

REPUBLIC OF SOUTH AFRICA  
DEPARTMENT OF MINERALS AND ENERGY

EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF  
COMPETENCY

DATE: 20-04-2007 (Friday)  
TIME: 8:30 to 11:30 (3 Hours)

TOTAL MARKS: 100  
TO PASS: 50

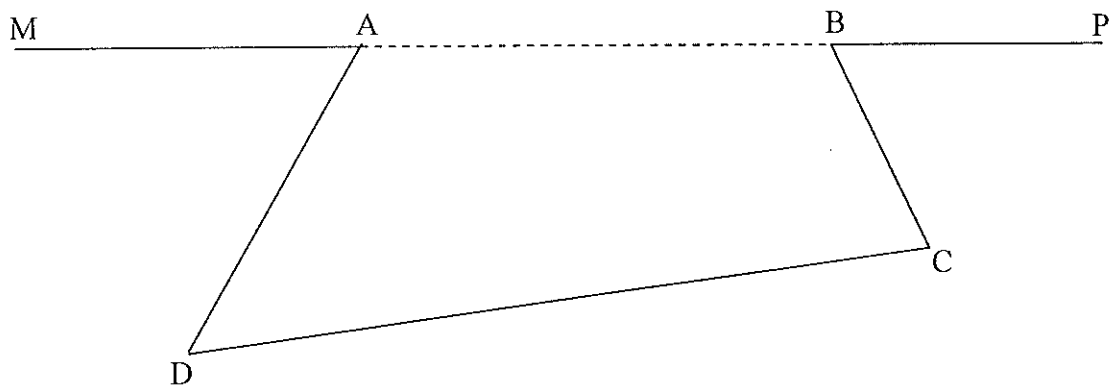
SURVEY II

- 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**

MABP is a straight line and the following observations were made.

Angle DAM	$70^{\circ}19'00''$
Angle CBP	$56^{\circ}17'00''$
Angle ADC	$43^{\circ}45'00''$
Angle DCB	$82^{\circ}51'00''$
Horizontal distance AB	728,000m
Horizontal distance DC	2 246,400m



Calculate the area of ABCD and the distance BC and AD.

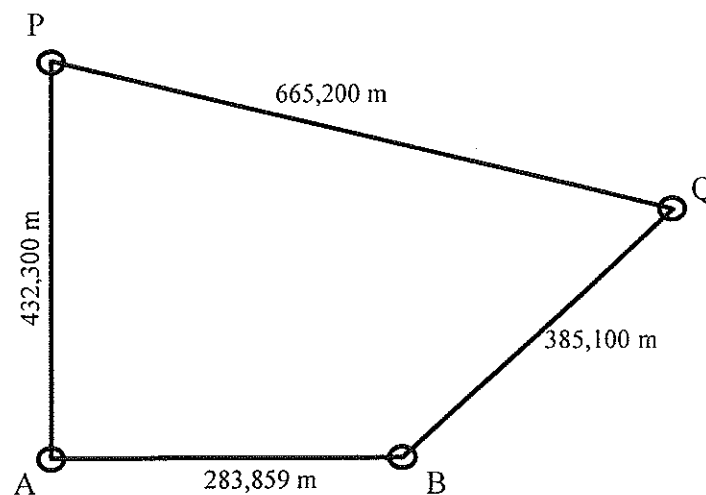
[15 marks]

### QUESTION 2

Two points P and Q on a boundary line of known direction have to be fixed from two fixed beacons A and B, and as no theodolite was available they were fixed by horizontal measurements from A and B.

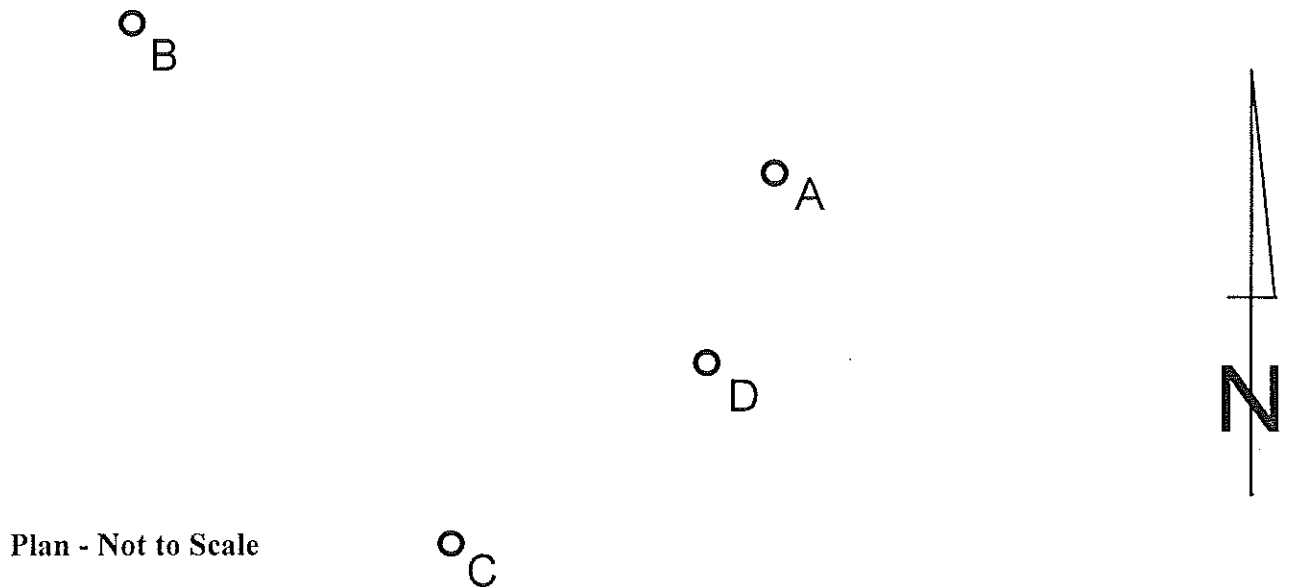
From the data below, calculate the direction A - P and the direction B - Q

	CO-ORDINATES		ANGLE OF DIRECTION	DISTANCE
	Y	X		
A	+ 79,500	+ 462,600		
B	- 203,300	+ 438,100	A - B = 265°02' 55"	A - B = 283,859 m
P				P - A = 432,300 m
Q			P - Q = 291°30'00"	P - Q = 665,200 m Q - B = 385,100 m



[20 marks]

## QUESTION 3



A reef plane, free of any geological disturbance such as faults and dykes, is intersected by three boreholes drilled vertically from points A, B and C. The following data is given

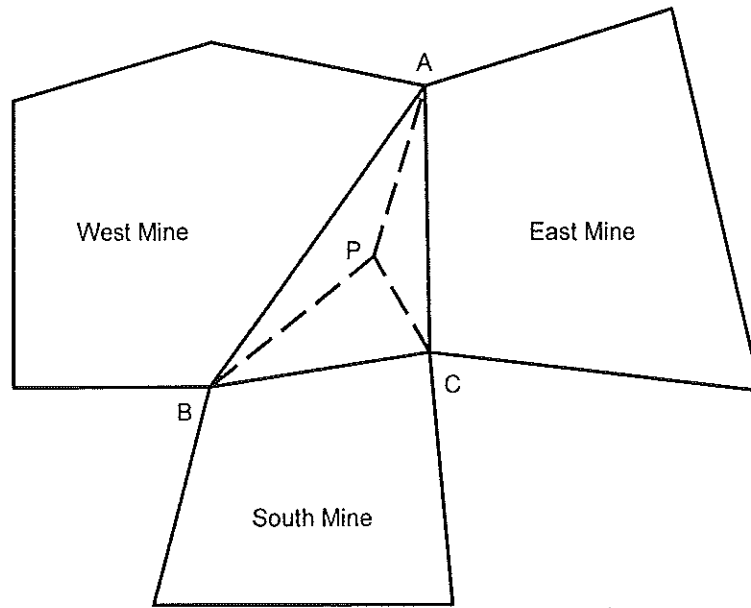
	<u>CO-ORDINATES</u>		<u>REEF ELEVATION</u>
A]	+ 770,174	+ 14 842,390	- 1 505,915
B]	+ 948,181	+ 14 811,759	- 1 616,219
C]	+ 858,585	+ 14 935,037	- 1 554,939
D]	+ 786,163	+ 14 888,962	

The elevation of peg D is - 1 616,219.

- Calculate:
- 3.1 The strike and dip of the reef plane
  - 3.2 The length, dip and direction of the shortest hole that can be drilled from D to intersect the reef.

[30 marks]

## QUESTION 4



The above sketch shows three mines which are separated by a triangular piece of ground ABC.

It has been decided to lease this area in equal parts to the three surrounding mines and it is to be trisected by an internal point P.

Given:

	Y (metres)	X (metres)
Co-ordinates of A	= -11 726,020	- 32 632,849
Co-ordinates of B	= - 8 127,737	- 28 326,806
Angle ABC	= 40° 32'00"	
Direction BC	= 260° 25'00"	
Distance AB	= 5 611,564 metres	
Distance BC	= 3 914,429 metres	

Calculate the co-ordinates of P and the area leased to each mine.

[20 marks]

**QUESTION 5**

A, B and C are three points on an existing railway curve. It is required to establish a new straight from point B which will be tangential to the curve ABC at point B. M is the centre of the circular curve.

Given: A      + 1 293,500    + 6 592,640

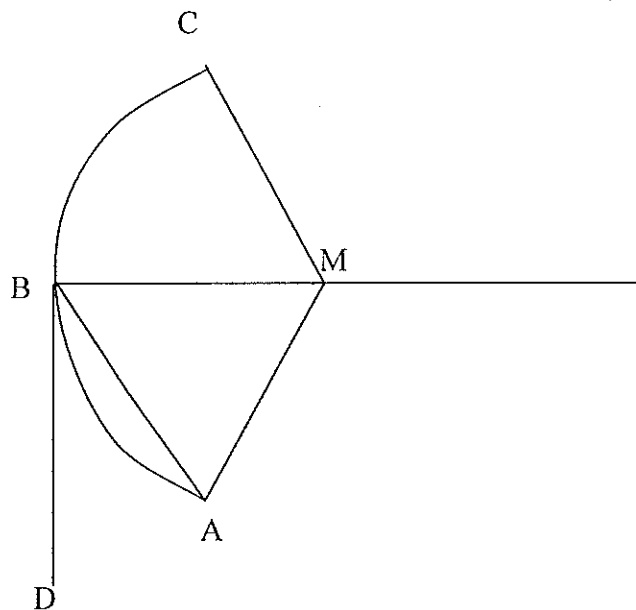
      C      + 1 331,753    + 6 473,218

Angle AMC =  $50^\circ$

Length of the chord AB = 75,608m

Calculate:

- 5.1 The radius of the curve.
- 5.2 The length of the chord BC.
- 5.3 The direction of the new straight BD.



[15 marks]

[Total marks 100]