

**REPUBLIC OF SOUTH AFRICA  
DEPARTMENT OF MINERALS AND ENERGY  
EXAMINATION FOR THE MINE SURVEYORS CERTIFICATE OF COMPETENCY**

DATE: 15<sup>th</sup> April 2005 (Friday)  
TIME: 8:30 to 11:30 (3 Hours)

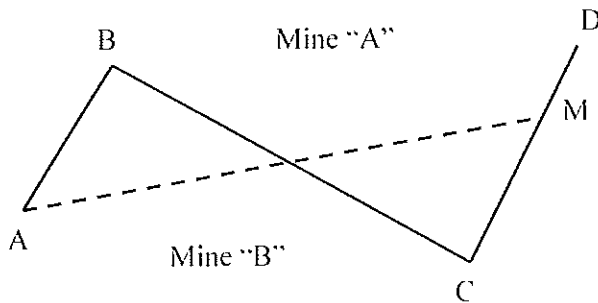
TOTAL MARKS: 100  
TO PASS: 50

**SURVEY II**

- Note:**
- (1) Work to 1 second of arc and 0.001m except where stated otherwise.
  - (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**

It has been decided to enter into a ground swap agreement between Mine "A" and Mine "B". A, B, C, and D are beacons along a portion of the boundary line between the two properties.



Given:

	Y Co-ord (m).	X Co-ord (m).
A	+ 2 146,820	+ 6 424,620
B	+ 2 308,760	+ 6 306,480
C	+ 2 077,360	+ 6 030,700

Direction C – D      120° 00' 00"

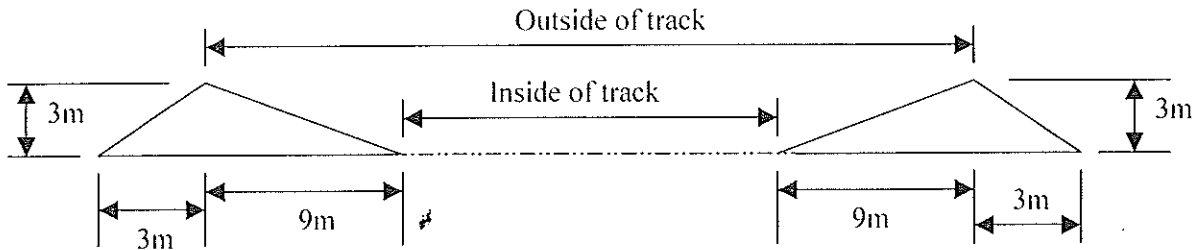
Calculate the co-ordinates of the beacon M on the line CD so that the new boundary line defined by beacons A, M, and D will not alter the area of either mining company.

[15 Marks]

### QUESTION 2

A circular track is laid out on level ground. The inside circumference is 400m and the sides slope 1 to 3 on the track and 1 to 1 towards the outside of the bank. The base of the bank is 12m wide.

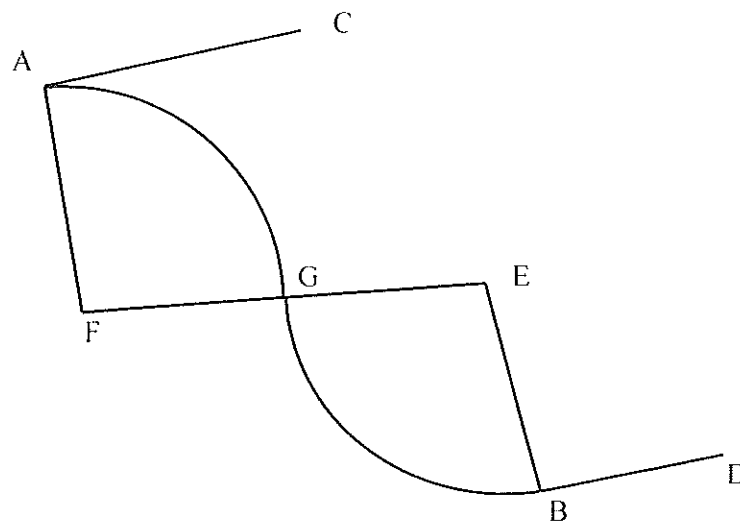
Sketch not to scale



Calculate the contents in  $m^3$  of the bank.

[12 marks]

### QUESTION 3



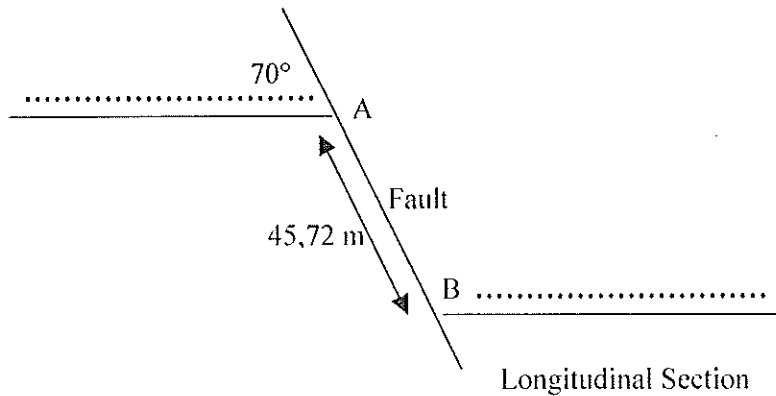
A & B are two fixed points through which it is required to pass a reverse curve AGB of equal radii EG & FG.

GIVEN:      Distance AB =      1 400,000 m  
                  Direction AB =       $190^{\circ} 00' 00''$   
                  Direction of Tangent AC =       $160^{\circ} 00' 00''$   
                  Direction of Tangent BD =       $170^{\circ} 00' 00''$

Calculate the common radius of the curves.

[18 Marks]

**QUESTION 4**



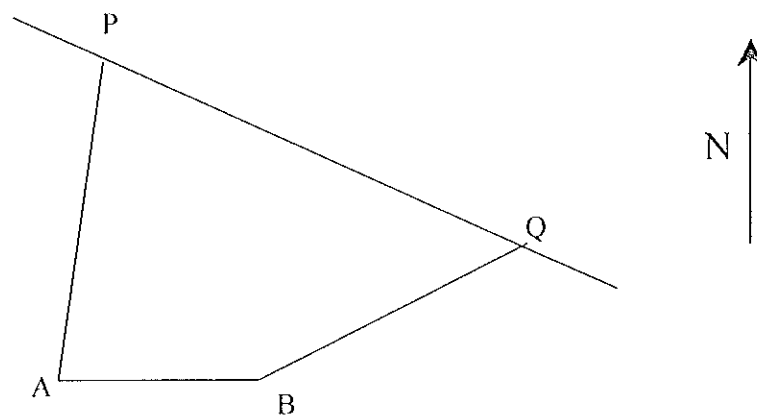
The above sketch is a longitudinal section of a reef-fault dislocation, the section being drawn parallel to the strike of the reef, which is due East and West. The strike of the fault is N 30° E by S 30° W and the dip of the reef is 35° South. The reef is thrown down to the East, a distance AB equal to 45,72 metres along the fault, which dips at 70° in the direction of the section.

Calculate:

- The distance from A of a level crosscut along the fault to the reef on the East Side of the fault.
- The true dip of the fault.
- The direction of the line of intersection of the reef and fault.

[17 Marks]

**QUESTION 5**



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

Given:

	Y (m)	X (m)
Co-ordinates of A	+ 23,850	+ 138,780
Co-ordinates of B	- 60,990	+ 131,430

Direction PQ      291:30:05

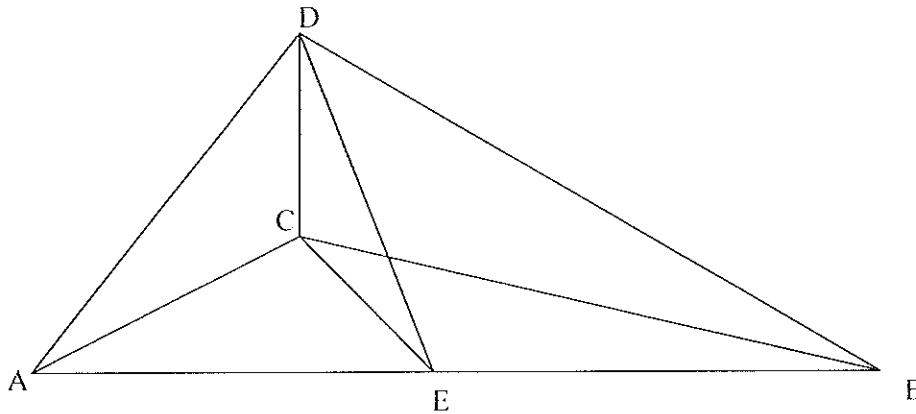
Horizontal distances	PQ	199,560 metres
	AP	129,690 metres
	BQ	115,530 metres

Calculate the co-ordinates of P and Q.

#

[24 marks]

### QUESTION 6



Given:

- Minor dip  $DAC = 50^\circ$
- Minor dip  $DBC = 15^\circ$
- Horizontal angle  $ACB = 80^\circ$

Calculate the major dip angle DEC

[14 marks]

[Total 100 marks]