



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

MINING ECONOMICS 1

DATE: 10 OCTOBER 2013

TOTAL MARKS: 100
TO PASS: 50

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

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

What questions would you ask if tasked with a grade control investigation on your underground Platinum mine? Motivate your answers and issues to be addressed in the following environment:

- a) At the face
- b) In the back areas
- c) In the gullies
- d) In ore passes
- e) In the shaft system
- f) On surface
- g) In the treatment plant

For the purposes of this examination you must assume that your sampling, assaying and estimation procedures are sound and required no attention.

[15 marks]

QUESTION 2

Explain the following:

- a) Primary development;
- b) Secondary development;
- c) Mineral Resource;
- d) Mineral Reserve;
- e) Cutting of samples;
- f) Discounting of samples;
- g) Regression of estimates;
- h) Milling width;
- i) Milling grade;
- j) Sweepings;
- k) Vampings;
- l) Reclamation.

[25 marks]

QUESTION 3

The monthly report of the operations of a platinum mine showed that ore reserve blocks, which were estimated as a value of 7,00 g/t at a block width of 100cm actually averaged 6,00 g/t at a width of 110cm when stoped. Ore mined from unblocked sources (Not in Reserve or N.I.R) produced 40 000 tons at a value of 5,50 g/t and a stoping width of 105cm.

Other sources of ore before sorting were:

Sources	Mass (t)	Value (g/t)
Ore from reclamation	25 000	8,00
Ore from development	10 000	5,00
Waste sorted and packed underground	5 000	0,50
Ore from stockpile sent to the sorting station	5 000	6,00
Waste sorted in the plant at 7.00%	-	0,30
Tonnage discrepancy (shortfall)	10 000	nil

The monthly tonnage milled was 330 000 tons at a recovery factor of 97%.

Calculate:

- The total area of reef stoped during the month, expressed in square metres (m^2)
- The stope tramming width, expressed in centimetres (cm)
- The block factor for the month
- The mass of gold produced for the month, expressed in grams (g)
- The residue value, expressed in grams per ton (g/t)

[25marks]

QUESTION 4

A mine sells a waste rock dump to a stone crushing company, subject to the following conditions: all fines, amounting to 8% of total tonnage, and hand-picked reef amounting to 2% of total tonnage will be delivered to the gold treatment plant. The balance of tonnage must be paid for by the stone crushing company as a rate of R1.00 per ton. Labour for the reef picking plant will be supplied by the mine.

Calculate the monthly profit made by the mine, assuming the following conditions:

Tons removed from the dump	50 000 tons per month
Value of the fines	1.5g/t
Value of the hand-picked reef	5.00 g/t
Plant residue value	0.20 g/t
Price of gold	USD 354 per ounce (1 oz. = 31.10348 g)
Currency exchange rate	R 8.32 per USD
Milling cost per ounce	USD 210 per ounce recovered
Cost of hand-picked per ton	ZAR 200 per ton picked

[10 marks]

QUESTION 5

The data below represent a business case of an old mine that has been bought by a small mining consortium. The first 3 years (2014 – 2016) of production is the most critical period to either make profit or loss. Should it make a loss the shareholders have threatened to stop investing.

- From the data below fill in the missing data? You need not show your calculation only the answer must be shown.
- Please comment on the final answer whether profit or loss.

c) Will this business case be approved by the shareholders? Substantiate your answer.

d) What influences the profit/loss for year 2015?

Shaft Information

	Units	2014	2015	2016	Total
m ² Broken	m ²	213 836	222 643	233 070	669 549
Stope Tramming Width	m	1.17	1.18	1.18	
Density	t/m ³	3.1	3.11	3.13	
Tonnes Broken from Stopes	tonnes				
4E Stope Broken Grade	g/t	5.14	5.11	6.23	
4E Ounces Broken from Stopes	oz				
4E Ounces from Historic Sweeping & Vampings	oz	6 707	6 884	0	13 591
Total 4E Ounces Produced/ Broken	oz				

Metallegical Information

MCF	%	98%	92%	89%	93%
4E Ounces in Mill Feed	oz				
4E Concentrator Recovery	%	89%	89%	89%	89%
4E Ounces in Concentrates (M&C)	oz				
4E Equivalent Refined Recovery	%	99%	99%	99%	99%
Equivalent Refined 4E Ounces	oz				
Pt % (Equivalent Refined)	%	63%	63%	63%	63%
Equivalent Refined Pt Ounces	oz				

Basket Price per Pt oz Sold	R/oz	22 420	18 566	20 100	20 362
Revenue (EBITDA)	R ('000)				
Total operating costs per annum	R ('000)	1 800 000	1 800 000	1 800 000	5 400 000
Earnings before equity payment	R				
Equity at 14% of Earnings	R				
Profit/Loss	R				

[25 Marks]

[Total Marks 100]