

MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2012

PHYSICS



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 2012
TIME 2:10 HOURS

INSTRUCTIONS TO CANDIDATES

Instructions to the candidate (please read carefully)

This paper consist of 20 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 one: (10 multiple choices) = 10 marks**
 - **PART two: (10 structured questions) = 90 marks**
- Total = 100 marks**



Use this page for rough work, it will not be marked

A series of horizontal dotted lines for rough work.

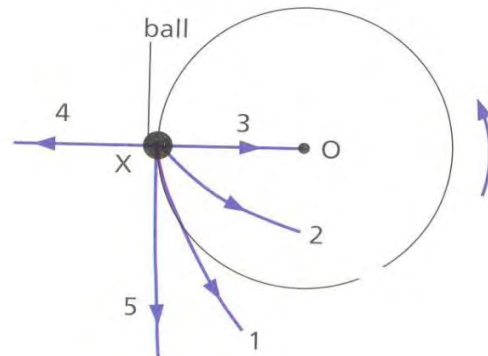


PART ONE: MULTIPLE CHOICE QUESTIONS

(10 MARKS)

Circle the correct answer in each of the following questions

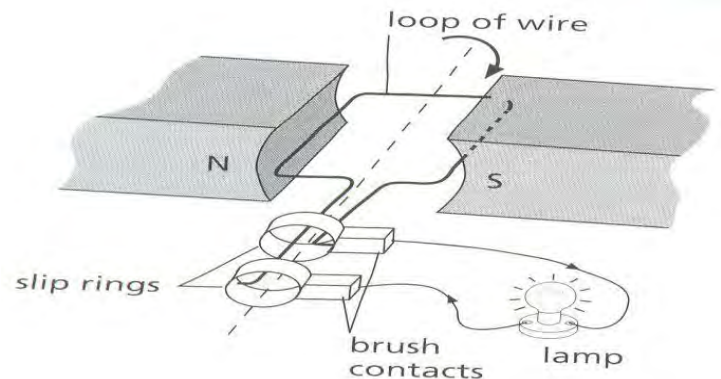
1. A boy whirls a ball at the end of a string round his head in a horizontal circle centre O. If he lets go of the string when the ball is at X in the diagram, the ball flies off in the direction



- A. 1
- B. 2
- C. 4
- D. 5

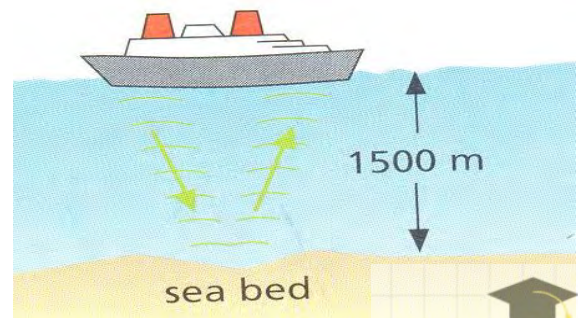
2. What is the name of this electrical device?

- A. Generator
- B. Motor
- C. Capacitor
- D. Transformer

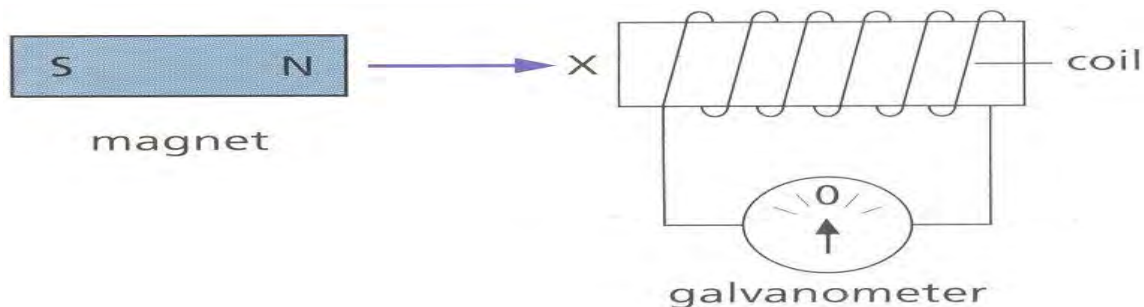


3. The signal sent out by a ship is received back from the sea bed directly below the sea 2 seconds later. The speed of sound in sea water in m/s is

- A. 750
- B. 1500
- C. 3000
- D. 2250



4. Which one of the following statements is NOT true when a magnet is pushed into a coil as shown?



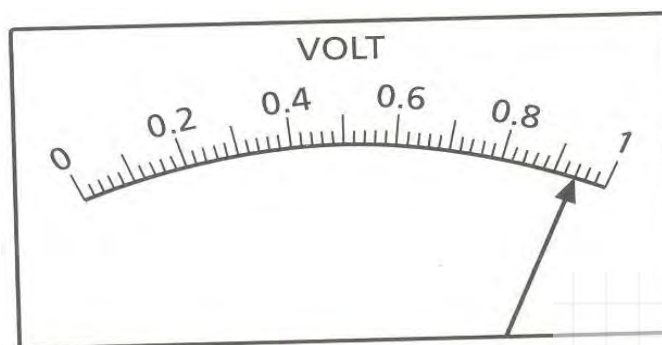
- A. A p.d is induced in the coil and causes a current in the galvanometer.
 - B. The induced p.d increases as the magnet moves fast
 - C. Mechanical energy is changed to electrical energy
 - D. The coil moves to the right because the induced current makes face X a S – pole which is repelled by the N – pole of the magnet
5. A student measures her mass and finds that it is 45 kg. Her friend has a stop watch to time her. if it takes 3 seconds to climb the flight of stairs, find out her own power

- A. 180,000 W
- B. 60,000 W
- C. 6,000 W
- D. 3,600 W



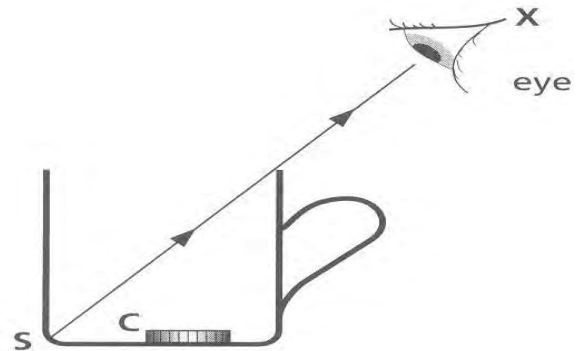
6. The figure presents the face of a voltmeter. What is the accurate reading of the voltmeter?

- A. 0.9 V
- B. 0.87 V
- C. 0.94 V
- D. 0.8 V



7. A coin is put at the bottom of an empty cup as shown in the diagram. An observer looking from X can see point S on the cup but can't see the coin. However when the cup is full of water the observer can see point C on the coin, because the ray is:

- A. Refracted at the surface
- B. Reflected from the surface
- C. Diffracted in the second medium
- D. Vertically polarized

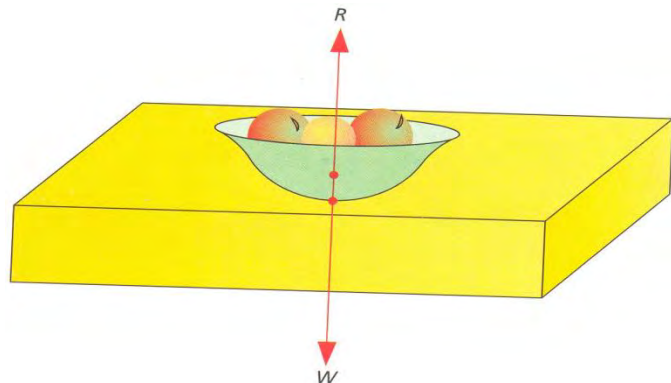


8. A drink is cooled more by ice at 0°C than by the same mass of water at 0°C because ice:

- A. Floats on the drink
- B. Has a smaller specific heat capacity
- C. Gives out latent heat to the drink as it melts
- D. Absorbs latent heat from the drink to melt

9. A bowl of fruit resting on a table is pulled downwards by its weight **W**. What force **R** is pushing it upwards?

- A. Resultant force
- B. Up thrust force
- C. Normal force
- D. Friction force



10. A plastic ruler is charged positively by rubbing it with a cloth because the ruler has:
- A. Gained electrons
 - B. Lost electrons
 - C. Gained protons
 - D. Lost protons

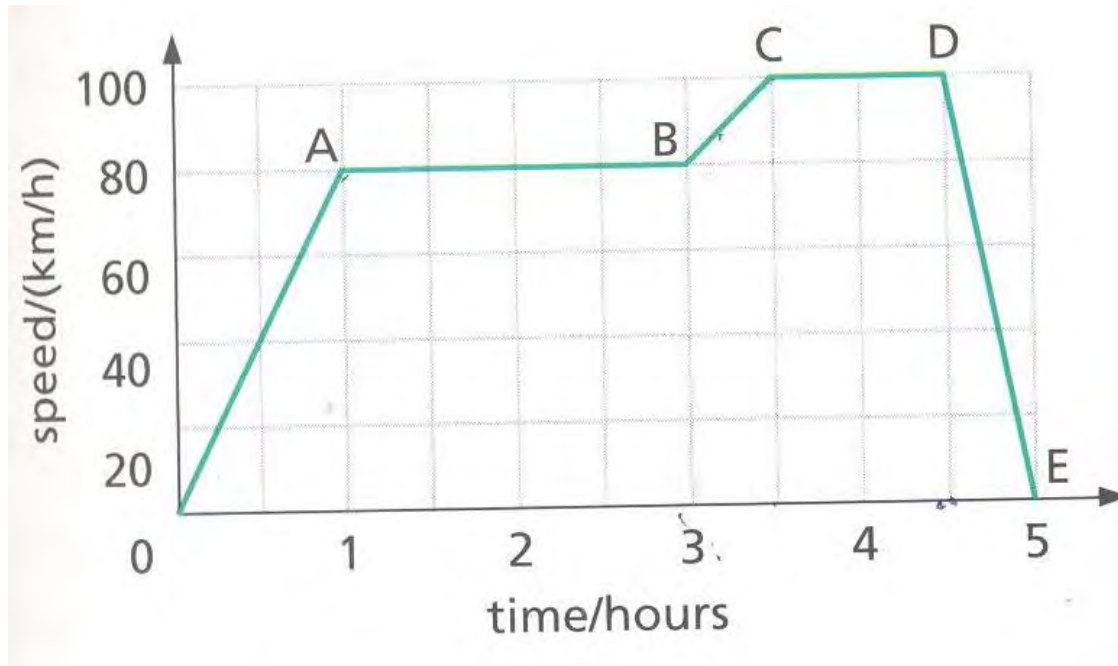


PART TWO: STRUCTURED QUESTIONS

(90 MARKS)

QUESTION ONE: LINEAR MOTION (10 MARKS)

The approximate speed-time graph for a car on a 5-hour journey is shown below.



- a. State in which of the regions OA, AB, BC, CD or DE the car is:
- i. Accelerating(2 marks)
 - ii. Decelerating(1 mark)
 - iii. Travelling with constant speed(2 marks)

b. Calculate the total distance travelled by the car

.....

.....

.....

.....(3 marks)

c. What is the average speed for the whole journey?

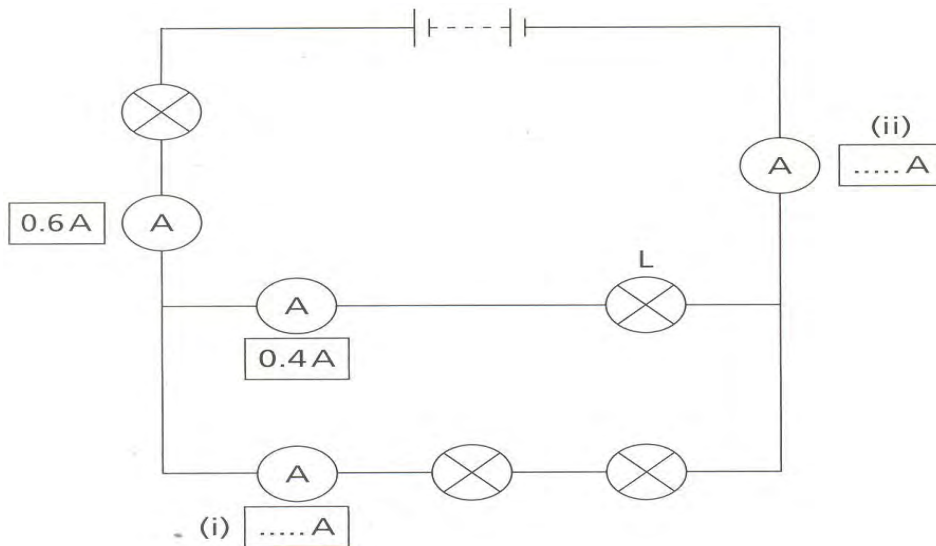
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.....(2 marks)



QUESTION TWO: ELECTRICITY (11 MARKS)

Sahra connects the circuit below



- a. She measures the current at four places in the circuit. Two of her readings are shown in the diagram. Complete the readings of the other two ammeters. (2 marks)

- b. Sahra uses a voltmeter to measure the voltage across lamp L.
 - i. On the diagram show how the voltmeter should be connected using correct circuit symbols (1 mark)

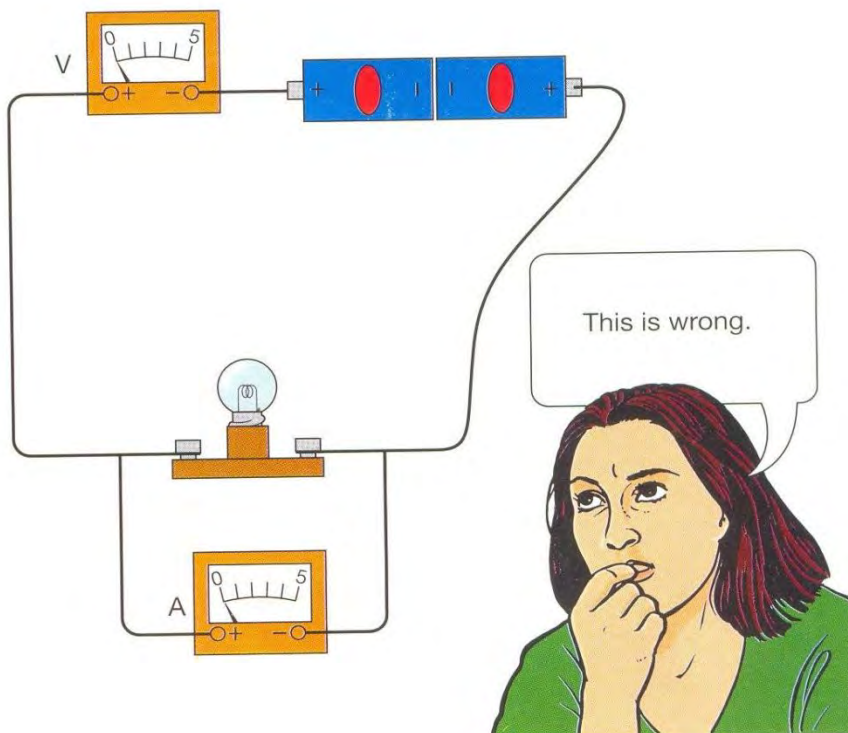
 - ii. The reading on the voltmeter is 10 V. calculate the power being transferred by lamp L.

.....

 (2 marks)



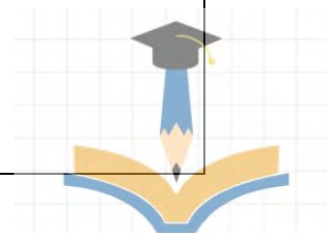
- c. The diagram shows a circuit set up by a boy trying to measure the resistance of a bulb. He has made several mistakes.



- i. List any two mistakes he made

.....
 (2 marks)

- ii. Draw the correct circuit using circuit symbols. (1 mark)



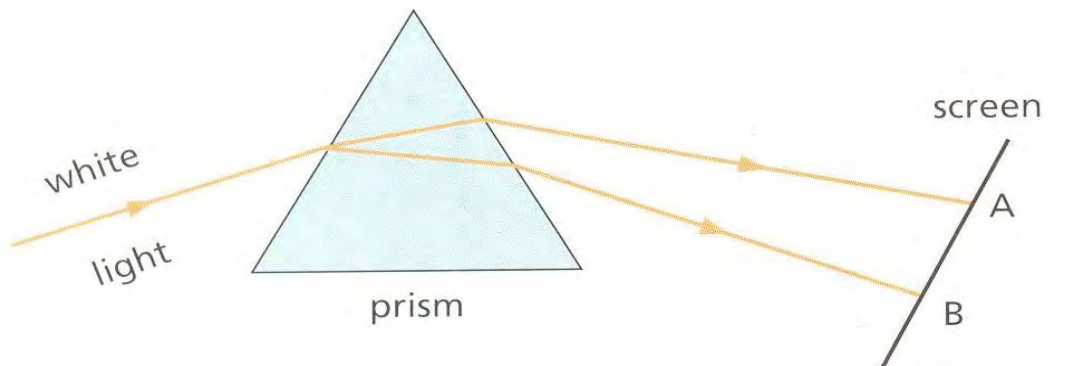
- iii. When the circuit is set up correctly, it's found that a voltage of 3 V gives a current of 0.5 A. find the resistance of the bulb.

.....

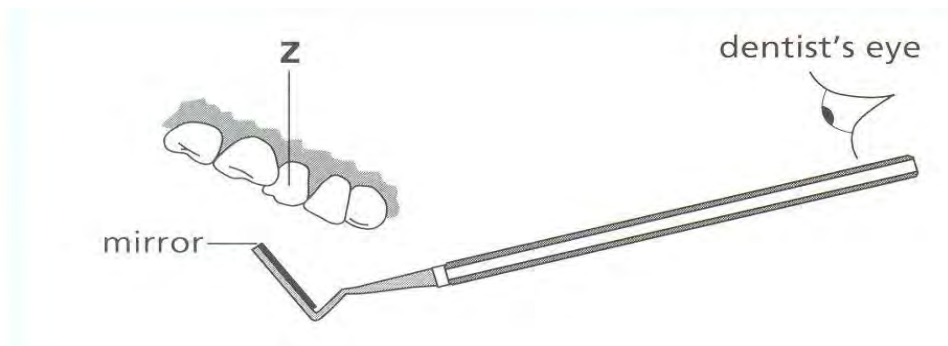
 (3 marks)

QUESTION THREE: LIGHT (12 MARKS)

A narrow beam of white light is shown passing through a glass-prism and forming a spectrum on a screen.

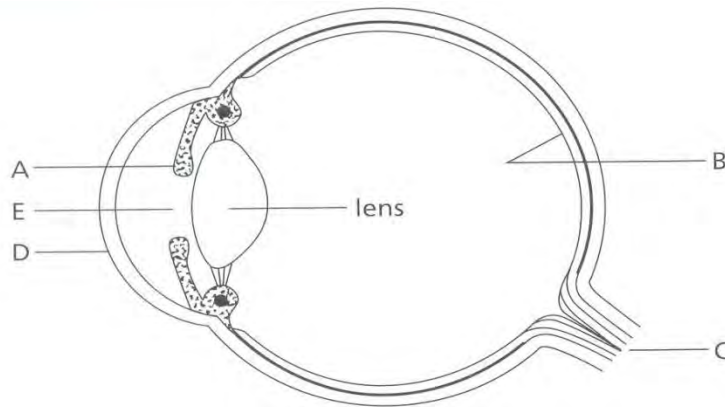


- a. What is the name of this effect (1 mark)
- b. What colour of light appears at:
- i. A.....(1 mark)
- ii. B.....(1 mark)
- c. The diagram shows a mirror which can be used by a dentist to see the back of a patient's tooth. (2 marks)



Draw a ray of light to show how the dentist is able to see the tooth labeled **Z**.

d. The diagram shows a cross-section of the eye.



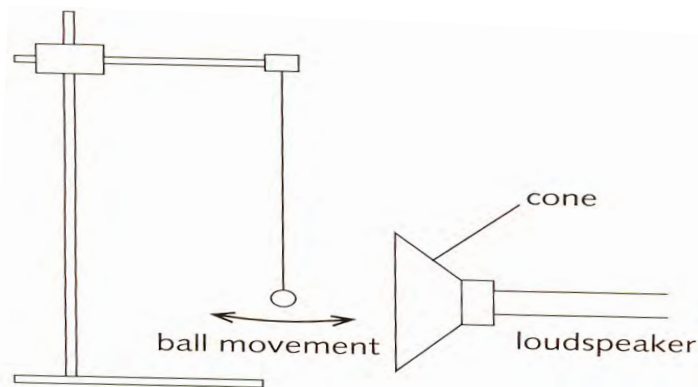
Label the parts A, B, C, D and E (5 mark)

e. Which of the labeled parts A – E:

- i. Refracts the light entering the eye?.....(1 mark)
- ii. Controls the amount of light entering the eye? (1 mark)

QUESTION FOUR: SOUND AND WAVES (10 MARKS)

A light ball is shown hanging very close to a loudspeaker. The loud speaker gives out a sound of low frequency and the ball is seen to vibrate.



a. Explain how the sound from the loud speaker causes the ball to move as described.



.....

 (2 marks)

b. Explain what will happen to the motion of the cone of the loudspeaker when:

i. The sound is made louder

.....
 (1 mark)

ii. The pitch of the sound is increased

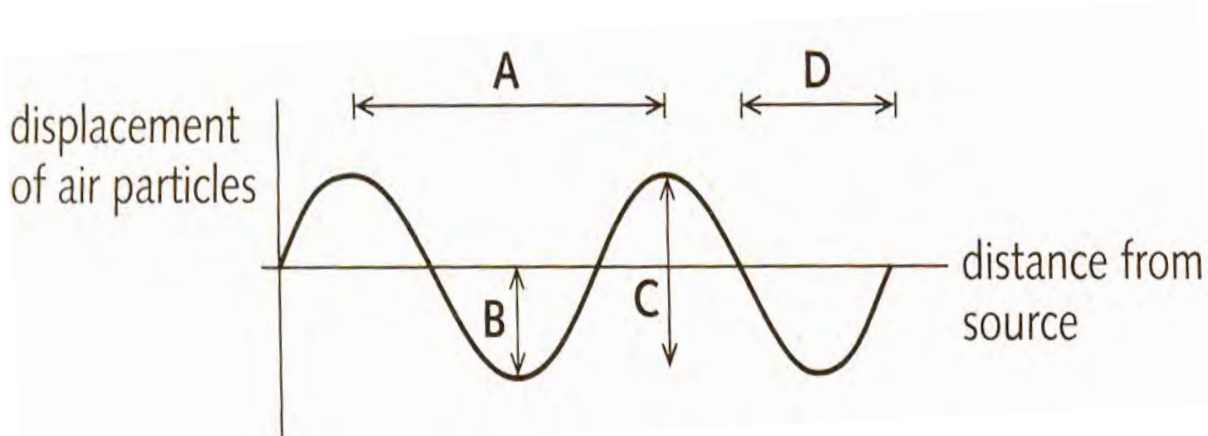
.....
 (1 mark)

c. Calculate the frequency of this sound wave if it has a wavelength of 0.5 m and travels at a speed of 340 m/s in air.

.....

 (3 mark)

d. The sound wave of the loudspeaker travelling through air can be represented as shown.

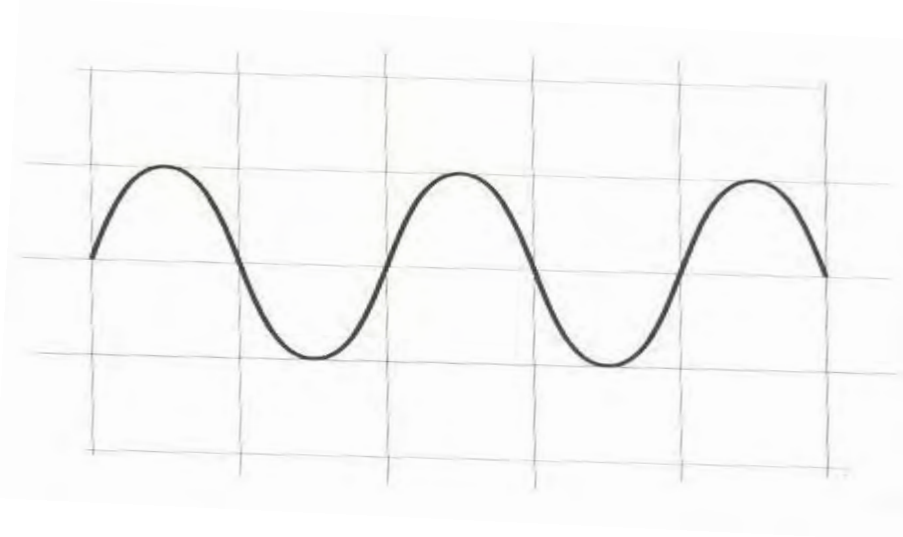


Which distance A, B, C or D represents:



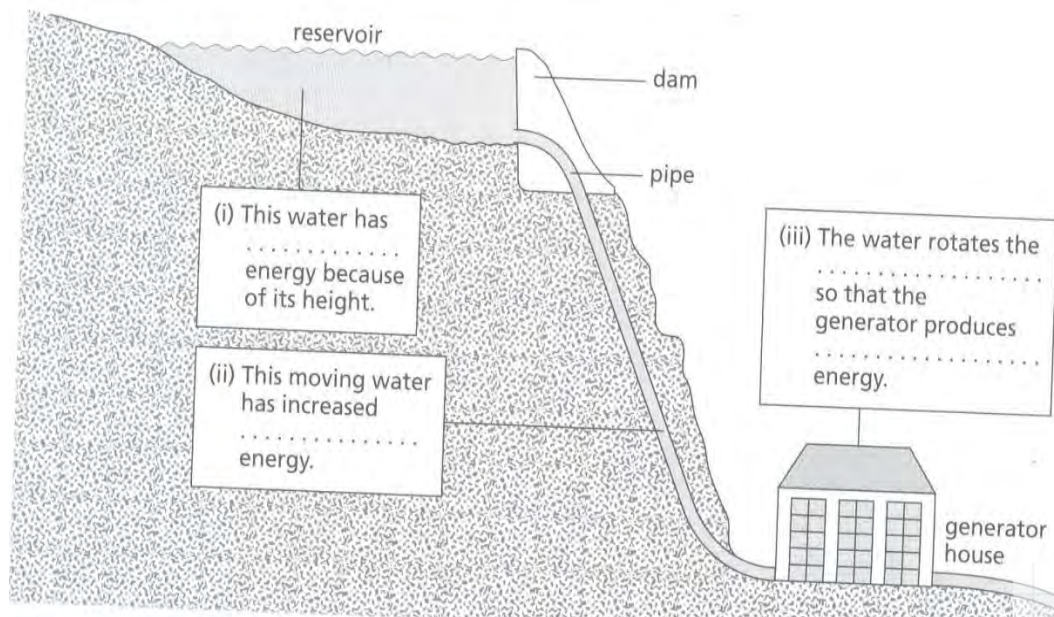
- i. The wavelength (1 mark)
- ii. The amplitude of the wave..... (1 mark)

e. On the same axes, draw a wave which has double the amplitude but the same frequency as the one below. (1 mark)



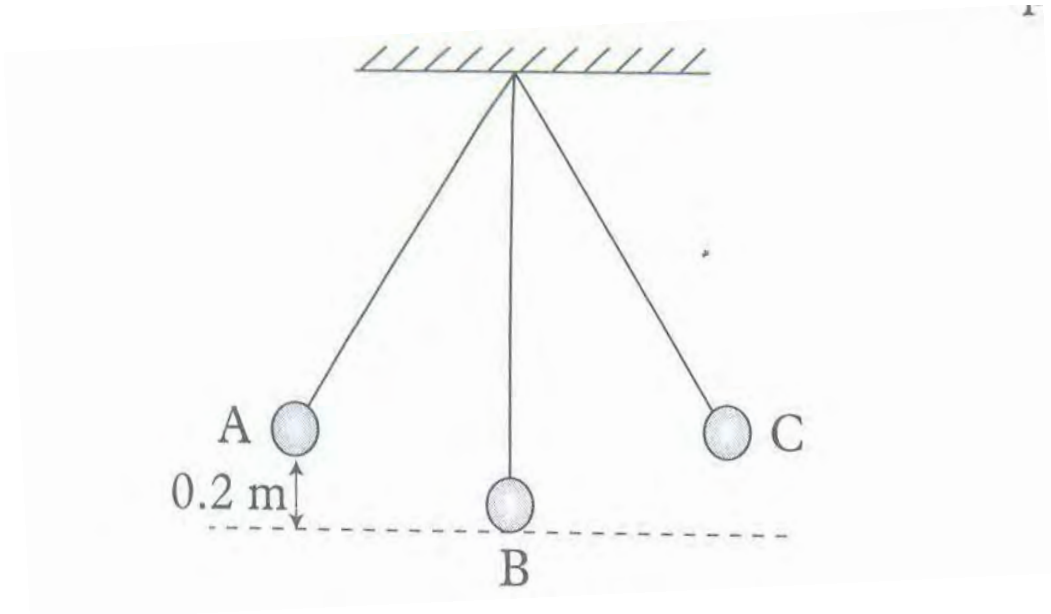
QUESTION FIVE: WORK AND ENERGY (10 MARKS)

The diagram shows one way of using water to generate electricity



a. Write out the words that are missing in the boxes. (4 marks)

b. A pendulum bob of mass 2 kg oscillates between A and C.



i. What form of energy does it passes at B? (1 mark)

ii. Calculate its potential energy at C.....

.....

 (2 marks)

iii. What is its maximum kinetic energy?

.....
 (1 mark)

iv. Find the speed of the bob when it is passing point B

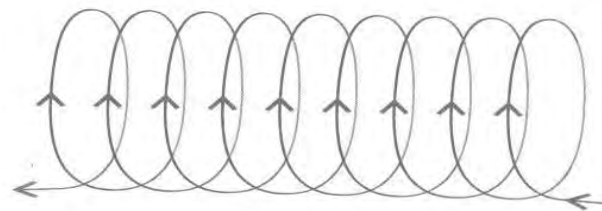
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.....
 (2 marks)

QUESTION SIX: ELECTROMAGNETISM (12 MARKS)

- a. Ahmed is making an electromagnet using a current carrying solenoid and a core.

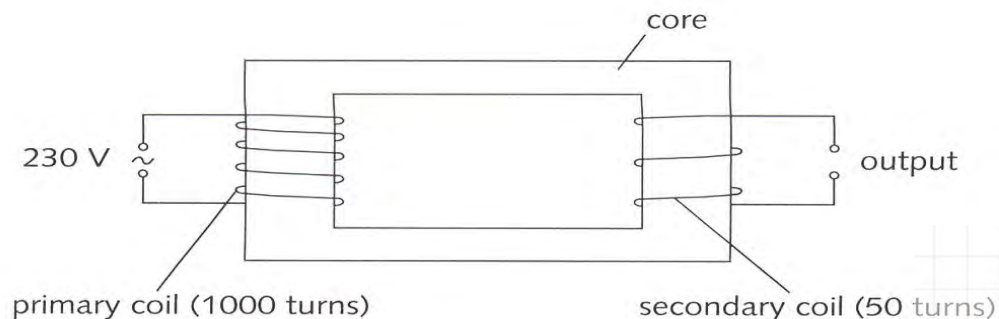


- i. Complete the diagram of the solenoid to show the magnetic field around it. (2 marks)

- ii. Suggest a material that could be suitable for the core. (1 mark)
-

- iii. The core material Ahmed has chosen is magnetically soft. Explain what this means. (2 marks)
-
-

- b. The diagram shows a simple transformer.



The transformer is a step-down transformer.

i. What is a step-down transformer?

.....
..... (1 mark)

ii. How can you tell from the diagram that this is a step-down transformer?

.....
..... (1 mark)

iii. Calculate the output voltage of this transformer

.....
..... (3 marks)

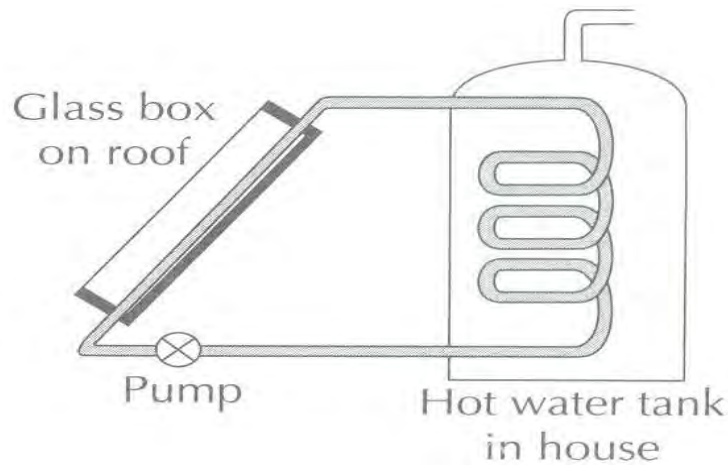
iv. Explain why transformers are used when power needs to be transmitted over long distances

.....
..... (2 marks)

QUESTION SEVEN: HEAT (10 MARKS)

The diagram shows a solar heating panel which is used to heat cold water in a house.





a. Describe how heat is transferred:

i. From the sun to the solar heating panel

.....
 (1 marks)

ii. From the hot water in the pipe to the cold water in the tank

.....
 (1 marks)

iii. Throughout the water in the tank

.....
 (1 marks)

b. Explain why the pipes in the heating panel are painted black.

.....
 (2 marks)

c. Asha wants to heat 2 kg of water at 20⁰ C in an electric kettle. Calculate the amount of heat energy required to reach the temperature of the water to 70⁰ C. (specific heat capacity of water is 4200 J kg⁻¹ °C⁻¹).



.....

 (3 marks)

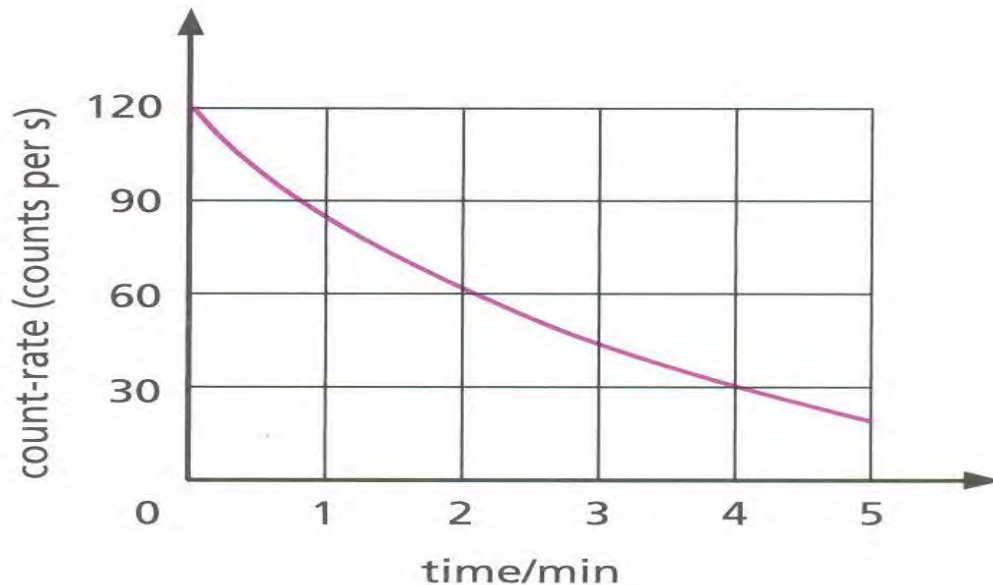
d. Explain why salt is spread over icy roads in cold countries.

.....

 (2 marks)

QUESTION EIGHT: RADIOACTIVITY (8 MARKS)

a. The graph shows the decay curve of a radioactive sample which has a short half-life.



i. What is meant by half-life?

.....
 (2 marks)

ii. What is the half-life of this radioactive sample?



.....
 (1 mark)

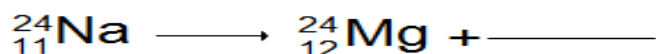
iii. What is the drop in activity over the first 4 minutes?

.....
 (1 mark)

iv. What would be the activity of the sample after 6 minutes?

.....
 (1 mark)

b. When radioactive sodium-24 decays, magnesium-24 is formed. The following equation represents part of the decay process.



Assuming that only one charged particle is emitted:

i. What is the mass number of this particle?

.....
 (1 mark)

ii. What is the relative charge of this particle?

.....
 (1 mark)

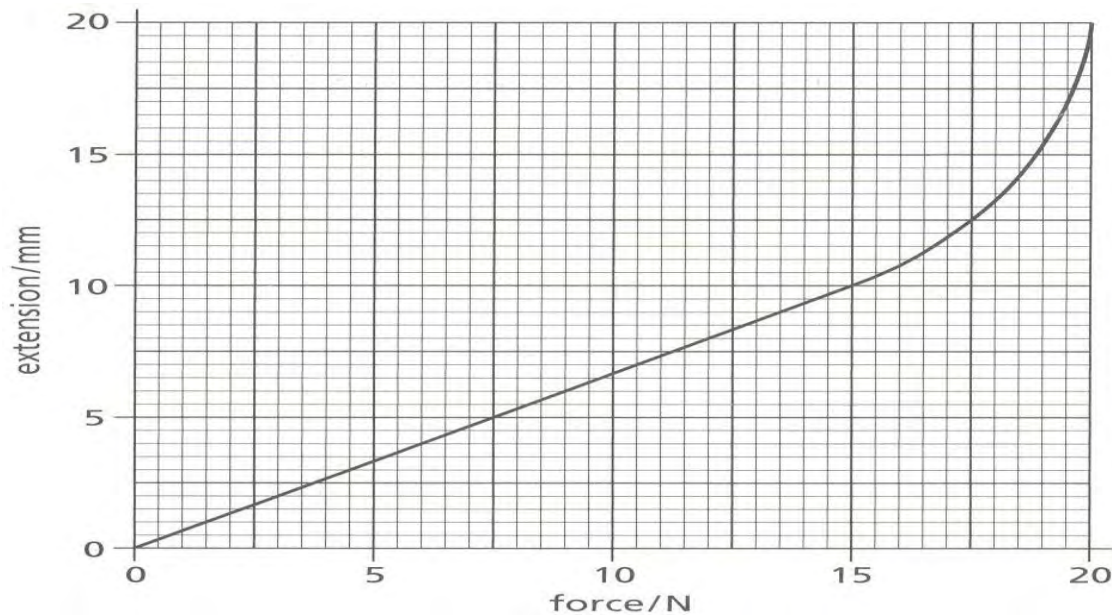
iii. What type of particle is it?



.....
 (1 mark)

QUESTION NNE: FORCES (7 MARKS)

The graph shows an experiment carried out by a group of secondary school students to investigate how the extension of a spring varies with the force applied to it.



a. Describe in words how the extension varies with the force applied to the spring

.....
 (2 marks)

b. Mark the limit of proportionality with an X (1 mark)

c. (i) Write down the extension corresponding to a force of 9 N.

..... (1 mark)

(ii) Write down the force corresponding to an extension of 4 mm

..... (1 mark)

(iii) Calculate the **spring constant** of this spring



.....

.....

..... (2 marks)

