MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2013

# PHYSICS

2013

P/LAND NATIONAL EXAMINATION BOARD

# PUNTLAND STATE OF SOMALIA

## MINISTRY OF EDUCATION

## NATIONAL EXAMINATIONS BOARD

| | |
|---|---|
| **NAME OF THE STUDENT** | |
| **NAME OF THE SCHOOL** | |
| **ROLL NUMBER** | |

## FORM FOUR PHYSICS EXAMINATION MAY 2013

## TIME 2:10 HOURS

## INSTRUCTIONS TO CANDIDATES

**Instructions to the candidate (please read carefully)**

This paper consist of 18 pages, count now, if there is missing please inform to the invigilator

- Answer ALL question
- Write your working on the space provided below the question
- No allowed extra paper
- No allowed calculators
- If you write wrong answer please delete and write right the answer clearly
- This paper consist of two parts
- PART A: (10 multiple choices) = 10 marks
- PART B: (9 structured questions) = 90 marks

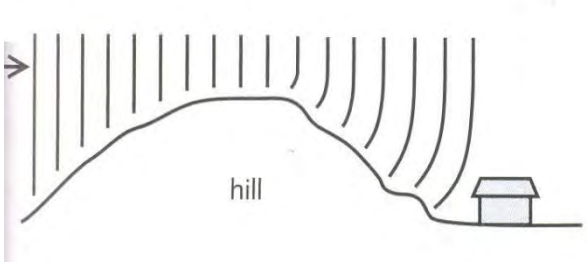
Total = 100 marks

**Use this page for rough work. It will NOT be marked.**

**PART ONE**: MULTIPLE CHOICE QUESTIONS 10 MARKS

**Circle the correct answer in each of the following questions**

1. Radio waves are detected by a receiver which is in a house on the other side of a hill.

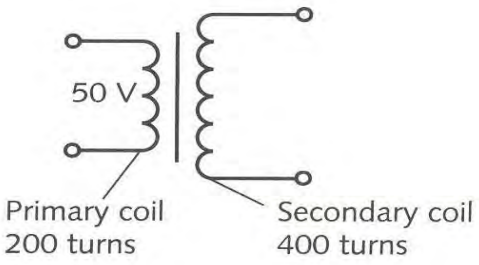



The radio waves reach the receiver because they are:

A. Reflected B. Refracted C. Diffracted D. Radiated

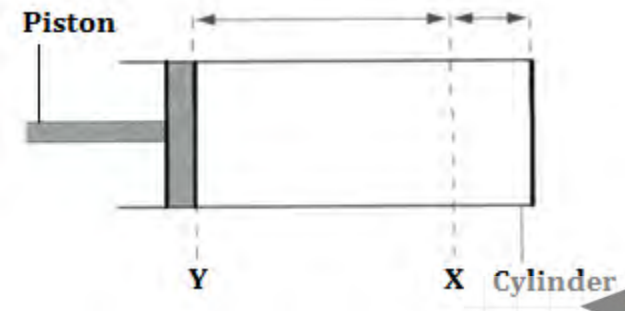
2. What is the voltage across the secondary coil of the transformer shown?

A. 25 V
B. 100 V
C. 50 V
D. 200 V

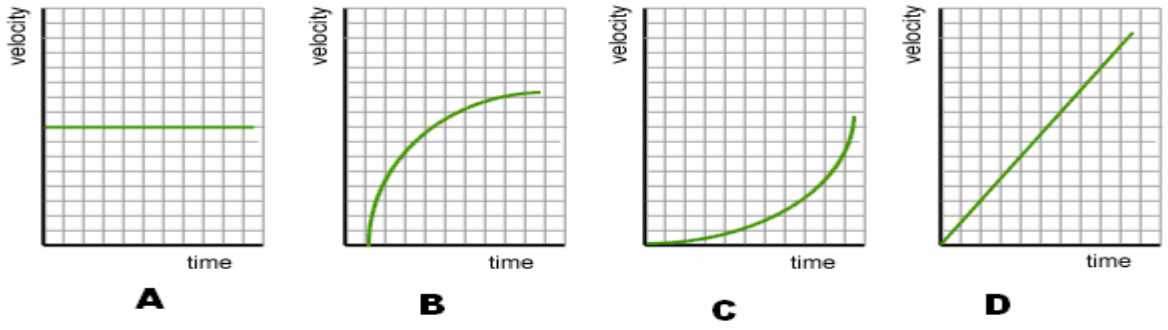



3. If the piston is pushed into the cylinder from Y to X without changing the temperature of the air enclosed, the air pressure:

A. Increases
B. Decreases
C. Remains constant
D. Reduces to zero.

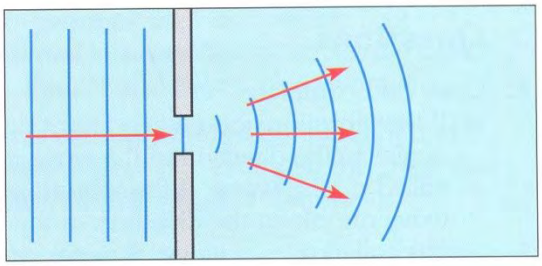


4. Which of the following velocity-time graphs represents an object falling freely in a vacuum?




5. What is the name of the wave effect illustrated by the diagram below?

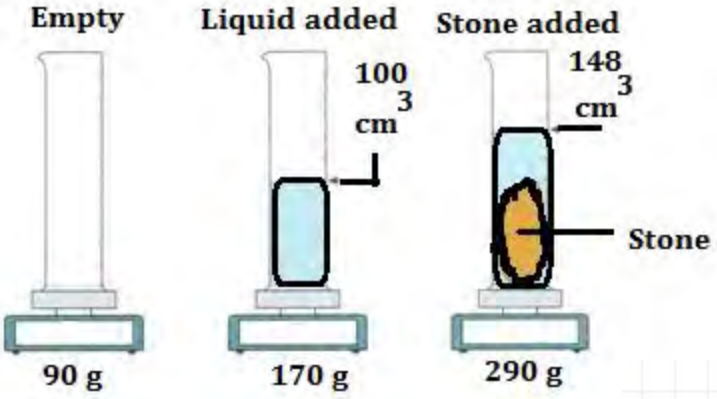
   A. Diffraction
   B. Interference
   C. Polarization
   D. Resonance



6. A secondary school student set an experiment to find the density of a stone.

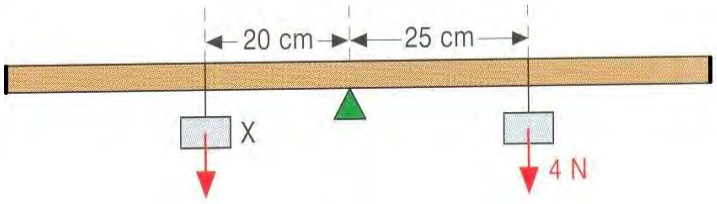
   Using the information on the diagram, which of the following values could be the density of the stone?

   A. 48 g/cm$^3$
   B. 2.5 g/cm$^3$
   C. 0.4 g/cm$^3$
   D. 148 g/cm$^3$

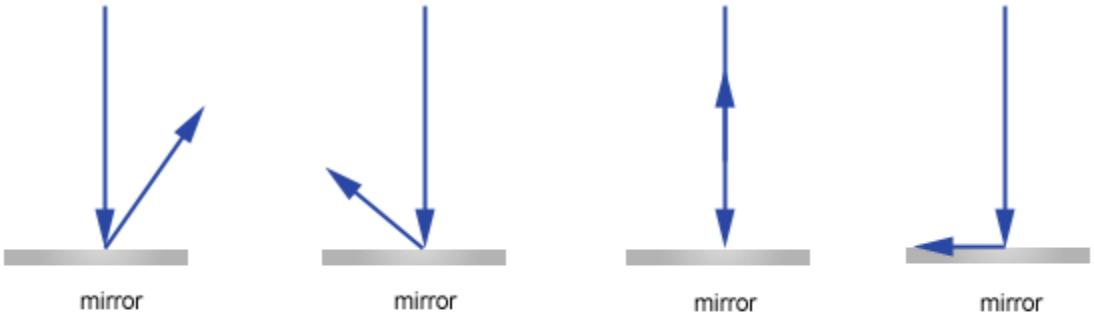


7. The ruler is balanced at its centre of gravity. What is the weight of X?

   A. 4 N
   B. 8 N
   C. 25 N
   D. 5 N

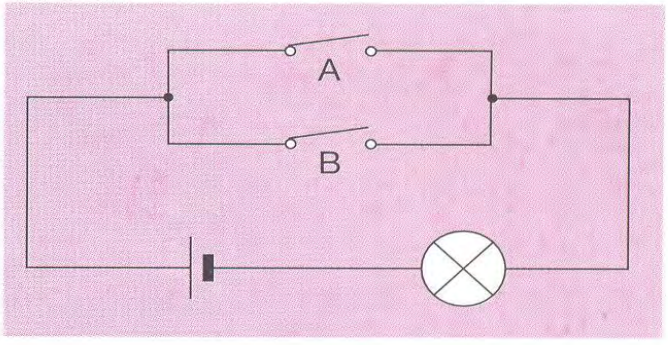



8. Which of the following correctly shows the path of light striking a plane mirror?




**A** **B** **C** **D**

9. The lamp in the circuit lights in each of the following situations EXCEPT:




   A. When switch A is closed and switch B is opened
   B. When switch A is opened and switch B is closed
   C. When both switches are closed
   D. when both switches are opened

10. A 3 kg mass falls with its terminal velocity. Which of the combinations A to D gives its weight, the air resistance and the resultant force acting on it?

| | **Weight** | **Air resistance** | **Resultant force** |
|---|---|---|---|
| A | 0.3 N down | Zero | Zero |
| B | 30 N down | 30 N up | Zero |
| C | 10 N down | 10 N up | 10 N down |
| D | 3 N down | 3 N up | 10 N down |

**PART TWO**: **STRUCTURED QUESTIONS** **90 MARKS**

**Answer ALL the following questions in the spaces provided.**

**QUESTION ONE: SOLAR SYSTEM** **7 marks**

The table below contains data about the Earth and Saturn.

| | **Earth** | **Saturn** |
|---|---|---|
| Distance from sun | 150 million km | 1427 million km |
| Average temperature | $20^0$ C | $-180^0$ C |
| Surface gravitational field strength | 9.8 N/kg | 8.9 N/kg |
| Time to rotate axis | 24 hours | 11 hours |
| Time to orbit sun | 1 year | 25.5 years |
| Density | 5.5 g/cm$^3$ | 0.7 g/cm$^3$ |

Use the data in the table to answer the questions below.

a. How long is a day on Saturn? 1 mark

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b. Suggest why Saturn is colder than the Earth. 1 mark

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c. Give one reason why astronomers think that Saturn is composed mainly of gases. 1 mark

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d. A satellite lands on Saturn surface. How will the weight of the satellite on Saturn compare with its weight on Earth? 2 marks

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e. Name another two planets in the solar system other than Earth and Saturn.

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……2 marks

**QUESTION TWO: MOTION** **10 marks**

a. Define acceleration 2 marks

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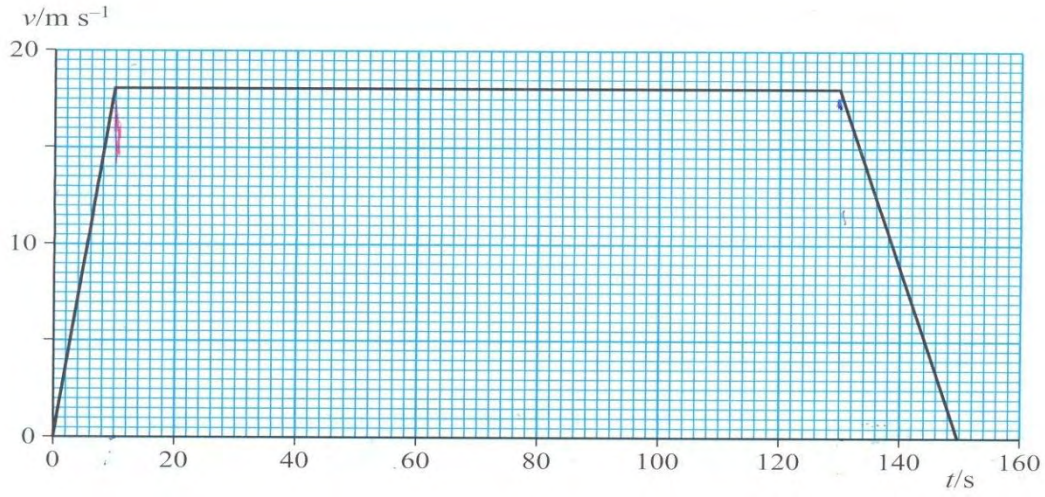
The diagram shows the velocity – time graph of a train as it travels from one station to the next.




I. Use the diagram to calculate the acceleration of the train in the first 10 seconds.

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…… 3 marks

II. Use the diagram to calculate the distance between the two stations.

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…… 3 marks

III. Calculate the average speed for the whole journey.

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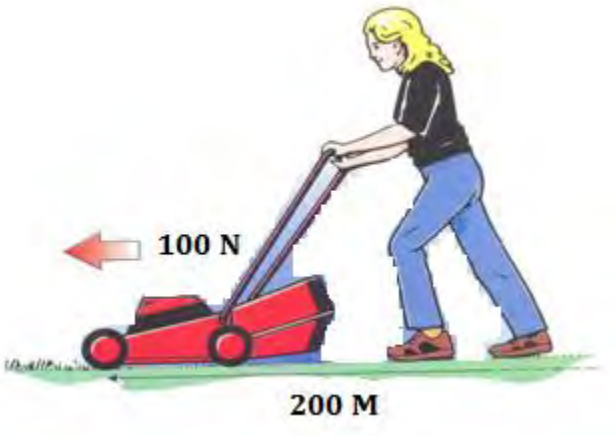
…… 2 marks

**QUESTION THREE: WORK & ENERGY** **10 marks**

a. A lady uses 100 N to push a lawn mower by a distance of 200 m as shown.




I. Calculate the work done by the lady

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……..... 3 marks

II. Where does the pushing energy come from?

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……. 1 mark

III. What type of energy change takes place when the land mower moves?

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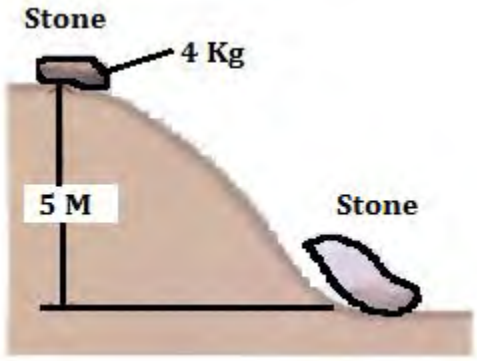
…….. ……. 1 mark

b. A 4 kg stone slides down a smooth slope. (g = 10 N/kg).




I. Calculate the gravitational potential energy of the stone at the top of the slope.

……

…….. 2 marks

II. What is its maximum kinetic energy at the bottom of the slope?

……

……. 1 mark

III. State any two renewable sources of energy.

……

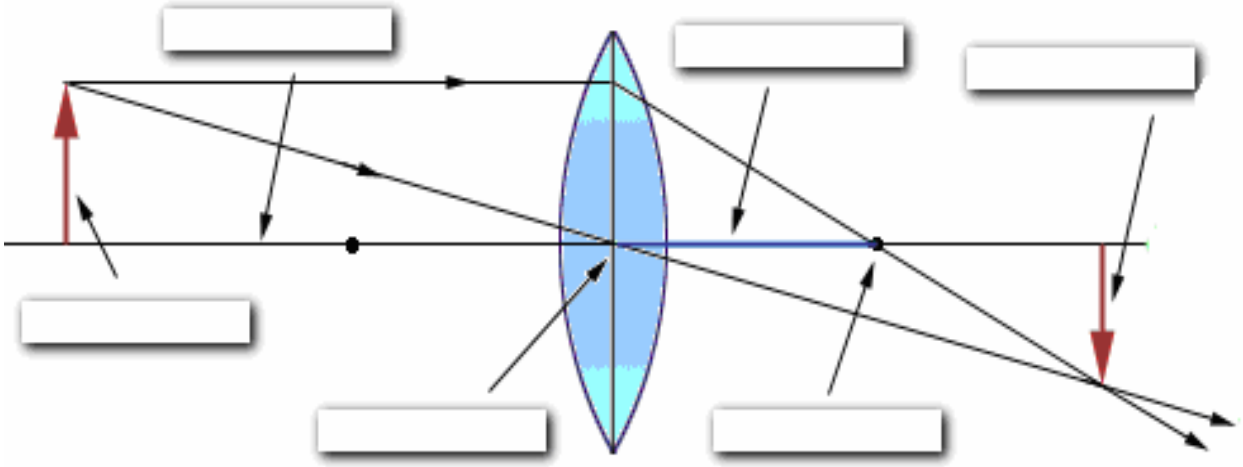
……... 2 marks

**QUESTION FOUR: LIGHT 11 marks**

Nawawi secondary school students were investigating images formed by lenses.

a. Label the diagram using the following words. 6 marks

**Focal point ( A), Principal Axis ( B) , Optical Centre ( C), Image ( D), Focal length ( E) , Object ( F)**



b. Give the name of this lens.

……...1 mark

c. Find the position of the image formed by this lens if its focal length is 3 cm and the object is 4 cm from the lens.

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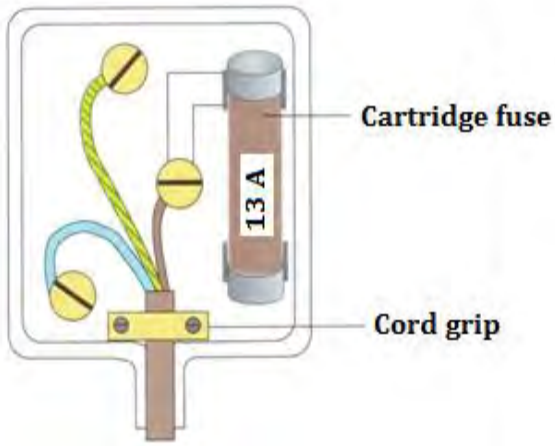
…… …….. 3 marks

d. Is the image formed by this lens real or virtual?

…….. 1 mark

**QUESTION FIVE: ELECTRI CITY 11 marks**

a. The diagram shows the inside of a 13 A plug.




i. Write down the names of the wires in the plug.

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…… 3 marks

ii. What colour wire should you connect to the fuse in the plug?

**blue brown or yellow-green**

…….. 1 mark

iii. The fuse helps to prevent the fire caused by electrical faults. Explain how it does this.

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……. 2 marks

b. Mohamed uses a 2 KW electric kettle to boil water in 6 minutes.

I. Calculate the electrical energy transferred in kilowatt-hours.

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…….. 3 marks

II. Local electricity costs $ 0.8 per kilowatt-hour. How much does it cost Mr. Mohamed to boil the water?

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…….... 2 marks

**QUESTION SIX: HEAT** **11 marks**

a. Explain the following in terms of the various methods of heat transfer.


I. If you put your hand above burning match, your hand feels hot. However your hand does not feel hot when it is underneath the burning match.

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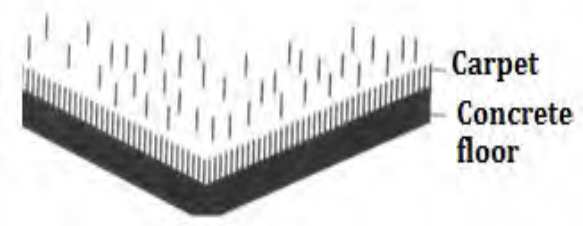
……2 marks

II. Putting a thick carpet on a concrete floor helps the room to keep warm.

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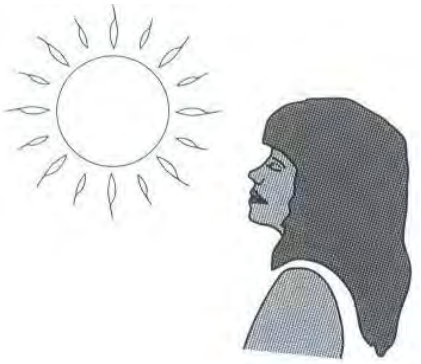
..... 2 marks

III. Heat from the sun can reach us, even though there is a vacuum between the earth and the sun.



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…… 2 marks

b. Calculate the total heat energy required to convert 2 kg of ice at $0^0$ C to water at $100^0$ C. (specific latent heat of fusion of ice $L_f$ = 340000 J/kg and specific heat capacity of water c = 4200 J $kg^{-1}$ $^0C^{-1}$).

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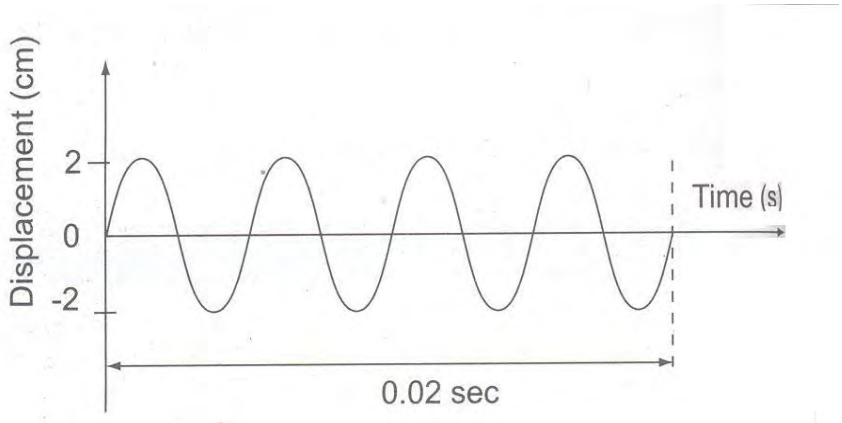
**QUESTION SEVEN: WAVES** **11 marks**

a. The figure below shows a waveform.



I. On the diagram, draw a wave with twice the frequency and half the amplitude as the one shown. 2 marks

II. How many complete waves are shown?

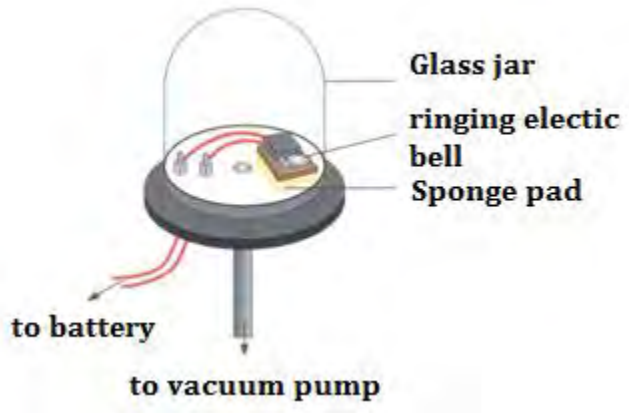
……1 mark

III. Calculate the frequency of the wave shown.

……

……2 marks

b. The diagram shows a bell-jar experiment to test the behaviour of longitudinal sound waves.




I. Explain what is meant by a longitudinal wave.

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…… 2 marks

II. Describe what is happening to the intensity of the sound of the bell when the air is removing out of the glass jar?

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…….. 2 marks

III. What does this experiment verify?

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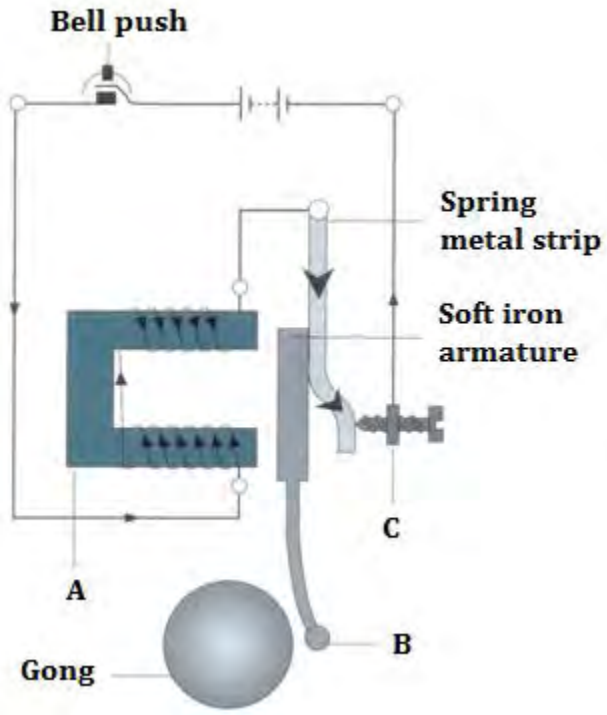
…….. 2 marks

**QUESTION EIGHT: ELECTROMAGNETISM** **10 marks**

a. The diagram shows the parts of an electric bell.




II. Label the parts A, B and C.

A ……

B ……

C ……...

III. Briefly explain how the electric bell works.

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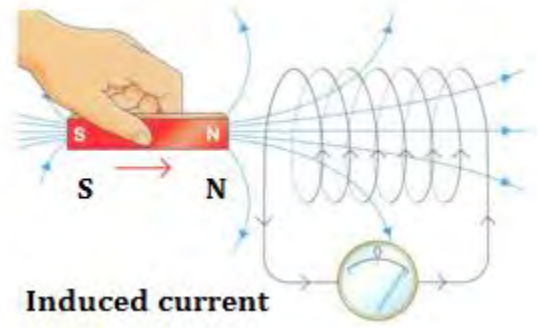
…… 3 marks

b. When the magnet shown in the diagram below is moved towards the coil, the meter gives a reading to the right.




I. What is the name of the effect being produced by the moving magnet?

……..1 mark

II. What happens to the reading shown on the meter when the magnet is moved away from the coil?

……

…… …….. 1 mark

III. State two ways in which the reading on the meter could be increased.

.....

..... 2 marks

**QUESTION NINE: RADIOACTIVITY** **9 marks**

a. Compete the following gaps with the words given below.

***Alpha*** ***Beta*** ***Gamma***

I. Has the most penetration power ……1 mark

II. Carries positive charge ……1 mark

III. Is made up of electrons ……1 mark

IV. Is not deflected by an electric field ……..1 mark

V. Has the most ionization power……..... 1 mark

b. The activity of radioactive sample of Iodine-128 falls from 200 counts/second to 25 counts/second in 75 minutes. Calculate the half-life of this radioactive sample of Iodine.

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…… 4 marks

**END**