

REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF MINERAL RESOURCES
EXAMINATION FOR THE MINE SURVEYORS CERTIFICATE OF COMPETENCY

DATE: 16 April 2010
TIME: 12:30 to 15:30 (3 Hours)

TOTAL MARKS: 100
TO PASS: 50

SURVEY III

- Note:**
- (1) Work to 1 second of arc and 0,001m.
 - (2) Trigonometrical functions must be shown to six (6) decimal places.
 - (3) All steps and checks must be shown.
 - (4) All calculations and answers to be shown clearly.
 - (5) Sketches have been reduced and are not to scale and attached herewith.
 - (6) The make and model number of your calculator **must** be written on the front cover of your answer book.

Point A is situated outside the entrance of a decline shaft. Point B is a survey station in the footwall of the decline shaft in the course of sinking on a reef plane which dips in a southerly direction. AB is the centre line of the tracks which are graded at -15 degrees.

A vertical dyke, striking due east and west, was encountered at B. From B three boreholes were drilled down through the dyke striking the reef plane at L, M and N.

It was found that there was no change in either the direction of strike or dip of the reef plane, and that the actual thickness of the dyke was 30,480 metres. It was decided to continue sinking the decline shaft AB without change of dip or direction to a point C where a circular tunnel of 30,480 metre radius would be driven on a level grade to end at D. From point D the sinking of the -15 degree shaft would continue and end at point E on the reef/dyke intersection on the south side of the dyke. The direction D to E is to be at right angles to the strike of the dyke. Following are the notes from the surveyor's field book:

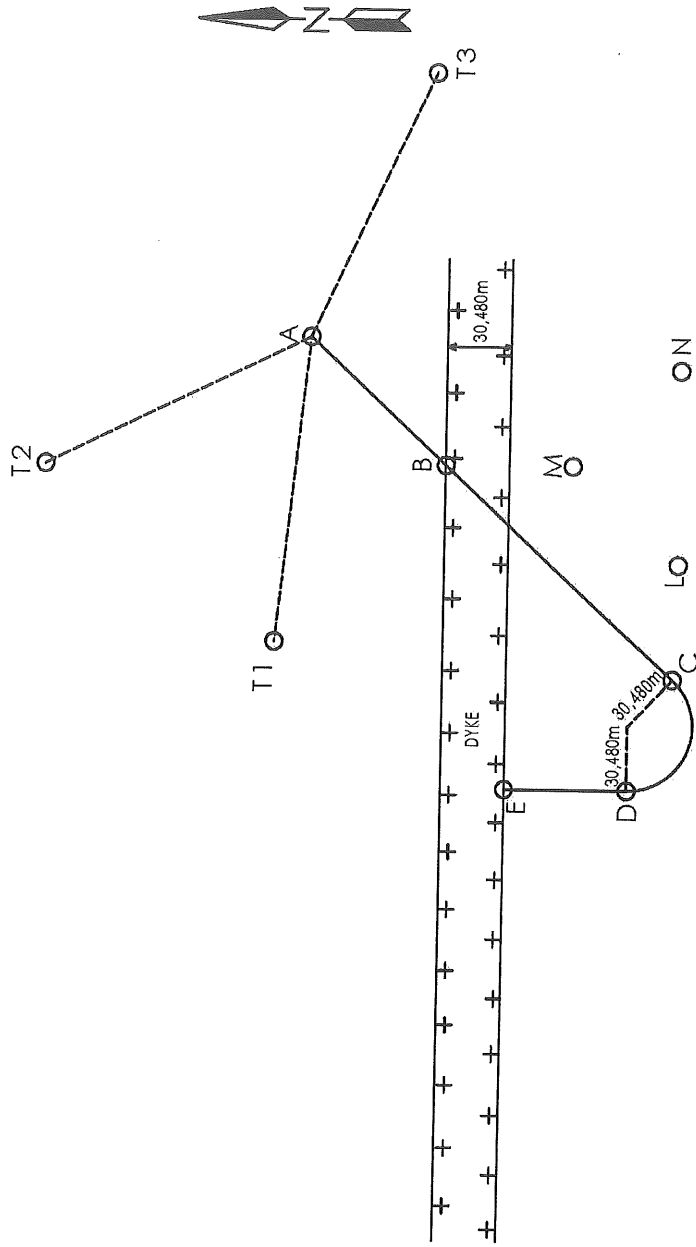
Co ordinates of L	Y= 269,559	X= 679,599
Co ordinates of N	Y= 177,701	X= 679,599
Co ordinates of M	Y= 223,363	X= 629,348
Co ordinates of T1	Y= 307,649	X= 487,708
Co ordinates of T2	Y= 224,378	X= 378,566
Co ordinates of T3	Y= 37,623	X= 561,278
Angle	T1 A T3	161:11:26
Angle	T1 A T2	57:47:46
Angle	T2 A T3	141:00:48
Angle	T1 A B	53:28:01
Angle	T3 A B	107:43:25
HD	A - B	88,775 m
Elevation at reef plane	Point B	1 516,616
Elevation at reef plane	Point L	1 431,766
Elevation at reef plane	Point N	1 431,766
Elevation at reef plane	Point M	1 450,056

From the above information calculate the following:

1. Direction of the line ML.
2. The dip of the reef in the direction ML.
3. The true dip of the reef.
4. Co-ordinates and elevations of the points C, D and E.
5. Incline length of the shaft A to E.

[100 marks]

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PLAN - NOT TO SCALE