



UNIVERSITY OF JOHANNESBURG
FACULTY OF EDUCATION
AUGUST EXAMINATION 2016

PROGRAMME: B. Ed. Intermediate Phase

MODULE: Natural Science and Technology for the Intermediate Phase

CODE: SATINA1

TIME: 2 hours

MARKS: 100

EXAMINER: Mr F Naude and Mr E Libusha

MODERATOR: Ms K Fonseca and Mr W Engelbrecht

(This paper consists of 6 pages)

INSTRUCTIONS

Read the following instructions carefully before answering the questions.

1. Answer all questions.
2. Read the instructions carefully and answer appropriately.
3. Use the mark allocation of each question as an indication of how much information to provide.
4. Complete section A and section B in separate booklets

SECTION A

QUESTION 1

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)

1.1 Which of the following groupings are all vertebrates?

- | | |
|---------------------------------|--------------------------------------|
| A. snakes, birds and fish | B. ants, crabs, spiders and snails |
| C. ants, crabs, snakes and bees | D. birds, bees, butterflies and ants |

1.2 One type of living organism which is found in a habitat is better known as:

- | | |
|---------------|--------------|
| A. population | B. herd |
| C. community | D. ecosystem |

1.3 Which of the following substances are not part of respiration?

- A. CO_2
- B. H_2
- C. H_2O
- D. O_2

1.4 A shooting star is not a star but

- A. the light from weather balloons
- B. space debris entering the atmosphere
- C. a black hole
- D. the interaction of several gasses

1.5 Which of the following is a terrestrial planet?

- A. Uranus
- B. Mars
- C. Jupiter
- D. Pluto

1.6 Why do you place your hands over a fire when you are cold instead of underneath the fire?

- A. hot air sinks
- B. wind blows heat upwards
- C. hot air rises
- D. cold air insulates your hands

1.7 Which of the following is a heterogenous mixture?

- A. Coffee
- B. Sugar stirred into water
- C. Fruit salad
- D. Air in the atmosphere

1.8 Which of the following statements about the moon is not correct?

- A. radiates light
- B. rotates on its own axis
- C. orbits the earth
- D. travels around the sun

QUESTION 2

2.1 State the difference between potential and kinetic energy. (2)

2.2 You take an elevator up to the top of a skyscraper.

2.2.1 Do you have more potential energy at the top of the skyscraper than you did at the bottom? Explain. (2)

2.2.2 Do you have more, less, or the same amount of energy at the top of the skyscraper than if you were to take the stairs? (Let's assume you did not eat anything on the way up.) Explain. (2)

2.3 A heater is placed on one side of a room and is turned on. It is a cold night. Explain how the heat is transferred through the room. What is the term we use for this heat transfer? (3)

2.4 Study the picture below. Answer the questions that follow



- 2.4.1 Can we refer to the warm clothing of the children in the picture above as insulators? Explain. (2)
- 2.4.2 The children in the picture tried to make a string of 'fairy lights' for their igloo but the more bulbs they added the dimmer the bulbs glowed. Explain why the bulbs were glowing dim. (3)
- 2.4.3 Based on your answer in 2.4.2, what advice would you give the children? Explain your answer by drawing an electric circuit that includes all the necessary components for conventional flow. (7)
- 2.4.4 Explain why people who touch electric wires may be electrocuted. (3)

2.5 Write a paragraph on how a coal-fired power station supplies electricity to appliances in homes. (8)

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QUESTION 3

- 3.1 Draw a representation of our solar system. (10)
- 3.2 The position of the Earth in the solar system is described as the goldilocks zone. Compare the narrative of the fairy tale to the position of the Earth in the solar system. (4)
- 3.3 Name the three basic types of rocks, and briefly state the process by which each type is formed. (6)

[20]

QUESTION 4

- 4.1 Illustrate by using an appropriate drawing what is meant with the term "aquatic food web". (6)
- 4.2 Describe what a terrestrial food chain would look like. (2)
- 4.3 How does the water cycle influence the organisms in 4.2. (2)

[10]

Section A Total = 70

Section B

QUESTION 1

- 1.1 List two methods which can be used to make a structure rigid. (2)
- 1.2 Explain the difference between the static force and dynamic force that contribute to the failure of a structure. (2)
- 1.3 Name two functions of structures (2)
- 1.4 What is the difference between a tie and a strut in frame structure? (2)
- 1.5 Give an example of each of the following forces below
- 1.5.1 Tension force. (1)
 - 1.5.2 Compression force (1)
 - 1.5.3 Torsional force (1)
 - 1.5.4 Shear force. (1)
- 1.6 What force must be applied to the lever at D to just balance the load? (5)



- 1.7 Give one word for the statement below:
- 1.7.1 The point through which the resultant of the system of parallel forces formed by weights of the particles constituting the body passes for all positions of the body. *centre of gravity* (1)
- 1.8 Name two ways to ensure that the structure does not lose its balance. (2)

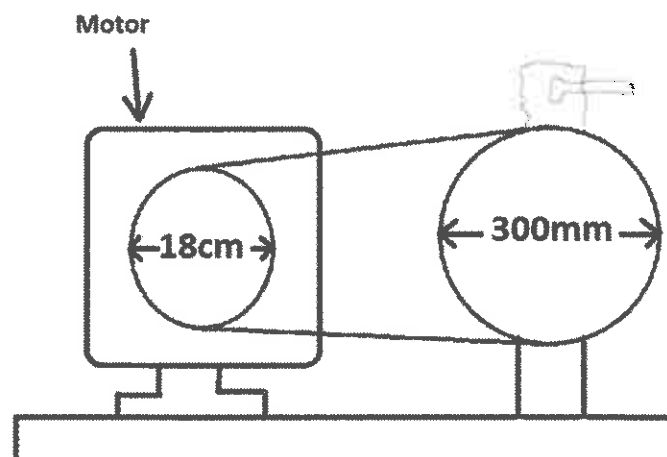
[20]

QUESTION 2

- 2.1 Give 3 advantages of using a belt and pulley system. *no friction, no taking, steady* (3)
- 2.2 What must the relationship of the driver pulley and the driven pulley in terms of the output of the speed if the pulleys have the following diameter? (3)

- 2.2.1. Diameters of the pulleys are equal
- 2.2.2. The diameter of the driven is smaller than the diameter of the driver
- 2.2.3. The diameter of the driven is bigger than the diameter of the driver

- 2.4 The air compressor below is driven via a pulley system from a motor running at 200rpm. At what speed does the compressor shaft rotate? (4)
- [10]



Section B Total: 30

Grand Total = 100