

FACULTY OF SCIENCE



**UNIVERSITY
OF
JOHANNESBURG**

DEPARTMENT OF GEOLOGY

MODULE APG3A10
APPLIED GEOLOGY
CAMPUS APK

JULY SUPPLEMENTARY EXAMINATION

DATE: July 15 2016

SESSION: 1130-1430

ASSESSOR

MR H BROWN

MODERATOR

DR Z JINNAH

DURATION 3 HOURS

MARKS 144

NUMBER OF PAGES: 4 PAGES INCLUDING COVER PAGE

NUMBER OF ANNEXURES: 2

INSTRUCTIONS: ANSWER ALL THE QUESTIONS

REQUIREMENTS: ANSWER SCRIPT, DRAWING INSTRUMENTS, CALCULATOR, STEREONET,
GRAPH PAPER, TRACING PAPER

QUESTION 1

ANNEXURE 1 shows a portion of the 1:1000 scale geological plan of the 87 Level area of the Bambanani Mine – a typical Witwatersrand-type gold mine in the Free State. Note that all elevations are in meters below datum (1828.8 m.a.m.s.l.)

- 1.1 Draw a SECTION of the anticipated geology along the 85-36 X/CUT E to 87-36 X/CUT E line. (15)
- 1.2 What distance must the 85-36X/Cut E be extended until it intersects the reef? (3)
- 1.3 Is the displacement event along the dyke older or younger than the displacement event along the fault with the throw of 30m? Explain your answer. (2)
- 1.4 Determine the shortest possible distance of a borehole drilled perpendicular to the bedding from the K5351 survey Peg in the hanging of the 87-36/Cut E (5)

Draw the section on the attached graph paper, make sure your name is on the sheet, and hand it in with your answer script.

[25]

QUESTION 2

Using the stereographic method determine the following from Annexure 1.

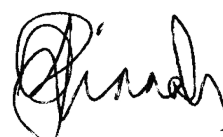
- 2.1 Determine the apparent dip of the reef as it would be seen in the same direction as the crosscut joining the 87 Haulage south and the 87 RAW (5)
- 2.2 An exploration borehole is to be drilled from surface in a direction S 45°W at an angle of 30 °below the horizontal. Determine the core/bedding angle. (5)

[10]

QUESTION 3

Examine the copy (Annexure 2) of the shareholders plan of a gold mine. The plan has a scale of 1:30 000. Several features have been circled and labelled A to F.

Determine and list what these features are. Note that items C and D represent two features in each case. For items A and B the shading represents a different feature in each item.



[8]

3/...

QUESTION 4

Define, in your own words, what is meant by the following geological terms:

- | | | |
|------|----------------------------------|-----|
| 4.1 | mine call factor | (5) |
| 4.2. | "gold accumulation" - (cmg/t) | (3) |
| 4.3 | "assay tracing" | (3) |
| 4.4 | "Block Factor" | (5) |
| 4.5 | "stretch value" | (3) |
| 4.6 | discontinuity | (5) |
| 4.7 | shear strength | (3) |
| 4.8 | "Rock Quality Designation" (RQD) | (4) |
| 4.9 | sampling | (5) |
| 4.10 | Rock strength | (4) |

40/2 = [20]

QUESTION 5

Briefly discuss a geologist's role in GRADE CONTROL on a typical underground mining operation that is mining a thin, tabular orebody.

[10]

QUESTION 6

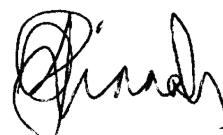
The determination of the geomechanical properties of a large mass of in-situ rock is very difficult. These properties are required for the assessment of rock mass strength and the displacements induced around mine excavations. Bieniawski developed a Rock Mass Rating scheme that is widely used in mining practice to give an indication of rock mass behaviour. Briefly describe Bieniawski's Rock Mass Rating scheme by describing the five parameters that are used to classify rock masses in this scheme.

[15]

QUESTION 7

Briefly compare hard-rock LONGWALL MINING and SUBLEVEL-OPEN STOPING in terms of the application of each mining technique, and discuss/describe the geological input required and role of the geologist in each of these mining methods.

[16]



QUESTION 8

Strategic planning on a mine just like any other business operation is an important process in the survival of the mine and is undertaken annually by each department. Why is it necessary for a Geologist to be intimately involved in this process?

[10]

QUESTION 9

As detailed in the notes and lectures, a Geologist is involved in three different stages of mining operations, whether underground or on surface.

Discuss details of the Geologist's role:

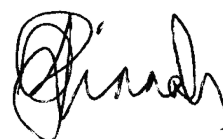
- a. Before mining begins
- b. During mining
- c. After mining is completed

[15]

QUESTION 10

Discuss the role which you as a Mine Geologist can play in assisting the Mineral Processing Department on a mine in solving problems related to the beneficiation of an ore. Using any commodity (ore) of your choice show your understanding of the mineralogy etc. of this commodity (ore) by discussing what potential beneficiation problems may arise and how your geological knowledge may be of assistance.

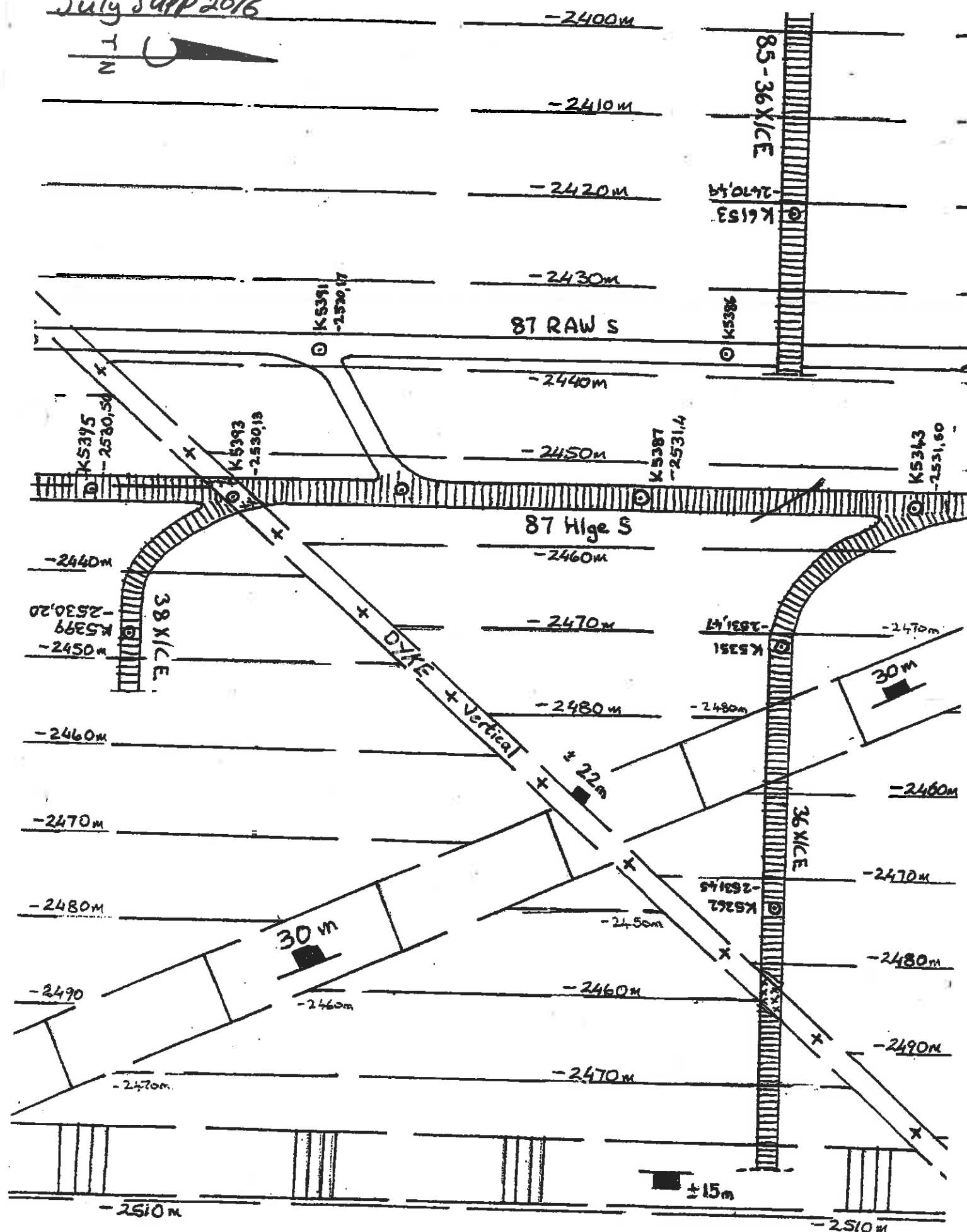
[15]



STUDENT No.: NAME:

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Scale 0 10 20 30 40 50
metres

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