

**UGANDA MARTYRS UNIVERSITY**  
**FACULTY OF EDUCATION**  
**BACHELOR OF EDUCATION (PRIMARY) YEAR 1**  
**SEMESTER TWO SUPPLEMENTARY/SPECIAL EXAMINATIONS, 2018/19**  
**PHYSICAL SCIENCE**

**PAPER TWO: FORCE AND MOTION, MEASUREMENT OF LENGTH, TIME AND MASS**

**INSTRUCTIONS**

- **Attempt four questions choosing two from each section.**
- Clearly indicate the question number you attempt.
- Begin each selected question on a new page in the answer booklet.
- Write your answers clearly, using illustration clear.
- Indicate the order of question answered on the front on your answer booklet.

**SECTION A: FORCE AND MOTION**

1. (a) (i) What is force? State the S.I units of force. (2marks)
  - (ii) Mention four types of force. (4marks)
  - (b) Explain why a stone thrown upwards at an angle to the horizontal finally comes back to the ground. (5marks)
  - (c) (i) When an object is measured at the earth's surface its weight is found to be higher than its weight on the moon's surface. (4marks)
  - (ii) Define weight and state its S.I units. (2marks)
  - (d) Name the forces which act on a freely falling body. (3marks)
  - (e) A car engine gave a forward force of 1000N and was moving at  $20\text{ms}^{-2}$  acceleration.
  - (i) What was the mass of the car? (3marks)
  - (ii) after sometime, the driver applied his brakes but instead the tyres slid and stopped later. What could be done if the other cars have to stop instantly? (3marks)
- 2.(a) Define the term below.
- (i) Static friction. (2marks)

- (ii) Dynamic friction. (2marks)
- (b) Explain how friction can be of a disadvantage. (6marks)
- (c) Explain how the methods below reduce friction.
- (i) Rollers (3marks)
- (ii) Oil (3marks)
- (d) (i) Prove that the units of acceleration are also newtons per kilograms. (3marks)
- (ii) Airplane of mass 6000kg was accelerating at  $2.5\text{ms}^{-2}$ . How much force was generated by the engine? (3marks)
- (iii) State what would happen to the acceleration if the thrust force of the engine reduced. (2marks)
3. (a)(i) Define the term friction. (2marks)
- (ii) Explain the origin of friction between any two surfaces in contact. (5marks)
- (b) Briefly describe how you would show to the learner that,
- (i) Oiling the surfaces in contact reduces friction between them. (2marks)
- (ii) Friction generates heat between the sliding surfaces in contact. (2marks)
- (c) Two forces act on a mass of 8kg, one of 20N due North and another one of 5N due South. What is the;
- (i) Resultant force and state its direction. (2marks)
- (ii) The acceleration produced on the body. (2marks)
- (d) (i) Explain three disadvantages of friction. (6marks)
- (ii) State three ways in which friction between any two surfaces can be reduced. (3marks)
- 4.(a) Define the terms below
- (i) Scalar quantity (2marks)
- (ii) Vector quantity (2marks)
- (b) State three examples of substances which are classified as
- (i) Scalar quantities (3marks)

(ii) Vector quantities (3marks)

(c) What is the weight of the object of mass 60kg on earth's surface and on the moon. Take acceleration due gravity to be  $9.8\text{ms}^{-2}$  and  $1.6\text{ms}^{-2}$  on earth and the moon respectively. (6marks)

(d) If the frictional force between the piece of block resting on a surface is given by  $F = \mu R$  where  $\mu$  is the coefficient of friction and  $R$  is the weight of the block, calculate the frictional force between the block of.

(i) 300kg and the surface where the coefficient of friction is 0.003 (3marks)

(ii) 4000g and the surface where the coefficient of friction is 0.5 (4marks)

(iii) If the coefficient of friction between the block of weight 200N and the surface is 0.04, what is the weight of the block (2marks)

## SECTION B: MEASUREMENT OF MASS, LENGTH AND TIME

5.(a)(i) The formula used to calculate the circumference of a circle is  $2\pi r$  where  $r$  is the radius. Show that this is the same as  $\pi d$  where  $d$  is the diameter. (2marks)

(ii) Calculate the volume of a sphere in  $\text{m}^3$  if its diameter 100mm. (4marks)

(b) (i) Describe an experiment that you would carry out to determine the volume of a small stone. (6marks)

(ii) When a stone was dropped into a measuring cylinder containing water, the water levels changed from  $60\text{cm}^3$  to  $100\text{cm}^3$ , if the stone has a density of  $3\text{gcm}^{-3}$ . What is the mass of the stone? (4marks)

(c) A Box measures 5m by 4m by 6m. What is the volume of the box in  $\text{mm}^3$ ? (5marks)

(d) Write the figures below in scientific form

(i) 5600,000 (2marks)

(ii) 0.0000009 (2marks)

6.(a) (i) Differentiate between a fundamental quantity and a derived quantity. (2marks)

(ii) Mention three examples of derived quantities stating their S.I unit. (6marks)

(b) A university bus covered a distance of 360km in only four hours.

(i) Calculate the distance covered in metres. (2marks)

(ii) At what speed did the bus move. (3marks)

(c) Convert the quantities below.

(i)  $100\text{m}^3$  to  $\text{mm}^3$  (4marks)

(ii)  $4000\text{mm}^3$  to  $\text{cm}^3$  (4marks)

(d) Prove that the units of the quantities are as given below.

(i) Density  $\text{kgms}^{-1}$  (2marks)

(ii) Viscosity (2marks)

7. (a) Define the term below.

(i) Surface tension (2marks)

(ii) Viscosity (2marks)

(b) Explain why water flows more easily as compared to oil under the same temperature. (5marks)

(c) How would Viscosity vary with temperature? Explain your answer. (5marks)

(d) (i) Explain the origin of surface of tension on water surface. (4marks)

(ii) Mention four observations that have been made and attributed to the existence of surface tension. (4marks)

(iii) Explain how surface tension varies with temperature. (3marks)

8. (a) Define length and state its SI units (3marks)

(b) Convert the following quantities

(i)  $100\text{m}$  to  $\text{km}$  (2marks)

(ii)  $20\text{km}$  to  $\text{mm}$  (2marks)

(iii)  $3000\text{mm}$  to  $\text{cm}$  (2marks)

(c) In an experiment to determine the size of a water drop, water was placed in a burette. When the burette tap was opened, 120 drops were released, and the volume in the burette changed from  $10\text{cm}^3$  to  $45\text{cm}^3$ . What is the,

(i) Volume of each water drop. (4marks)

(ii) The radius of the drop in  $\text{mm}$  (6marks)

(iii) The radius of the drop in  $\text{m}$  (6marks)