LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF
EDUCATION

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**NDAEDZO SECONDARY SCHOOL**

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# TECHNOLOGY GRADE 8 MINI PAT

# MECHANICAL SYSTEMS AND CONTROL

# (MINE SHAFT HEAD GEAR)

# MINI PAT

# (PRACTICAL FORMAL ASSESSMENT TASK)

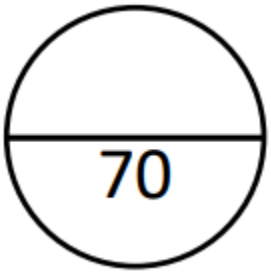
**SURNAME:_____NAME:_____**

**Class: 8__**

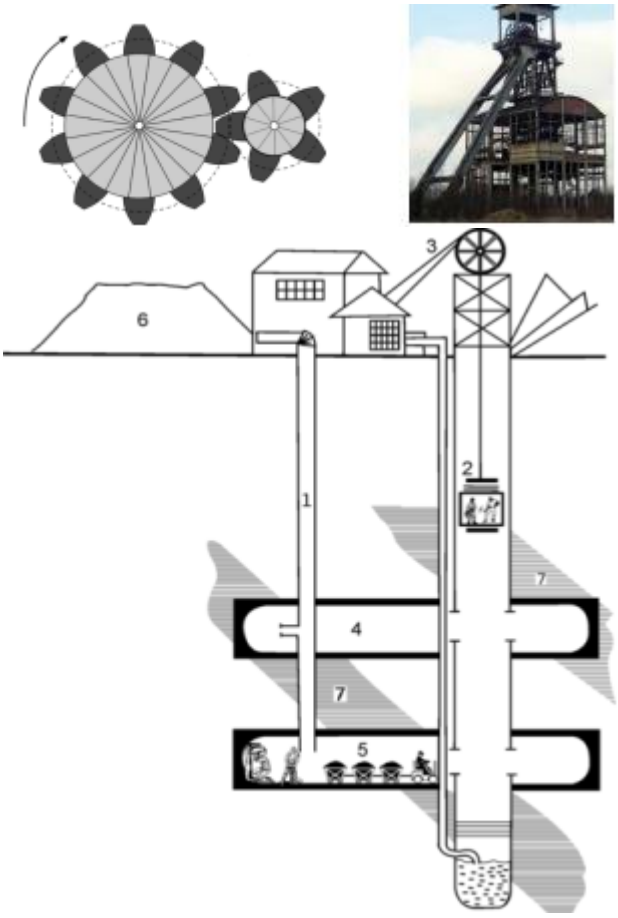
**Marks: Investigate _____**

**Design: _____**

**Make:_____**



**ACTIVITY 1**




**PROBLEM STATEMENT / SCENARIO/ CONTEXT**

***South Africa is a country rich in mineral resources. Mining occurs to some extent in every province of our country. We have huge reserves of coal, copper and iron ore. We are the main suppliers of platinum, manganese and chromium in the world. A commercially viable ore body containing platinum group metals has been found on land belonging to a tribe in rural South Africa. Drill samples have proved that the reef lies at a relatively shallow depth only 500m below surface. Your mechanical engineering company has decided to submit a tender for the construction of a shaft head-gear suitable to transport miners to and from the work level, and for raising ore and waste in loads. The headgear must be able to transport miners and equipment 500m underground. It must also be able to lift platinum ore that weighs10ton back up to the surface.***

## 1, INVESTIGATION

**1.1 What is the function of a shaft headgear in a mining setting?**

**(2)**

_____
_____
_____
_____

**1.2 What does the term "mechanical advantage" in gear systems mean, and how does it affect the efficiency of extracting waste and minerals from a mine shaft? (2)**

_____
_____
_____

**1.3 Explain the difference between synchronized and counter-rotational directions in gear systems. Which, and why, is better suited for a shaft head gear? (2)**

_____
_____
_____

**1.4 Calculate the velocity ratio for a gear system where one gear has 20 teeth, and another gear has 40 teeth. (2)**

_____
_____
_____

**1.5 Discuss the importance of material selection for gears in a mining environment. Why does the idler gear need to be made of a harder material compared to other gears? (2)**

_____
_____
_____

**1.6 Explain the function of an idler gear in a gear train (1)**

**1.7 What safety considerations should be taken into account when designing and constructing a shaft headgear for a mining operation? (2)**

_____
_____
_____

**1.8 Discuss the role of technology in modern mining operations. (2)**

_____
_____
_____

**[ TOTAL = 15 Marks]**

**ACTIVITY NO 2**

**DESIGN SKILLS**

**2.1 Design brief with specifications and constraints.**

**2.1.1. Write the design brief: (3)**

_____

_____

_____

**2.1.2. List any 3 specifications: (6)**

_____

_____

**2.1.3. List any 3 constraints. (6)**

_____

_____

**2.2 Use** the space below to sketch **Two** initial ideas (3-D Isometric) to meet the requirements given in the scenario. Your designs must include Labels. (10)

IDEA NO 1

[5]

IDEA NO 2

(5)

**Activity 3**

**1.1 Make or construct a shaft headgear**

| Criteria | Marks allocation | Marks obtained |
|---|---|---|
| **Design** | **5** | |
| **Planning and Research** | **5** | |
| **Construction** | **5** | |
| **Functionality** | **5** | |
| **Creativity and innovation** | **5** | |
| **Safety consideration** | **5** | |
| **presentation** | **5** | |

**[35]**