



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

SURVEY 1

DATE: 04 OCTOBER 2016
TIME ALLOWED: 3 HOURS
(08h30 to 11h30)

TOTAL MARKS: 100
TO PASS: 50

NOTE:

- This question paper consists of **FIVE** pages including cover page.
- All questions must be answered.
- All answers and sketches to be presented in a neat and decipherable manner. Papers will not be marked if not decipherable.
- Restrict the use of highlighters.
- Do not use a red pen.
- Read the instructions on the front page of your answer book carefully.
- No cellular phones shall be allowed in the examination venue.
- The use of computers, laptops and palmtops is prohibited.
- **All steps** and **CHECKS** must be done.
- The make and model number of your calculator must be written on the front cover of your answer book

Question 1

A development haulage with cross-sectional dimensions of 3,5m wide and 3,0m high has an arched roof which is 4,5m above the footwall of the haulage. If the haulage is developed for a distance of 52,5m calculate the tonnage of rock broken. Density is $2,70\text{t/m}^3$.

[10]

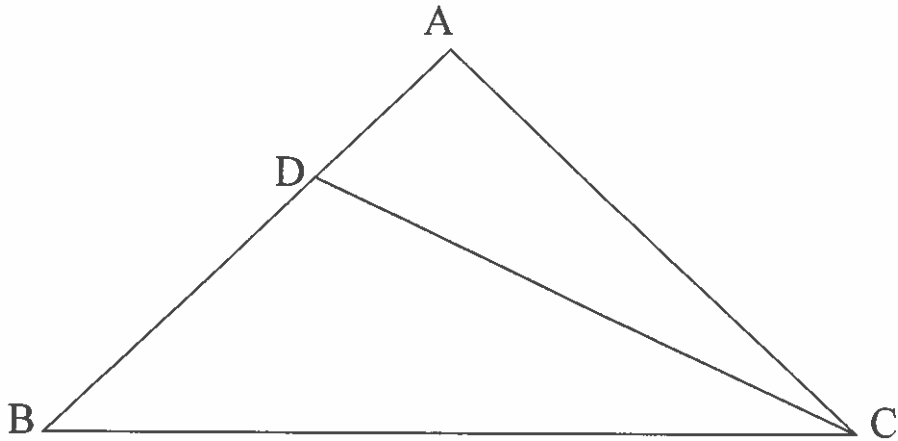
Question 2

(a) Explain very briefly the following terms:

- (i) Isogonic lines
- (ii) Equator
- (iii) Azimuth
- (iv) Great circles
- (v) Pantograph
- (vi) Graticule
- (vii) Magnetic meridian
- (viii) Contour line
- (ix) Poles
- (x) Meridian

[10]

Question 3



ABC represents a triangular piece of ground and it is required to lay out a fence from point C to D, so that the area ACD is one third of the area ABC.

Given :

	Y co-ordinates	X co-ordinates
[A]	+3 257,526	+4 623,311
[B]	+3 223,814	+4 672,778
[C]	+3 205,746	+4 625,900

Calculate the co-ordinates of point D.

[19]

Question 4

Describe contours and contouring with reference to the following headings:

- a. Definition (1)
- b. Characteristics (6)
- c. Methods (2)
- d. Uses of contour plans and maps (6)

[15]

Question 5

A rectangular shaft with a cross-sectional dimension of 8,75m x 3,15m was sunk 920.61 metres. The debris which was augmented by 35% of its original volume after excavation, was deposited in the form of a pyramid whose base consists of a regular hexagon, the sides of which slope at 32° .

Calculate the length of a side of the hexagonal base and height of the dump. Show all checks.

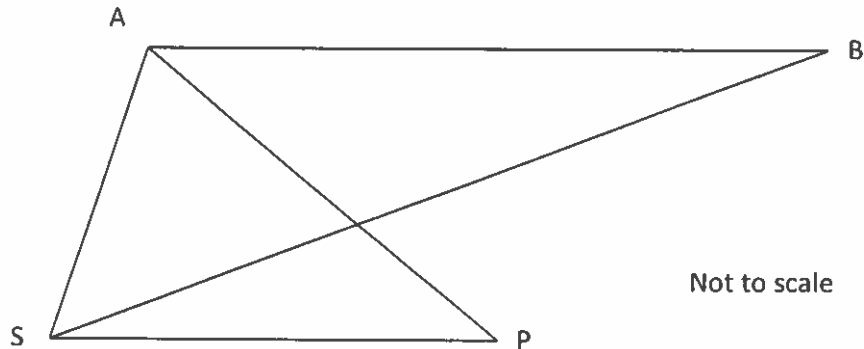
[17]

Question 6

- (a) Name and briefly describe the three classes of errors in surveying.
- (b) Briefly explain the South African co-ordinate system. Use a sketch where applicable.

[10]

Question 7



A and B are two fixed points. It is required to fix the position of S near A. The total station cannot be set up at point A, as a result a short base line SP is measured and the following angles observed from S and P:

Angle ASB = $40^{\circ}42'10''$
Angle ASP = $58^{\circ}37'20''$
Angle SPA = $63^{\circ}18'50''$
Distance SP = 109,880 m

Co-ordinates:

A +2 432,975 - 7 801, 905
B - 9 331,600 - 10 166,296

Calculate the co-ordinates of S.

[19]

TOTAL MARKS [100]