

REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF MINERAL RESOURCES

EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF COMPETENCY

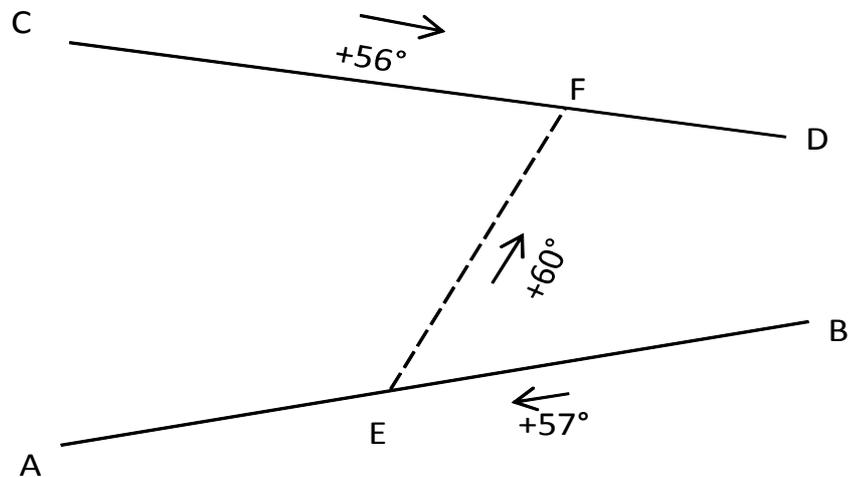
DATE: 12 April 2012 (Thursday)
TIME: 8:30 to 11:30 (3 Hours)

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



AB represents a part of an ore-pass and CD represents a part of an old waste-pass. Due to the reopening of old workings, it was decided to utilize the old waste-pass by connecting it to the ore-pass AB, with development carried out at a dip of $+60^\circ$ from a point E (in the ore-pass AB) to a point F (in the old waste-pass). The ore to be tipped at D will then pass through sections DF, FE and EB. (The old waste-pass will be sealed off below F, along FC)

Given :

Dip of ore-pass from B to A is $+57^\circ$
Dip of waste-pass from C to is D $+56^\circ$
Direction AB is $262^\circ 37' 50''$
Direction CD is $281^\circ 39' 40''$

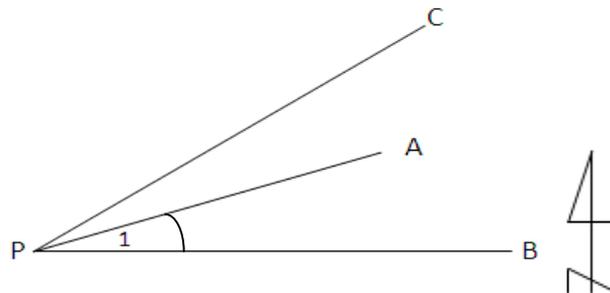
	Y	X	Elevation
Co-ordinates of point [B]	-109,867	+1 111,603	-1 077,379
Co-ordinates of point [C]	- 92,968	+1 086,709	-1 066,798
Co-ordinates of point [E]	-106,626	+1 112,022	-1 072,347

Calculate :

- (a) The co-ordinates and elevation of F.
- (b) The length of ore-pass portion EF.

[25 marks]

QUESTION 2



In order to calculate the co-ordinates of an unknown point [P], the following information is available.

Given:

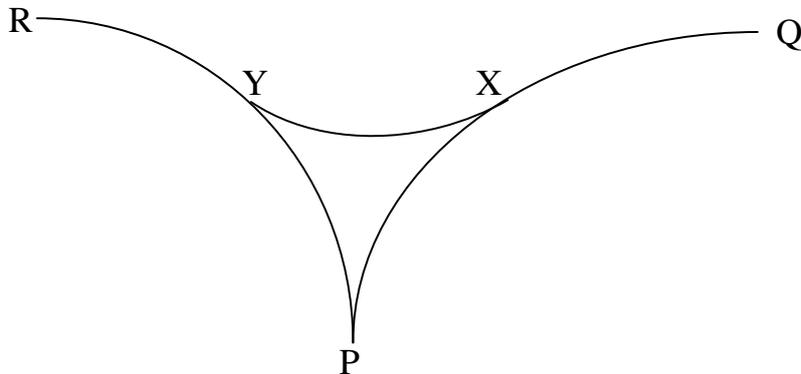
Horizontal clockwise angle APB = $25^\circ 09' 50''$
The direction from [C] to [P] = $24^\circ 32' 04''$

	Y	X
Co-ordinates of point [A]	-7 459,925	+8 039,770
Co-ordinates of point [B]	-7 919,807	+9 400,679
Co-ordinates of point [C]	-6 862,734	+4 516,853

Calculate the co-ordinates of point [P]

[25 marks]

QUESTION 3



Two circular curves PQ and PR, which have a common tangent point at P, are to be connected by a circular curve XY, which touches PQ and PR at X and Y respectively.

Given:

- Length of chord PX = 111,976m
- Radius of curve PQ = 146,304m
- Radius of curve PR = 106,680m

Calculate:

- The radius of the curve XY
- The chord length XY

[15 marks]

QUESTION 4

An abandoned mine, in which a considerable amount of development has been done, is completely flooded. No records are available but a development dump situated on level ground and consisting of all the rock from the mine has been left undisturbed. A contour plan of this dump has been plotted to a scale of 1 : 1 000 and the height of the dump was found to be 10m.

The following areas were determined by planimeter :

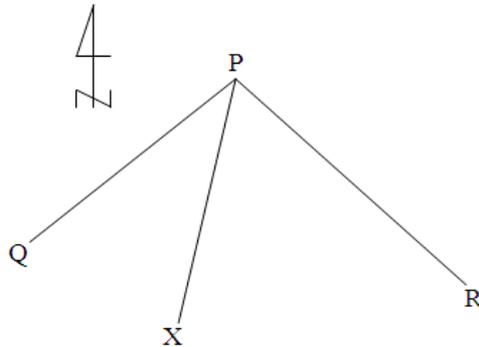
- Area of the level top of the dump = 31.0cm²
- Area covered by the dump = 234.8cm²
- Area enclosed by the 5m contour = 107.7cm²

Estimate how long it would take to de-water the mine by means of pumping units having a total capacity of 136 380 litres per hour, assuming 15 hours nett pumping per day.

- Assume the relative density of rock in situ = 2.78 t/m³
- One gallon = 4.5461 litres
- Ratio of solid rock to broken = 12 : 20
- Therefore the relative density of broken rock = 1.67 t/m³

[10 marks]

QUESTION 5



P, Q and R are three vertical boreholes which have intersected a reef plane and it is proposed to sink decline haulage at an angle of -15° from point X on surface to meet this reef plane.

Given:

	Elevations metres (A.M.S.L)	Horizontal Distances (metres)	Directions
Reef plane at P:	1 524,000	PQ: 246,540	$xPQ = 40^\circ 00' 00''$
Reef plane at Q:	1 488,780	PR: 670,560	$xPR = 300^\circ 00' 00''$
Reef plane at R:	1 463,040	PX: 835,649	
Elevation of X:	1 543,148		

Direction PX = Direction of dip of reef plane
Direction XP = Direction of inclined haulage

Calculate:

- (a) The direction of the dip of the reef plane
- (b) The true dip of the reef plane
- (c) The horizontal distance from X at which the declined haulage will meet the reef plane and the elevation of the haulage and reef intersection

[25 marks]

[Total marks 100]