably and cutting out on the younger.

Given:

$$AB = DC = 4\,000 \text{ meters}$$

$$AD = BC = 2\,000 \text{ meters}$$

$$AM = 800 \text{ meters}$$

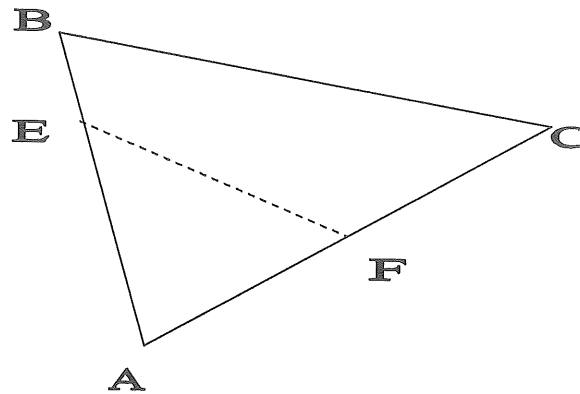
$$\text{Angle } AML = 30^\circ$$

Calculate:

1. The area ABCD in hectares
2. The area in hectares within the block ABCD underlain by both reefs

[15 marks]

QUESTION 5



It is required to divide the triangular area ABC into two equal areas by a straight line drawn from the given point E on the side AB to a point F on the side AC.

Given:

	Y	X
Co-ordinates of [A]	+ 3 210,400	+ 680,300
Co-ordinates of [B]	+ 3 466,540	+ 727,770
Co-ordinates of [C]	+ 3 455,270	- 641,260
Co-ordinates of [E]	+ 3 408,580	+ 717,030

Without determining the area of triangle ABC, calculate the co-ordinates of point F.

[20 marks]

[Total 100 marks]