



**UNIVERSITY OF JOHANNESBURG**  
**FACULTY OF EDUCATION**  
**JUNE EXAMINATION -2017**

**PROGRAMME:** B.Ed. Intermediate Phase.

**MODULE:** Natural Science and Technology.

**CODE:** SATINA1.

**TIME:** 2 Hours.

**MARKS:** 100.

**EXAMINER:** Dr. M.M.M. Kazeni and Mr. E. Libusha (UJ).

**MODERATOR:** Dr. B. Ndawonde (UJ- APK).

(This paper consists of 4 pages and 7 questions).

**INSTRUCTIONS:**

- Write the answers for sections A and B in separate exam booklets
- Read the questions carefully.
- Answer all the questions.
- Number your answers correctly.
- Write clearly and legibly.
- Write your surname, name and student number on **all** answer books.

## **SECTION A: NATURAL SCIENCE**

**[70]**

### **Short answers questions.**

**[25]**

#### **Question 1: The nature of science.**

Explain how you would demonstrate the following tenets of the nature of Science to grade seven (7) learners.

- a) Science involves processes of inquiry. (3)
- b) Scientific knowledge is tentative. (3)
- c) Empirical evidence is the foundation for scientific knowledge. (3)

#### **Question 2: Matter and materials.**

- 2.1 Define the following terms, and give one example of each. (6)
  - a) A pure substance.
  - b) A mixture.
  - c) An element.
- 2.2 Mention four disadvantages of using fossil fuels such as coal, crude oil and natural gas. (4)
- 2.3 Name three types of rock and explain how they are formed. (6)

#### **Question 3: Scenarios - Energy and change.**

**[20]**

3.1 On one cold day, Jane was frying some chips in her kitchen when her daughter Suzzie walked in and exclaimed! Waawuh! It is so warm in here, as she moved closer to the stove to get more warmth. Jane lost concentration and touched the hot pan, and shouted damn it, I have burned my fingers. Identify and explain the heat transfer processes experienced by Jane and Suzzie in this scenario, when:

- a) Suzzie walked into the kitchen. (3)
- b) Suzzie moved closer to the stove to get more warmth. (5)
- c) Jane touched the hot pan. (3)

3.2 James, a four-year-old boy was playing with his battery powered toy car. As soon as he switched it on, it moved forward and hit a cat, which was sleeping peacefully under a chair. Name and describe three types of energy involved in this scenario.

- a) The energy contained in the toy car battery. (3)
- b) The energy used by the moving car. (3)
- c) The energy possessed by the sleeping cat. (3)

**Question 4: Essay type questions - Life and living. [25]**

- 4.1 Explain how a carbon atom, from a carbon dioxide molecule in the air could end up in the blood stream of a lion. (3/4 page) (10)
- 4.2 Water pollution is a serious problem, which affects, not only human beings, but also entire ecosystems. Discuss the human activities responsible for water pollution. (1 page) (15)

**SECTION B: TECHNOLOGY [30]**

**Question 5:**

- 5.1 List two functions of structures. (2)
- 5.2 Name two forces that contribute to the failure of a structure. (2)
- 5.3 Gusset plates and triangulation are methods used for what purpose? (2)
- 5.4 List two ways of making sure that a structure is stable. (2)
- 5.5 Choose the correct answer and only write down the number of the question (e.g. 1.1) and letter of your choice (e.g. A)
  - 5.5.1 Forces which can cause a member to stretch. (1)
    - A. Dynamic force
    - B. **Static force**
    - C. Triangulation force
    - D. Tension force
  - 5.5.2 What force is caused by weight of a structure that can contribute in the failure of a structure? (1)
    - A. Dynamic force
    - B. **Static force**
    - C. Triangulation force
    - D. Moment
  - 5.5.3 An example of a solid structure. (1)
    - A. Egg
    - B. Human skeleton
    - C. **Stone**
    - D. Cup

5.6 Give one word for the statements below:

3.6.1 Forces which act at an angle to a member, tend to make it bend. (1)

3.6.2 Forces which cause a member to be squashed or buckled. (1)

3.6.3 Forces that act across a material in such a way that one part of the structure can be forced to slide over another. (1)

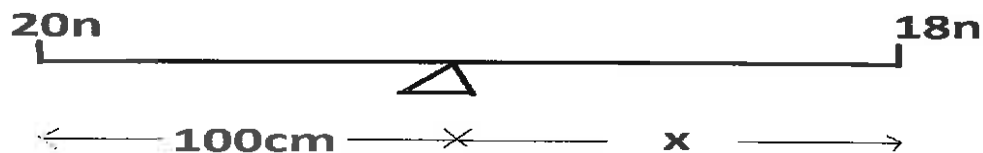
5.7 What type of force is torsional force? (2)

**Question 6:**

6.1 Where will you pivot the beam to make it balance if the beam is 20m long and there is 500N force on the left and 900N force on the right? Leave your answer to two decimal places. (5)



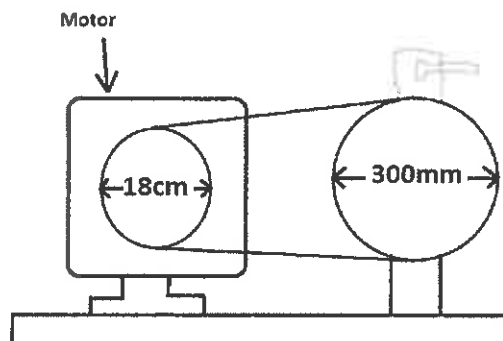
6.2 Determine the value of  $x$ . (3)



**Question 7:**

7.1 Give 3 advantages of using a belt and pulley system. (3)

7.2 The air compressor below is driven via a pulley system from a motor running at 200rpm. At what speed does the compressor shaft rotate? (3)



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**TOTAL: 100**