

**REPUBLIC OF SOUTH AFRICA**  
**DEPARTMENT OF MINERALS AND ENERGY**

**EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF  
 COMPETENCY**

DATE: 12 October 2007 (Friday)  
 TIME: 8:30 to 11:30 (3 Hours)

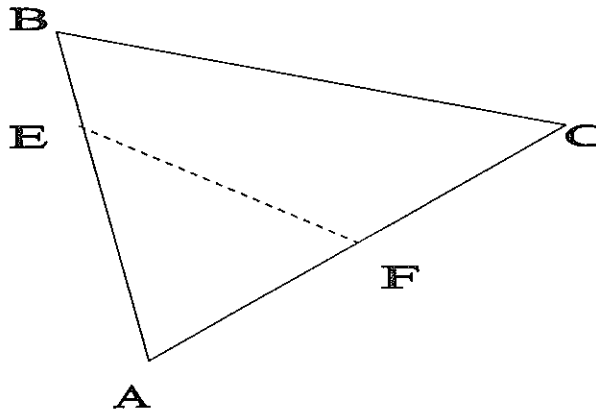
TOTAL MARKS: 100  
 TO PASS: 50

**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**

Sketch N.T.S



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

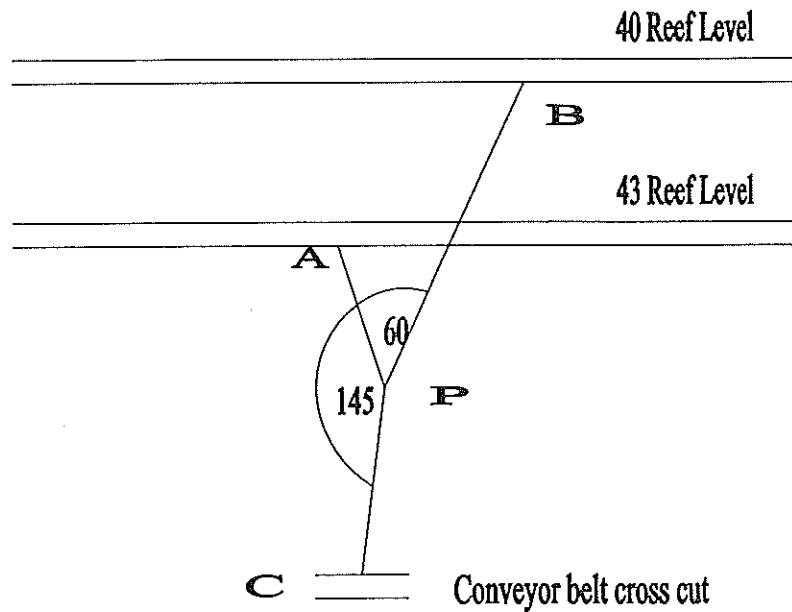
Given:

		<u>Co – ordinates</u>	
Y		X	
A	+ 10,400	+ 180,300	
B	+ 266,540	+ 227,770	
C	+ 255,270	- 141,260	
E	+ 208,580	+ 217,030	

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

[20 marks]

QUESTION 2



Proposed ore passes AP from 43 Reef level and BP from 40 Reef level could pass ore as required to the grade control ore pass PC which feeds on to the vertical shaft loading chute conveyor belt. The fixed points A, B, C and the proposed point P are in the same vertical plane and the angles at P as shown in the sketch above have been determined graphically.

It is required to define point P so that a cross cut could be driven from the shaft to this control point.

Given:

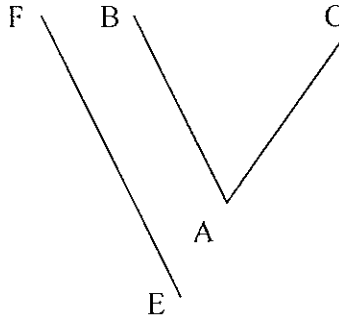
Co-ordinates (metres)		Elevation
Y	X	metres A.M.S.L
A + 3 183,389	+ 1 410,864	962,985
B + 3 122,438	+ 1 410,864	993,465
C + 3 168,158	+ 1 410,864	871,545

Angles APB = 60°  
APC = 145°

Calculate the co-ordinates and elevation of point P and the dip of the three ore passes.

[25 marks]

QUESTION 3



Stations A, B, C have been surveyed in a stope. The line AB is parallel to the boundary EF and B and C are on the same elevation

Given :	Y	X
Co-ordinates of E:	+294,252	-26,055
Co-ordinates of A:	+279,840	-38,856

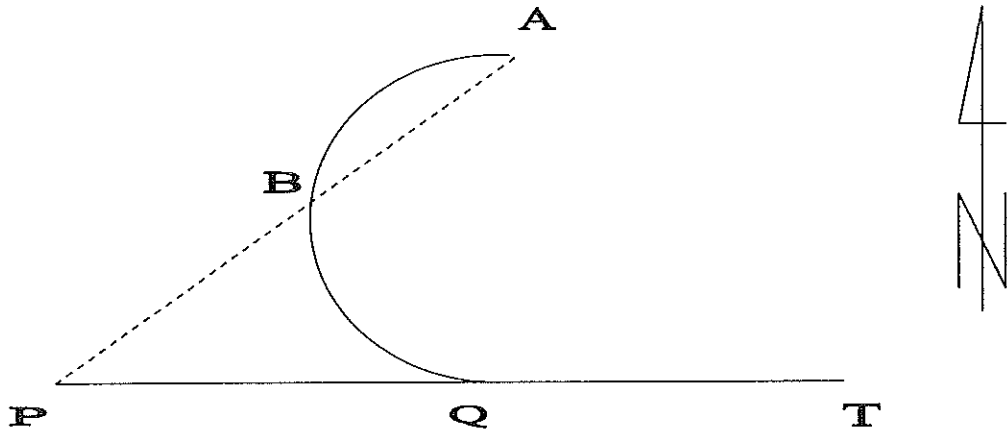
Direction AB or EF	=	154°00'00"
Horizontal angle BAC	=	70°00'00"
Dip of the line AB	=	43°15'00"
Dip of the line AC	=	38°13'00"

Calculate:

1. The strike and dip of the reef in the stope.
2. The distance at right angles to the line AB to which stoping can proceed so as to leave a 9 metre boundary pillar on the plane of the reef.

[17 marks]

QUESTION 4



It is desired to connect the two points A and B by means of a curve, as shown in the sketch, to the straight line PT. Point P is also the prolongation of the straight drawn through AB.

Given:

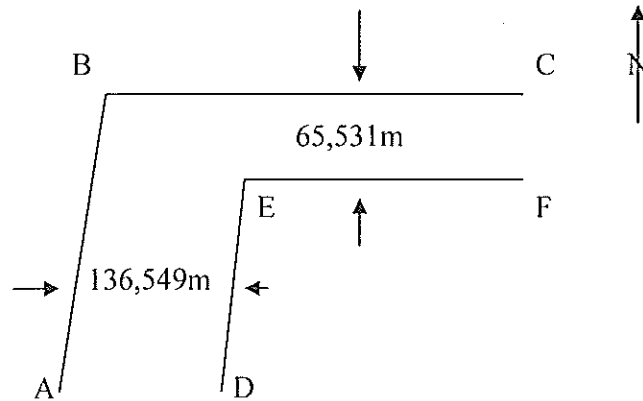
	Co-ordinates (metres)		
	Y	X	
A +	27,728	- 585,749	
B +	118,695	- 531,198	
P +	295,403	- 425,231	Angle BPT = 31°02'00"

Calculate;

1. The co-ordinates of the tangent point Q on the line PT
2. The radius of the curve ABQ

[20 marks]

## QUESTION 5



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

The railway administration is expropriating an area inside the mine boundary bordered by lines DE and EF. DE is parallel to and 136,549 metres east of AB and EF is parallel to and 65,531 metres south of BC.

The co-ordinates of B are :- Y - 108,950 X - 2 860,288

The directions BA and BC are  $4^{\circ}01'30''$  and  $267^{\circ}25'00''$  respectively

Calculate the co-ordinates of E.

[18 marks]

[Total 100 marks]