



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

SURVEY 1

DATE: 12 APRIL 2016

TOTAL MARKS: 100
TO PASS: 50

TIME ALLOWED: 3 HOURS
(08h30 to 11h30)

NOTE:

- This question paper consists of **FOUR** 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

An ore pass (box hole) is to be started at a required grade of $+60^\circ$. From the information below, calculate the length of the chains to give the required inclination.

Given:

Instrument at Peg 321

Height of instrument: 0,551m

Elevation of Peg 321: +1653, 212

Grade elevation of Peg 321: +1652, 389

	Vertical angle	Slope distance	Bob height
FLP top button	$+56^\circ 45' 30''$	2,758	0,555
FLP bottom button	$+38^\circ 00' 20''$	1,919	1,680

[20]

Question 2

An excavation has to be made for foundations of a building on ground the surface of which slopes evenly at 10° . The required excavation must have a level bottom of 52m wide and 70 m long with sides sloping at 37° . Calculate the volume of earth to be excavated to the nearest m^3 .

[10]

Question 3

- What does WGS84 stand for?
- Describe what WGS84 is and why was there a need for it?

[14]

Question 4

AB and CD are two portions of a base line separated by the portion BC that cannot be directly measured. An instrument is set up at E, readings are taken to A, B, C and D.

(A, B, C and D are on a straight line)

Given:

Distance AB: 152,989m

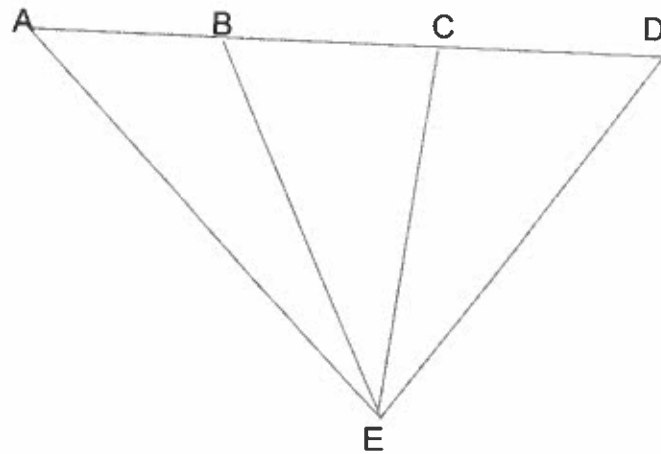
Distance CD: 126,473m

Angle AEB: $34^{\circ}09'09''$

Angle BEC: $10^{\circ}46'25''$

Angle CED: $33^{\circ}45'23''$

Calculate distance BC.



[10]

Question 5

a. Define the following terms

1. Magnetic declination
2. Grid North
3. Isogonic lines
4. Meridian convergence
5. Azimuth
6. Agonic lines
7. Prime meridian
8. Mercator's Projection

b. Name three classes of errors in surveying.

[13]

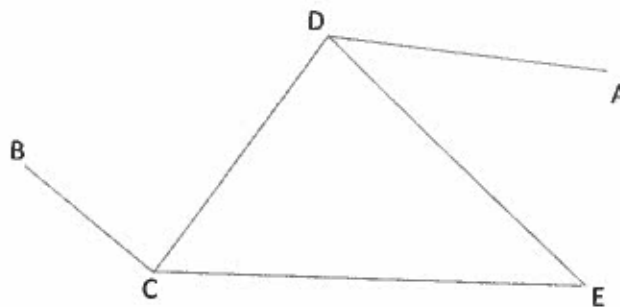
Question 6

State the uses of the following instruments :

- a. Stereometer
- b. Sextant
- c. Optical square
- d. Gyro
- e. Plane table

[10]

Question 7



A and B are two beacons which are not inter-visible. Stations C and D have been established in order to determine the position E.

Given:

Direction A-B: $344^{\circ}04'54''$ and horizontal distance $AB = 725,937\text{m}$

BCD: $73^{\circ}25'00''$ $CB = 135,300\text{m}$

DCE: $36^{\circ}32'00''$ $DA = 137,900\text{m}$

ADE: $49^{\circ}16'00''$ $EDC = 67^{\circ}08'00''$

Co-ords [A] +1689, 500 +3170, 200

Co-ords [B] +1490, 400 +3868, 300

Calculate co-ordinates of E.

[23]

TOTAL MARKS = [100]