REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF MINERAL RESOURCES

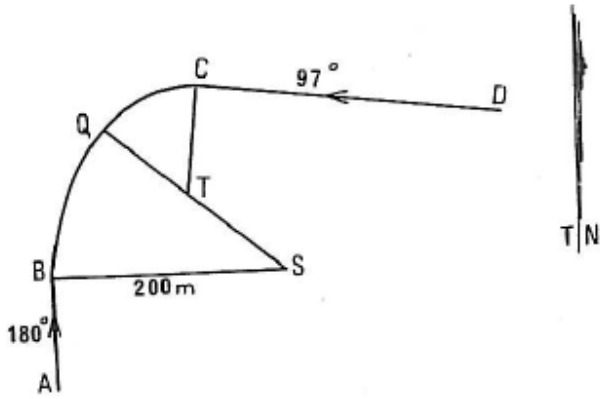
EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF COMPETENCY

DATE: 14th October 2011 (Friday) 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 CD are the centre lines of two straight stretches of a railway which are to be connected by means of a double curve BQC. BQ is the one and QC the other circular curve.

Given:

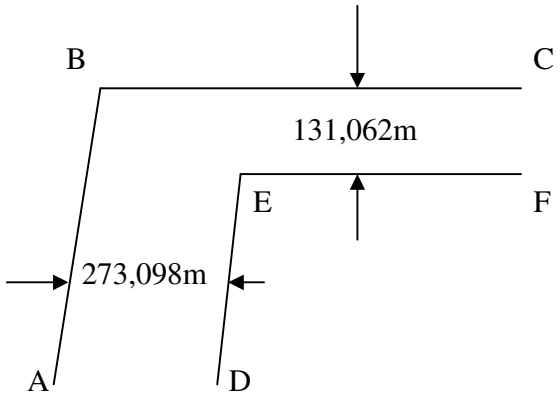
	Co-ordinates Y	X	Directions
B]	± 0,000	± 0,000	AB = 180°00'00"
C]	-140,000	-166,667	DC = 97°00'00"

Radius of curve BQ is 200 metres

Calculate:
The co-ordinates of Q
The radius of the circular curve QC (i.e. the length of TC)
The co-ordinates of T, the centre of the circular curve QC.
The total length of the curve BQC.

[25marks]

QUESTION 2



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 East of AB and EF is parallel to and 131,062 metres South of BC.

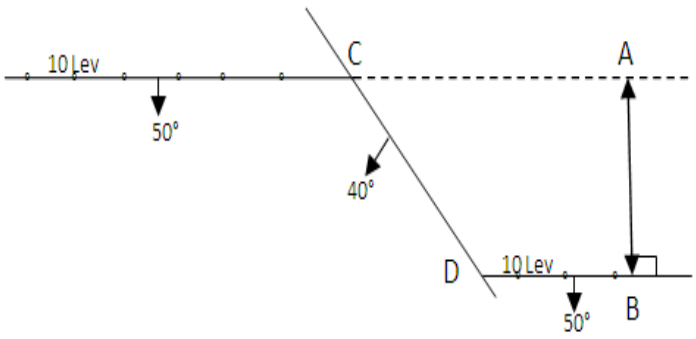
	Y	X
The co-ordinates of [B] are :	- 217,900	- 5 720,576

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

Calculate the co-ordinates of E.

[20 marks]

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.

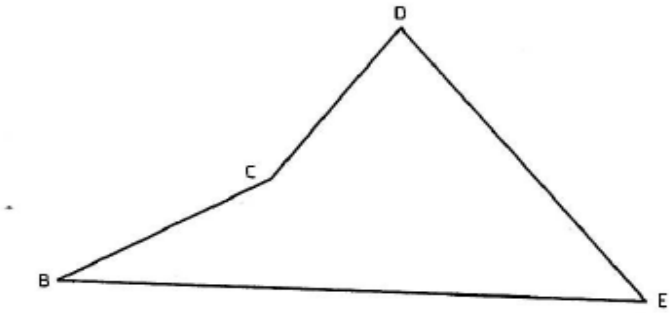
The fault is known to strike in a direction of 165°45'00" and dips at 40° in a westerly direction.

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



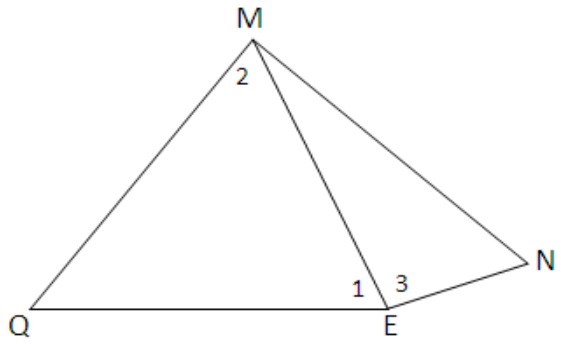
The Area of figure BCDE is 46850,00m²

From the information given in the table below you are requested to fill in the missing data.

Angles	Sides	Co-ordinates Y X
B = 16:29:10	BC missing	B) +330,000 +370,000
C = 210:35:50	CD missing	C) missing
D = 43:15:20	DE missing	D) missing
E = 89:39:40		E) +490,000 -70,000

[25 marks]

QUESTION 5



It is required to fix the co-ordinates of point Q from two existing beacons M & N. As it was impossible to set-up at point N, an eccentric station E was established near N so that the triangulation could be completed from M and E.
Given:
The direction from M to N = 318°34'47"

Mean horizontal clockwise angle QEM= 1 = 64°36'20"
Mean horizontal clockwise angle EMQ = 2 = 49°18'45"
Mean horizontal clockwise angle MEN = 3 = 91°15'20"

The horizontal distance from M to N = 7 610,000m (approx.)
The horizontal distance from N to E = 3,165m
Calculate:

1. The direction from M to E
2. The direction from M to Q
3. The direction from E to Q

[10 marks]

Total [100 marks]