BERGVLIET HIGH SCHOOL

Grade 8 Technology Mechanical Systems and Mining

Informal Test 2 | 35 marks | Suggested working time 40 minutes

Name: _____ Class: _____ Date: _____

Answer all questions in the spaces provided. Use a pencil and ruler for drawings. Show working and units in calculations. This is preparation for the November examination.

Question 1 Multiple Choice

1.1 Which part is between effort and load in a first-class lever? **(1)**

- **A.** Load
- **B.** Effort
- **C.** Fulcrum
- **D.** Handle

Answer: _____

1.2 Two external spur gears mesh directly. How do they rotate? **(1)**

- **A.** In opposite directions
- **B.** Always clockwise
- **C.** In the same direction
- **D.** Neither can turn

Answer: _____

1.3 Which gears transfer rotation between intersecting shafts at 90 degrees? **(1)**

- **A.** Spur gears
- **B.** Idler spur gears
- **C.** Bevel gears
- **D.** Rack only

Answer: _____

1.4 Which change makes a rectangular frame resist sideways distortion? **(1)**

- **A.** Remove a joint
- **B.** Add diagonal bracing
- **C.** Add a roof load
- **D.** Make it narrower only

Answer: _____

1.5 Which part guides the lifting cable at the top of mine headgear? **(1)**

- **A.** Cage
- **B.** Foundation
- **C.** Winding drum
- **D.** Sheave wheel

Answer: _____

Question 2 Mine Shaft Headgear

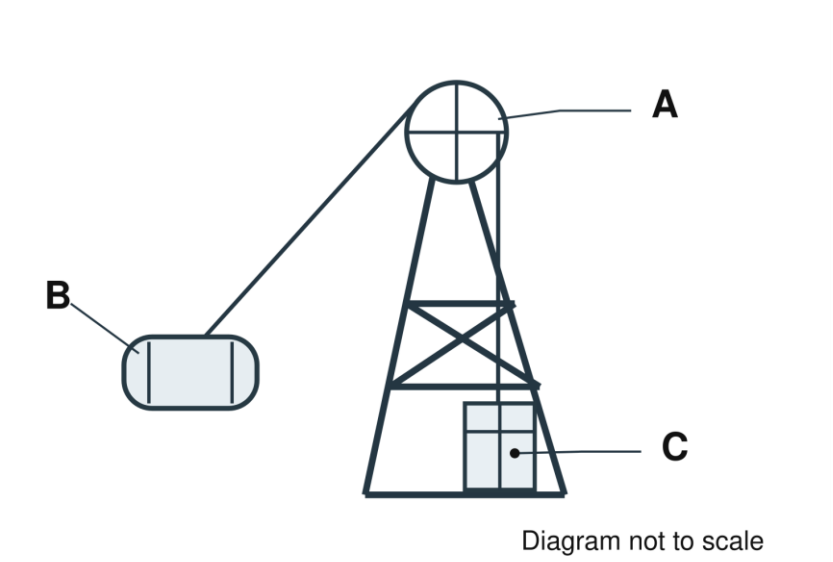


Diagram not to scale

2.1 Name parts A, B and C. **(3)**

2.2 Explain the difference between the jobs of A and B when C is lifted. **(2)**

Question 3 Mechanical Advantage and Gears

Ignore friction and other energy losses. For gear ratio, use driven teeth divided by driver teeth.

3.1 A lever lifts a load of 300 N using an effort of 75 N. Calculate the mechanical advantage. **(3)**

Driver A has 16 teeth. It drives idler B with 24 teeth, which drives output gear C with 48 teeth. The gears are on separate shafts.

3.2 Calculate the overall gear ratio from A to C as a simplified ratio. **(2)**

Question 4 Design Constraints

4.1 Define a constraint in a design task. **(2)**

Question 5 Mining Case Study

A quarry supports 90 local jobs. Wind carries fine dust from an exposed waste-material pile towards a nearby clinic and homes. Staff report coughing and dust on indoor surfaces. The quarry must reduce dust while protecting a limited water supply.

Two controls were tested over comparable dry, windy periods. Costs cover the same area. The dust index permits comparison; it is not a health-safety limit.

Control	Dust index	Water/day	Cost
No control	100	0 litres	R0
Water spraying	45	4 000 litres	R10 000
Vegetation and surface cover	30	600 litres	R16 000

A local heritage display describes indigenous ironworkers who used furnaces and bellows to regulate air supplied to burning charcoal. A quarry apprenticeship notice states: “Only men may apply.”

Question 5 Mining Case Study Continued

5.1 Describe ONE possible health effect on nearby people and explain how the dust reaches them. **(2)**

5.2 Identify ONE technological skill of the indigenous ironworkers and support it with a detail from the report. **(2)**

5.3 Choose ONE tested dust control. Give TWO reasons from the results; one must concern water use. **(3)**

My choice

Reason 1

Reason 2 about water use

5.4.1 Identify the bias in the apprenticeship notice. **(1)**

5.4.2 State ONE effect on applicants. **(1)**

5.4.3 Suggest a fair selection rule. **(1)**

Question 5 Mining Case Study Continued

5.5 A resident wants permanent, immediate closure. Use the prompts to make a justified recommendation. **(3)**

Health concern

Effect of closure on the community

My recommendation and reason

5.6.1 The manager says no monitoring is needed after installing a control. Do you agree? Give a reason. **(1)**

5.6.2 State ONE condition to keep the same when comparing before-and-after dust measurements. **(1)**

5.7 Improve “The model headgear must be strong” into a testable specification. Use all three prompts. **(3)**

Load to support

Test duration or condition

What must be observed for it to pass

TOTAL **35 MARKS**