

MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2015

PHYSICS



P/LAND NATIONAL EXAMINATION BOARD

MINISTRY OF EDUCATION AND HIGHER EDUCATION
PUNTLAND NATIONAL EXAMINATIONS BOARD

Code Number

FORM FOUR EXAMINATION 2015
Time 2 hours AND 10 minutes for reading

PHYSICS

Instructions to candidates

- Answer all the questions
- This paper consists of 16 printed pages, count it and if any is missing inform your invigilator
- Do not write your **name and roll number** on the exam paper
- Make sure that **student's profile** is attached to the exam paper, if not, inform your invigilator.
- No extra paper is allowed. Rough work can be done on page 2. This will not be marked
- If you make a mistake, **cross out the incorrect** answer and **write your correct answer**.

This exam paper consists of following parts

PART ONE: Multiple choices

10 marks

PART TWO: Structured questions

90 marks

TOTAL 100 marks

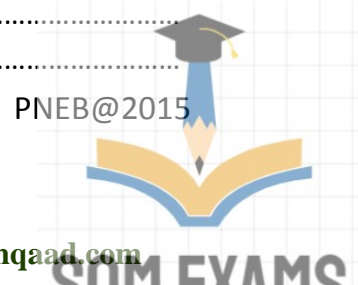
For the marker only

Parts	Marks
Part one	
Part two	
Total	%



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

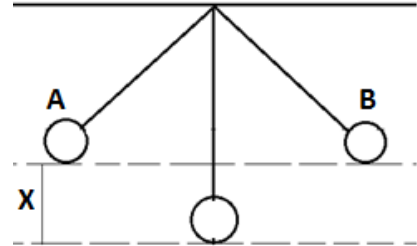
A series of horizontal dotted lines for rough work.



MULTIPLE CHOICE QUESTIONS 10 MARKS

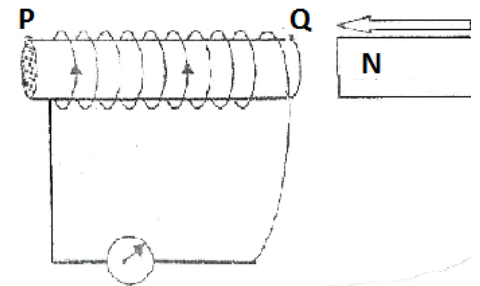
Circle the correct answer in each of the following questions

1. The figure shows a pendulum oscillating back and forth from A to B as shown. The displacement labeled X is known as:



- A. Period
B. Frequency
C. Amplitude
D. Wavelength

2. A bar magnet is pushed into a coil of wire as shown. Which of the following statements is TRUE?



- A. End Q becomes North-pole
B. End P becomes North-pole
C. Current will be induced in the direction shown along the coil
D. No current will be induced in the coil

3. $^{220}_{86}\text{Rn}$ decays by emitting an alpha particle to form an element whose symbol is:

- A. $^{216}_{85}\text{At}$
B. $^{216}_{86}\text{Rn}$
C. $^{218}_{84}\text{Po}$
D. $^{216}_{84}\text{Po}$

4. Which of the following planets has the greatest gravitational field strength?

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

5. The pressure at a point in a liquid

- A. Increases as the depth of the liquid increases
B. Increases if the density of the liquid decreases
C. Decreases as the density of the liquid increases
D. Is constant throughout the liquid

6. Someone's car will not start, so two friends help them by pushing it. By pushing as hard as they can for 10 seconds they make the car reach a speed of 2 m/s. Calculate the acceleration they give to the car.

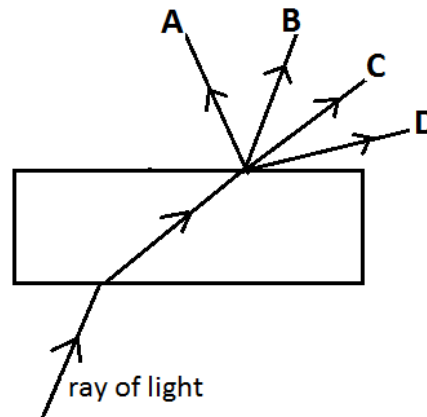
- A. 20 m/s^2
- B. 12 m/s^2
- C. 0.4 m/s^2
- D. 0.2 m/s^2



Mass of car = 800 kg

7. When an object is at rest on a surface, what can you say about the forces on it?
- A. they are all equal
 - B. they are unbalanced
 - C. the forces cancel out
 - D. all the forces are in the same direction
8. A ray of light strikes a glass prism and then passes through it. Which of the rays A to D is the correct representation of the emergent ray?

- A. D
- B. B
- C. A
- D. C



9. The following are forces those act at a distance EXCEPT
- A. Gravitational force
 - B. Magnetic force
 - C. Frictional force
 - D. Electrostatic force
10. Which of the following is NOT a type of simple machine?
- A. Sewing machine
 - B. Lever
 - C. Inclined plane
 - D. Wheel and axle

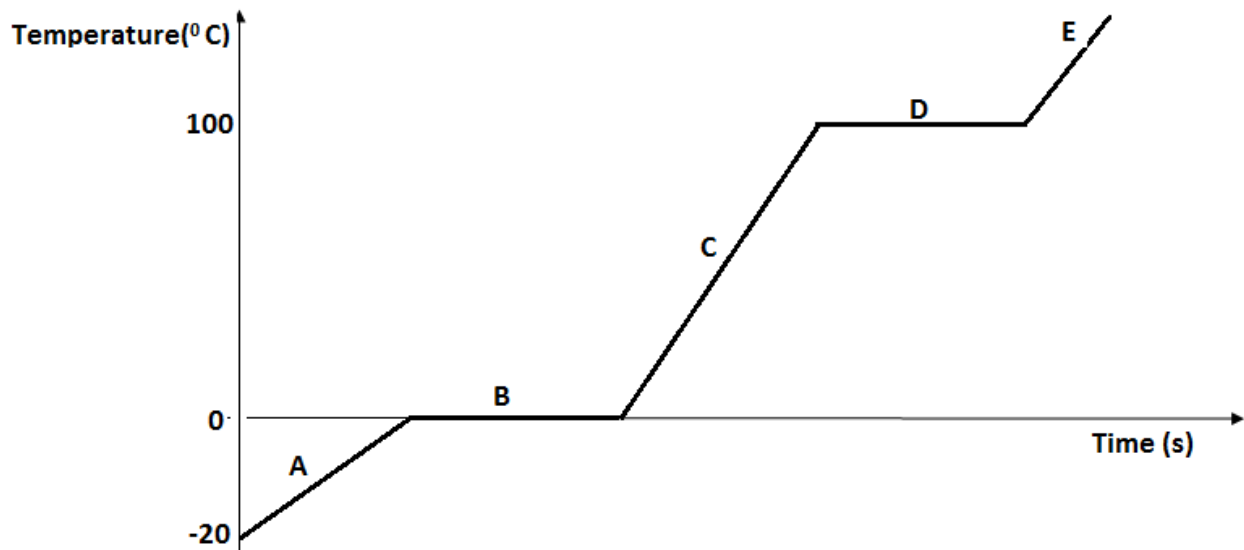
STRUCTURED QUESTIONS

90 MARKS

Answer all of the following questions in the spaces provided

QUESTION ONE 11 MARKS

The graph shows how the temperature of a block of ice at -20°C changes with time.



A. Use the letters on the graph to complete the following.

- I. The substance is pure water at 1 mark
- II. The block of ice has completely changed into steam at..... 1 mark
- III. The substance is pure ice at 1 mark
- IV. There is a change of state at section and 2 marks

B. Calculate the quantity of heat energy required to raise the temperature of 2 kg of water from 20°C to 70°C . (specific heat capacity of water is $4200\text{ J kg}^{-1}\text{ }^{\circ}\text{C}^{-1}$).

.....

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.....

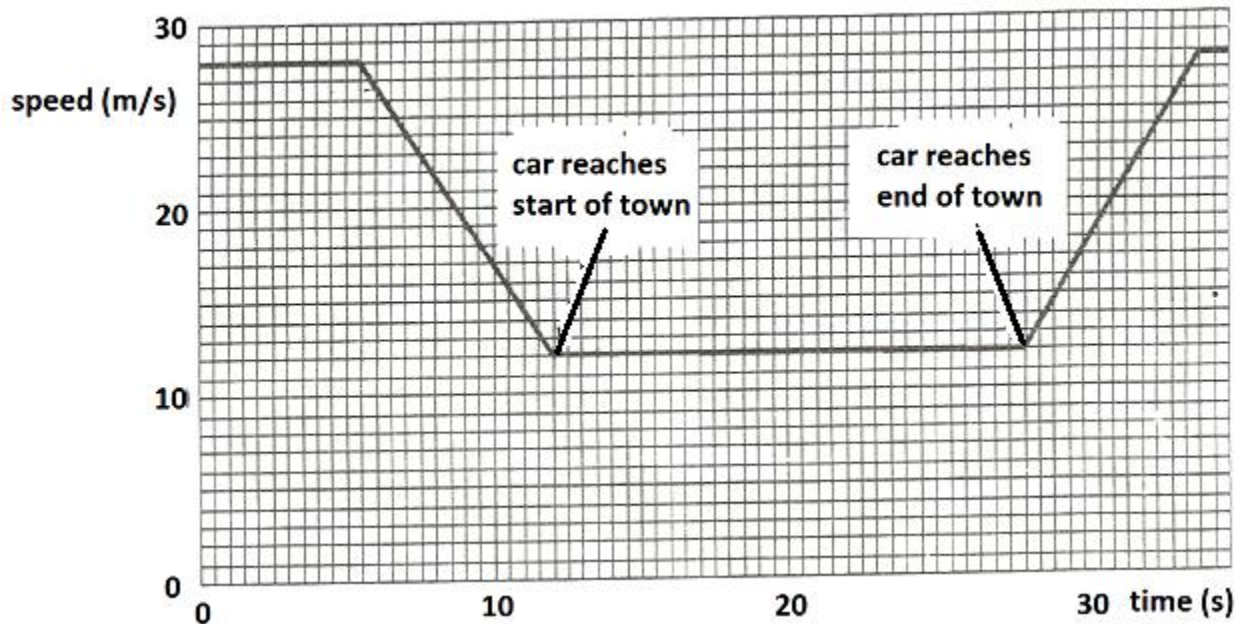
..... 3 marks

C. Use the words given to complete the gaps

- | | Conduction | Evaporation | Convection | Precipitation | Radiation | |
|------|--|--------------------|-------------------|----------------------|------------------|--------|
| I. | is the transfer of heat by hot moving particles | | | | | 1 mark |
| II. | is the transfer of heat by vibrating particles | | | | | 1 mark |
| III. | is the transfer of heat in the form of electromagnetic waves | | | | | |



QUESTION TWO 7 MARKS



The figure represents the motion of a car along a straight road. As the car approaches a small town it slows down. The car travels at a constant speed from the start of the town to the end of the town. After passing through the town the car speeds up.

a. State any two effects of the forces illustrated in the motion of the car

.....
 2 marks

b. From the graph what is the speed of the car in the town?

..... 1 mark

c. Determine the time taken by the car to pass through the town

..... 1 mark

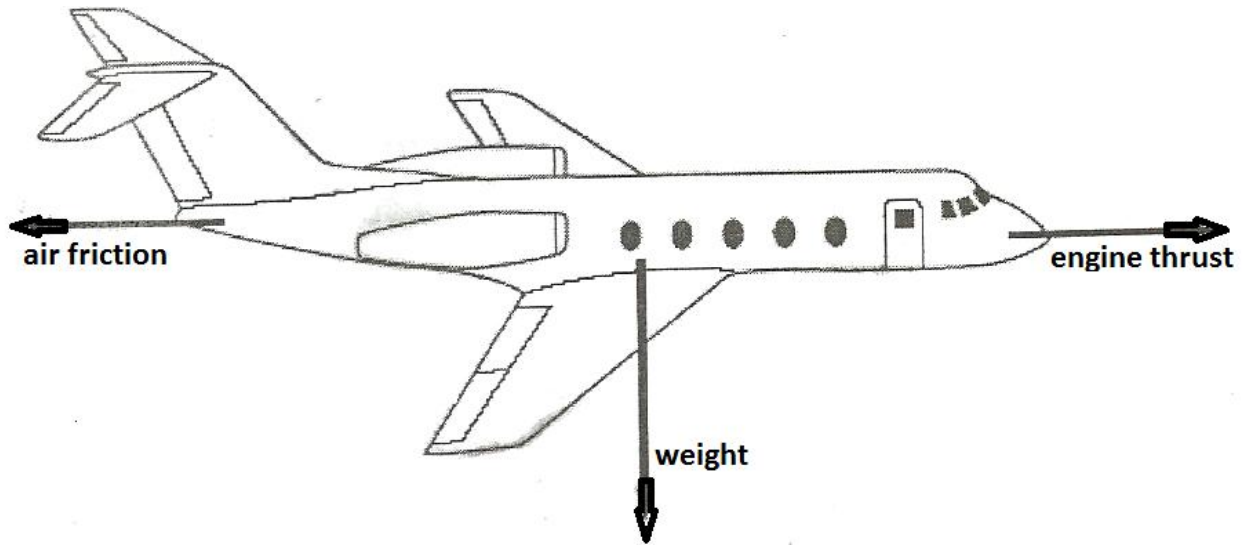
d. Calculate the total distance travelled by the car between the two ends of the town.

.....

.....
..... 3 marks

QUESTION THREE 6 MARKS

An aeroplane is flying horizontally at steady speed in a straight line. The figure shows three of the forces acting on it.



A. In order to fly horizontally at a steady speed, which two of the forces shown on the aeroplane **must** be equal?

..... and 2 marks

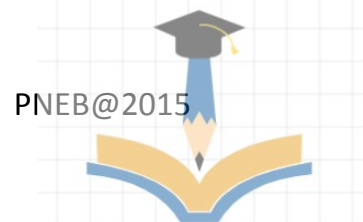
B. In order to fly horizontally in a straight line, there must be a fourth force acting on the plane. Draw an arrow on the figure to represent this force 1 mark

C. The aeroplane flies an outward journey from Garowe to Mogadishu in 3 hours. The distance between the towns is about 1200 km.

I. Calculate the average speed of the aeroplane in km/h

.....
.....
.....
..... 3 marks

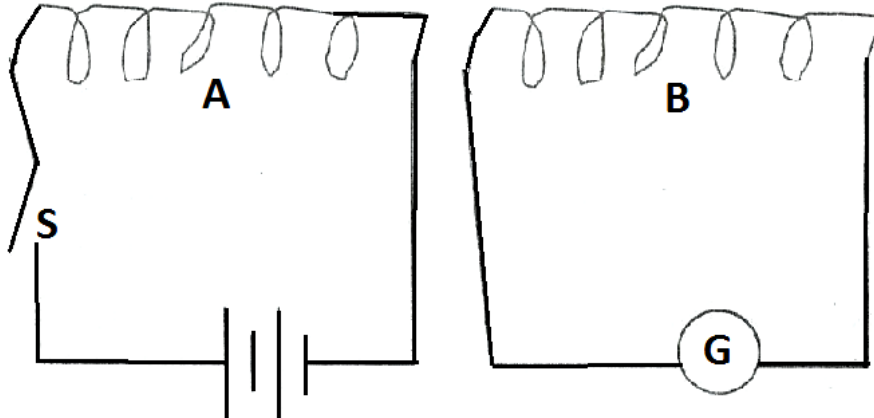
II. On the return journey from Mogadishu to Garowe, the journey is shorter even though the engine thrust is the same. Suggest what may have caused the return journey to be shorter.



.....
 1 mark

QUESTION FOUR 7 MARKS

A. Two coils **A** and **B** are placed near one another as shown.



Coil A is connected to a switch and battery and coil B is connected to a centre-zero Galvanometer.

I. What would happen to the galvanometer in coil B immediately after switch S is closed?

..... 1 mark

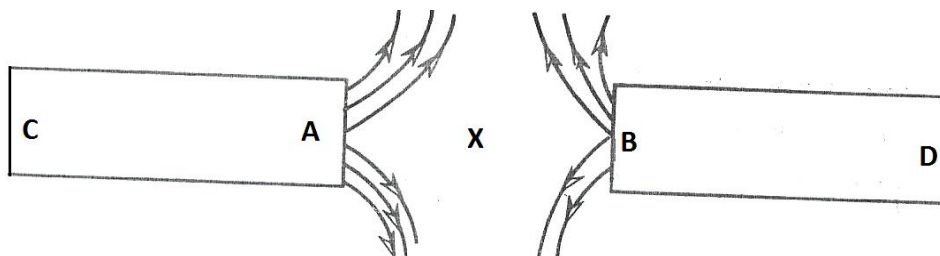
II. What would you expect to happen if soft iron cores were placed in the coils?

..... 1 mark

III. What effect would be seen if the number of turns of coil B is increased?

..... 1 mark

B. The diagram shows the magnetic field pattern between the poles of two bar magnets.



The neutral point is marked X.

I. What is meant by a neutral point?

..... 1 mark

II. C is a south-pole. Identify the other poles illustrated in the diagram.

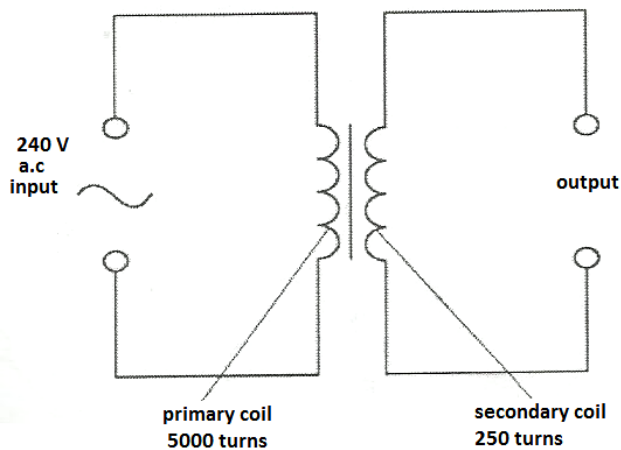
A 1 mark

B 1 mark

D 1 mark

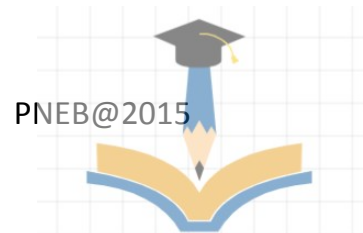
QUESTION FIVE 7 MARKS

A person has a 6 V bell. He hopes to operate the bell from a 240 V a.c mains supply with the help of the transformer shown in the figure.



A. State how you can tell from the figure that the transformer is a step-down transformer.

.....
..... 1 mark



B. State how the output voltage compares with the input voltage in step-down transformer.

.....
 1 mark

C. Calculate the output voltage of the transformer when connected to the 240 V mains supply.

.....

 3 marks

D. Why would it not be wise for the person to connect the 6 V bell to this output?

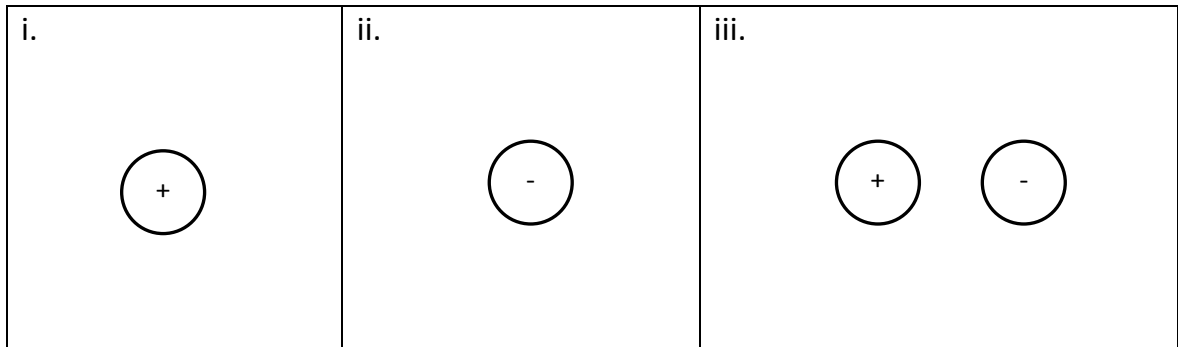
.....
 2 marks

QUESTION SIX 8 MARKS

A. Two balloons are brought near each other with electrostatic conditions as shown in the table. Complete the table below. 5 marks

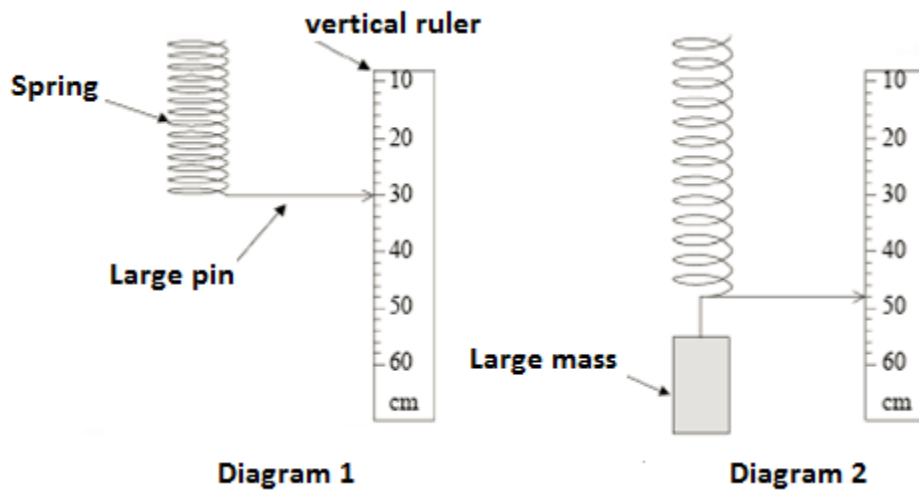
	Electrostatic condition of balloon A	Electrostatic condition of balloon B	Attraction, Repulsion or No effect
1.	+	+	
2.	+	-	
3.	+	Uncharged	
4.	-	Uncharged	
5.	Uncharged	Uncharged	

B. Draw the electric field lines around the following charged objects. 3 marks



QUESTION SEVEN 7 MARKS

A. Diagram 1 shows spring with a large pin attached alongside a vertical ruler. The ruler is marked in cm. Diagram 2 shows the spring with a large mass attached to it.



I. What is the initial reading on the vertical ruler?

..... 1 mark

II. What is the reading on the vertical ruler when a large mass is attached to the spring?

..... 1 mark

III. What is the extension of the spring as a result of adding the large mass?

..... 1 mark

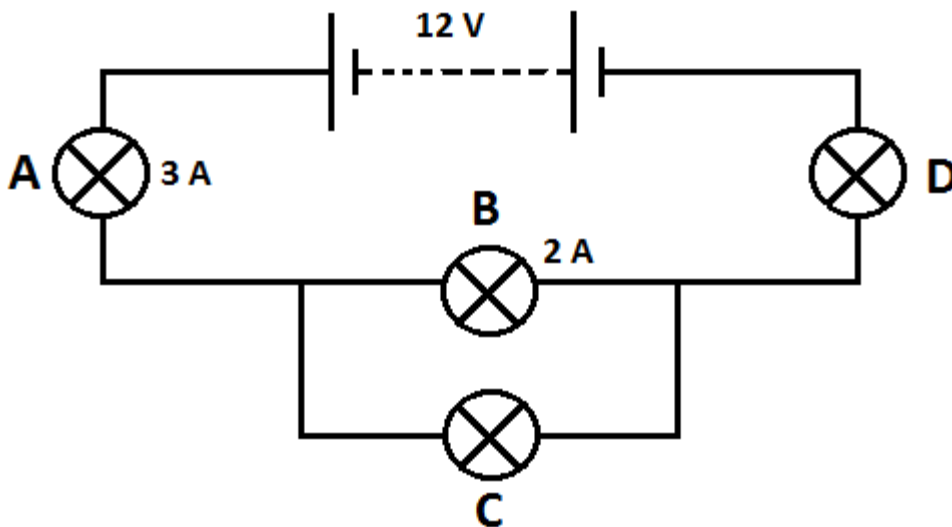
B. Place a tick in the appropriate position to show whether the following quantities are vector or scalar.

4 marks

	Quantity	Vector	Scalar
1.	Force		
2.	Mass		
3.	Speed		
4.	Acceleration		

QUESTION EIGHT 12 MARKS

The circuit shows a battery connected to a switch and four lamps, A, B, C and D. The currents through A and B are shown.



A. Write down the current flowing through

- I. Lamp C
- II. Lamp D

1 mark

1 mark



B. Use the diagram and add:

- I. A voltmeter V that measures the voltage across lamp D 1 mark
- II. A switch that controls lamp B only 1 mark

C. State and explain what effect of adding another cell to the battery would have on the brightness of the lamps in the circuit.

.....
 2 marks

D. Two lamps of 2 ohms and 6 ohms are connected in series and a voltage of 12 V is applied across them. Calculate

- I. The total resistance of the two lamps

.....

 3 marks

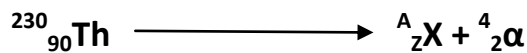
- II. The total current flowing through the circuit

.....

 3 marks

QUESTION NINE 6 MARKS

The nuclear equation represents the radioactive decay of thorium-230. A, Z and X are unknowns.

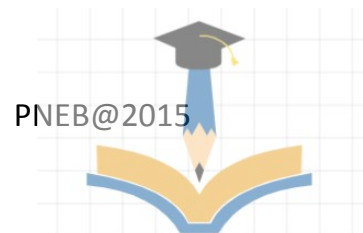


A. What type of radiation is being emitted

..... 1 mark

B. What are the values of A and Z?

A Z 2 marks



C. Use the periodic table to decide what new element is formed by the decay process.

$^{39}_{19}\text{K}$									
	$^{88}_{39}\text{Sr}$								
						$^{207}_{82}\text{Pb}$		$^{210}_{84}\text{Po}$	$^{222}_{86}\text{Rn}$
	$^{226}_{88}\text{Ra}$				$^{235}_{92}\text{U}$				

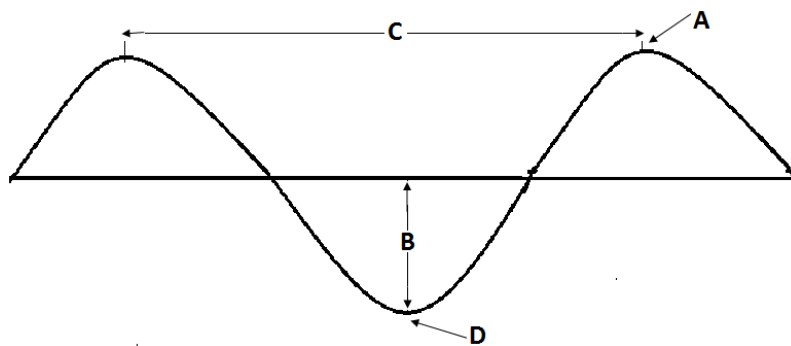
Name of the new element 1 mark

D. Write down the decay products of the nuclear reaction.

..... and 2 marks

QUESTION TEN 9 MARKS

A. Below is a diagram of a wave



Name the parts of the wave labeled A, B, C and D.

A 1 mark

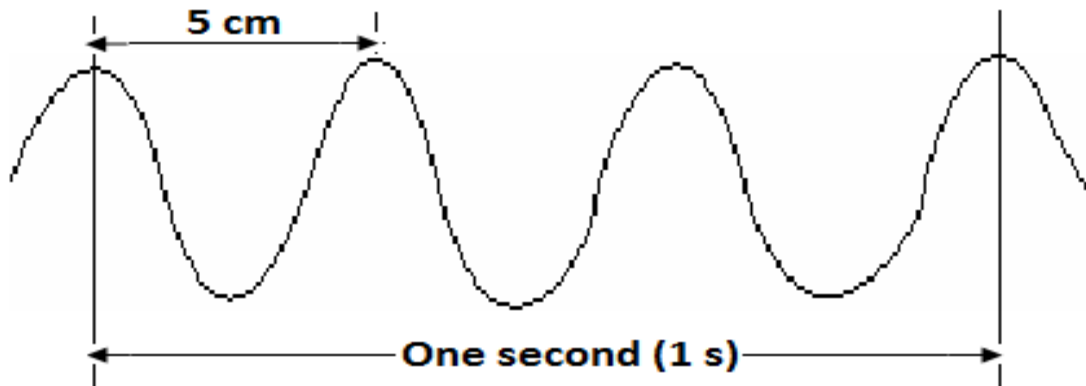
B 1 mark

C 1 mark

D 1 mark



B. Here is a trace of transverse water waves.



- I. Identify the wavelength and the frequency of the waves.
Wavelength = And the frequency = 2 marks
- II. Calculate the speed of the waves

.....

3 marks

QUESTION ELEVEN 8 MARKS

A. A musical instrument produces a sound wave with a frequency of 1000 Hz. The sound wave has a wavelength of 0.34 m in air. Calculate the speed of the sound wave in air.

.....

 3 marks

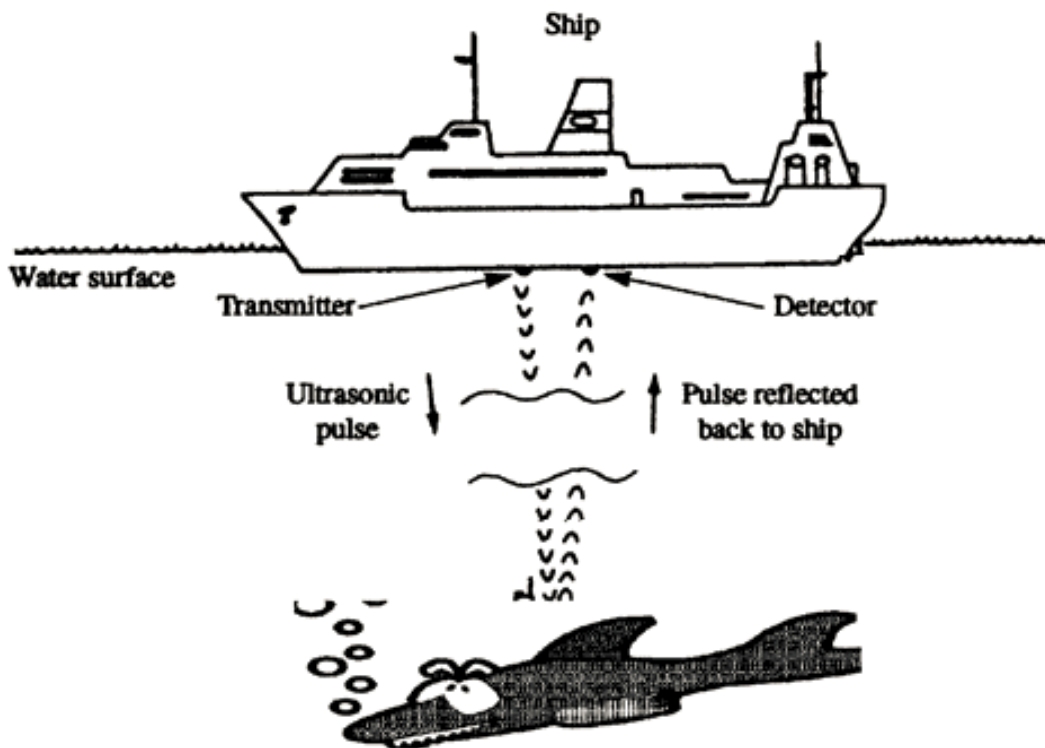
B. In water the speed of sound is different. The speed of a sound wave in water is 1300 m/s. The sound wave has a frequency of 1000Hz. Calculate the wavelength of this sound wave.

.....

 2 marks

C. The diagram shows a ship using an Echo locator (SONAR) to find a shoal of fish. Ultrasound wave is transmitted from the ship, which is then reflected off the top of the shoal and is then picked up by the receiver.





The time taken to receive the echo is 0.2s after transmission. Calculate how deep the ship has to lower its fishing nets to catch the top of the shoal.

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.....
.....
.....
..... 3 marks

D. Define the term **ultrasound**

.....
.....
..... 1 mark

END