Name:……………………………………………………………………………………………… Adm:…………..

 Class:…………..

**MOI HIGH SCHOOL – KABARAK**

**COMMON 2 EXAMINATIONS**

**TERM 1, FEBRUARY 2018**

**PHYSICS**

**FORM 3 TIME: 2 HRS**

**Instructions**

* *Write your name, admission number and class in the spaces provided at the top of the page.*
* *Answer ALL the questions in the spaces provided.*
* *All working* ***MUST*** *be clearly shown.*
* *Use the following constants:*

*Gravitational constant g = 10N/kg = 10 ms-2*

*Speed of sound in air = 340ms-1*

*Atmospheric pressure = 102,000 N/m2*

**FOR EXAMINER’S USE ONLY**

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| --- | --- |
| **Maximum Score** | **Student Score** |
| **100** |  |

**SECTION A (50 MARKS)**

1. (a) State the law of conservation of linear momentum. **(1 mark)**

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(b) Explain why the recoil velocity of a gun is much less than the velocity of a bullet. **(2 marks)**

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2. The figure shows oil drops from a car engine leaking on the road at regular intervals of one every 2 seconds.

**A B C**

 100m 104m

 Determine the velocity of the car at C. **(3 marks)**

3. The figure below shows a highly positively charged rod brought close to a cap of a negatively charged electroscope.

(a) State the observations made.  **(1 mark)**

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(b) Explain the observation. **(2 marks)**

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4. The figure below shows a conductor carrying current placed in a magnetic field and moves in the direction shown.

 X

Y

 F

Identify the polarities of X and Y. **(2 marks)**

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5. State the use of the manganese (IV) oxide in the cell. **(1 mark)**

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6. One method of producing a weak magnet is to hold a steel rod in the North South direction and then hammer it continuously for some time. Using the domain theory of magnetism explain how this method works. **(2 marks)**

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The figure below shows a motor connected to a magnetic switch call a relay operated by an ordinary switch S1. Use the information in the figure to answer questions 7 and 8.

Spring conductor

Pivot

Soft Iron

Core

Motor

Contacts

Insulator

Insulator

S1

Soft iron armature

7. Explain how the relay switches on the motor when S1 is closed. **(3 marks)**

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8. State with a reason the effect on the motor, if the iron core is replaced with a steel core and switch S1 is put on and then off. **(2 marks)**

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9. The figure below shows two rays of light incident normally on face PQ of a glass prism, whose critical angle is 420.

P

Q

R

Complete the diagram to show the paths of the two rays as they pass through the prism. **(2 marks)**

10. State the possible error of the reading on the scale of the instrument that gives the following readings.  **(3 marks)**

 (a) 28cm ……………………….. (b) 37.4kg …………………………

 (c) 0.45 seconds ………………………..

11. Find the volume of a cylinder with diameter 7.0cm and height 8cm answer in m3 and express your answer in standard form.  **(3 marks)**

12. (a) What is meant by turbulent flow? **(2 marks)**

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 (b) State the condition that may result in a flow being turbulent. **(2 marks)**

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(c) Water flowing at a velocity of 6m/s in a pipe of diameter 16cm enters a narrow paper of diameter 8cm. Calculate the velocity of water in narrow pipe. **(3 marks)**

13. The motion of smoke particles enclosed in a smoke cell can be studied using the set up shown below.

Microscope

 Lens

Lamp

Smoke cell

(a) Draw on the diagram a ray diagram to show how the smoke particles are illuminated.  **(2 marks)**

 (b) (i) Explain what happens in the smoke all. **(2 marks)**

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 (ii) What is the purpose of the microscope?  **(1 mark)**

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 (c) State **two** factors that affect the motion of the particles in the smoke cell.

 **(2 marks)**

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14. Explain why solids have a definite shape but liquids take the shape of the container in which it is put. **(2 marks)**

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15. A man of mass 80kg stands in a lift. Calculate the force exerted on the man by the lift if the lift is;

 (a) moving upwards at 2 ms-1. **(2 marks)**

 (b) moving upwards at 2m/s2. **(2 marks)**

 (c) moving downwards at 2m/s2. **(2 marks)**

16. State the following laws. **(3 marks)**

 (a) Newton’s first law.

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 (b) Newton’s second law .

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 (c) Newton’s third law.

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17. A high jumper usually lands on thick soft mattress. Explain how the mattress helps in reducing the force of impact. **(2 marks)**

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18. When a gun was used to fire a bullet of mass 5g it was found to have a recoil velocity of 3m/s when a bullet left, it barrel at a speed of 600km/h.

1. Why does a gun recoil when it is fired? **(2 marks)**

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1. Determine the mass of the gun. **(3 marks)**

19. A car moving initially at 10m/s decelerates at 2.5m/s2.

 (i) Determine

1. its velocity after 1.5s. **(2 marks)**
2. the distance in 1.5s. **(2 marks)**
3. the time taken for the car to stop. **(2 marks)**
4. Sketch the velocity – time graph for the car up to the time the car stopped.

**(2 marks)**

1. From the graph, determine the distance the car travelled before stopping.

**(3 marks)**

20. (a) In an experiment to demonstrate atmospheric pressure, a plastic bottle is

partially filled with hot water and the bottle is then tightly corked. After some time the bottle starts to get deformed.

1. State the purpose of the hot water. **(1 mark)**

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1. State the reason why the bottle gets deformed. **(1 mark)**

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 (iii) Explain your answer in (ii) **(2 marks)**

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(b) A lift pump can lift water to maximum height of 10m. Determine the maximum height to which the pump can raise a liquid of density 750kg/m3.

 **(2 marks)**

(c) State one factor that determines the height to which a force pump can lift water. **(1 mark)**

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21. Two balls are thrown vertically upwards from the same point with the same velocity of 20m/s but at an interval of 2 seconds when they meet, the second ball is rising at 10m/s. What was the velocity of the first ball when they met? State any assumption you make in obtaining your answer. **(3 marks)**

22. A bullet of mass 20g moving at 400m/s strike a block of wood of mass 3.5kg initially at rest. The bullet sticks into the block and the two more off together on a horizontal surface where frictional retarding force of 4N is acting between the block and the surface.

1. Determine the initial common velocity of the bullet and wooden block.

**(3 marks)**

1. The deceleration of the block. **(2 marks)**
2. What distance does the block move before coming to rest? **(2 marks)**

23. (a) A boy standing in front of a cliff blows a whistle and hears the echo after 0.5s.

He then moves 17m further away from the cliff and blows the whistle again. He now hears the echo after 0.6s. Determine the speed of the sound.

 **(2 marks)**

 (b) (i) Distinguish between transverse and longitudinal waves. **(1 mark)**

 (ii) Give one example of a transverse wave and one example of

longitudinal wave.  **(2 marks)**

(c) Water waves are observed as they pass a fixed point at the rate of 30 crest per minute. A particular wave crest takes 2 s to travel between two fixed points 6m apart. Determine for the wave.

1. the frequency **(1 mark)**
2. the wavelength **(2 marks)**

24. (a) A uniform mixture consists of 30cm3 of water and 40cm3 of ethanol. If the

densities of water and ethanol are 1g/cm3 and 0.85g/cm-3 respectively. Calculate the density of the mixture. **(2 marks)**

(b) Three identical springs of spring constant 4.5N/cm are used to support a load as shown in the figure below. Determine;

90N

1. the equivalent spring constant for the three springs. **(2 marks)**
2. the extension of combined network. **(2 marks)**
3. the energy stored by the combined springs. **(2 marks)**