MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2014

PHYSICS

20
14

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 2014

TIME 2:10 HOURS

INSTRUCTIONS TO CANDIDATES

This paper consist of 19 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: (11 structured questions) =   90 marks

        Total   =   100 marks

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

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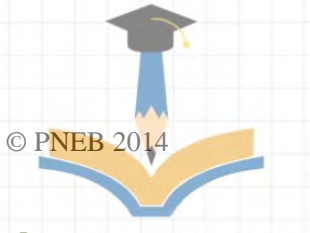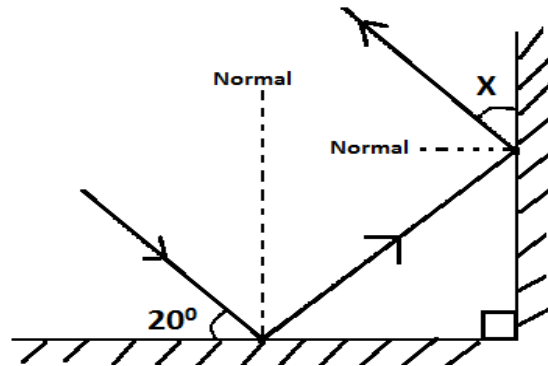**PART ONE: MULTIPLE CHOICE QUESTIONS (Each question carries 1 mark)**

**For each question in this section, <u>circle</u> the correct answer, either A or B or C or D**

eg. Ⓐ

1. Two plane mirrors are joined at 90^0. A ray of light incident at an angle of 20^0 is reflected as shown.

   What is the value of X?

   A. 20^0

   B. 70^0

   C. 90^0

   D. 110^0

2. The diagram shows how much a spring stretches when objects with different masses are hung from it. The extension is directly proportional to the mass.
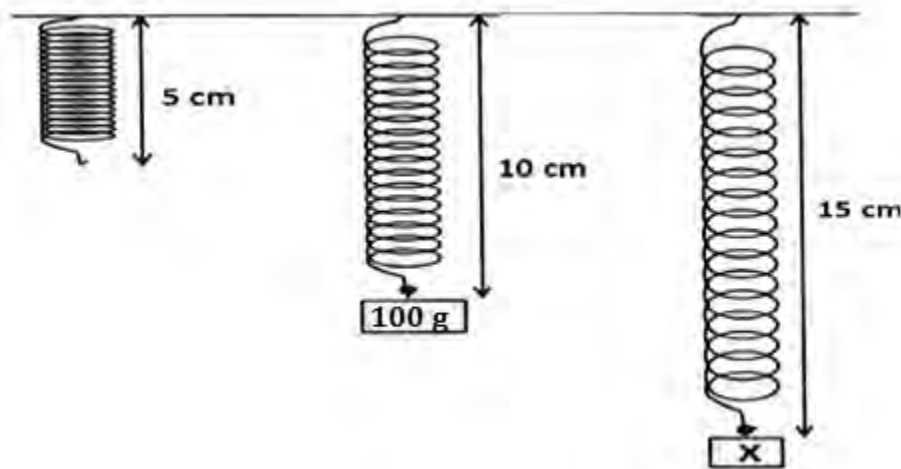
   What is the mass of object **X**?

   A. 125 g
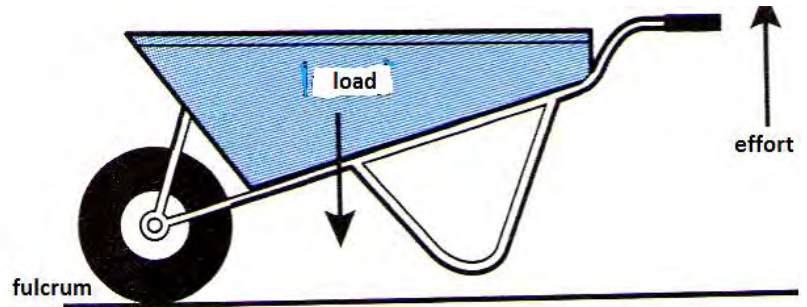
   B. 150 g

   C. 200 g

   D. 300 g

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3. Which of the following actions does **NOT** cause an EMF to be induced in a coil of wire?

    A. Pushing a magnet into a stationary coil

    B. Moving a coil over a stationary magnet

    C. A steady current following through the coil
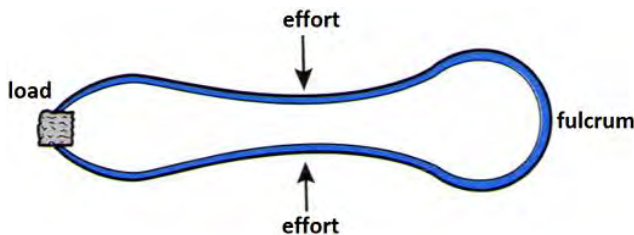
    D. Withdrawing a magnet from inside the coil

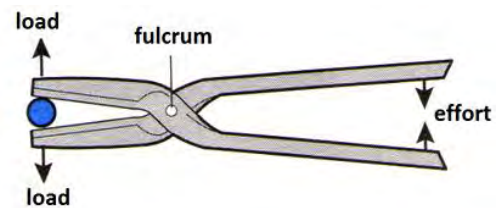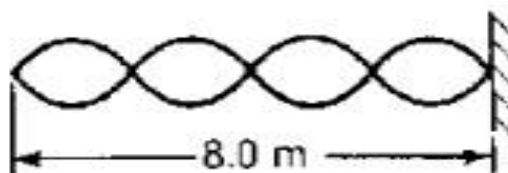4. Identify which of the following simple machines is a **second-class lever**
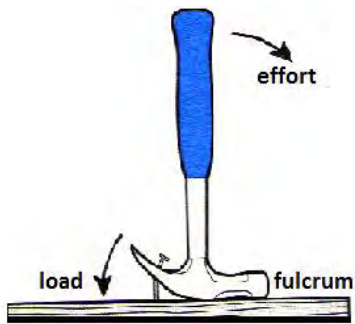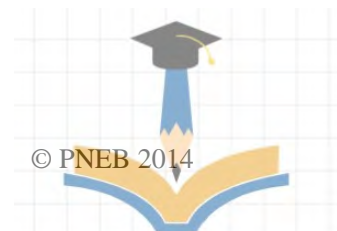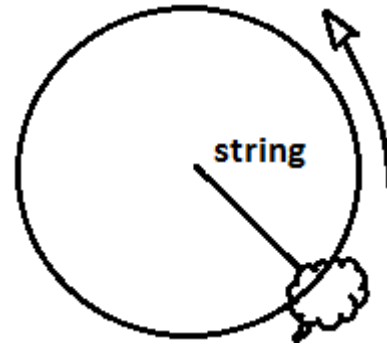

5. What is the wavelength of the standing wave shown below?

    A. 16
    B. 8
    C. 4
    D. 2

6. The diagram shows a stone tied to the end of a string being rotated in a vertical circle. The force acting on the stone towards the centre of the circle is known as

A. Centripetal force

B. Centrifugal force

C. Tension force

D. Rotational force

string

7. In which circuit would lamps **Q** and **R** light but NOT lamp **P?**

A

B

C

D
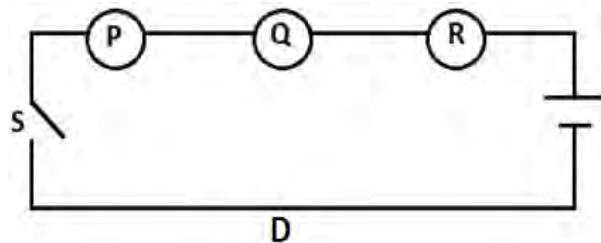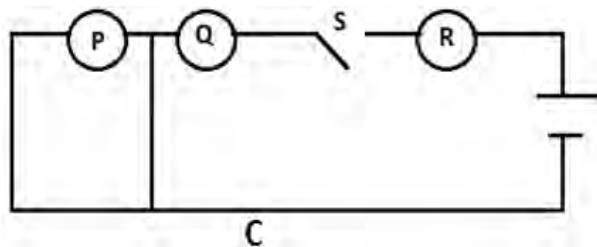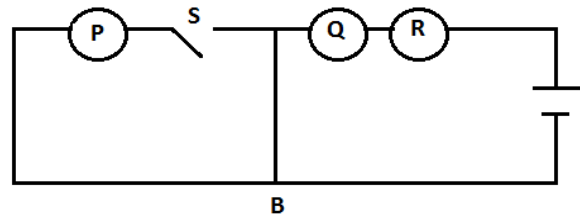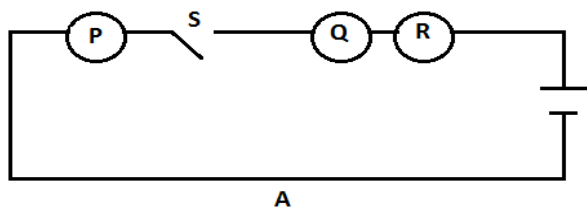
8. Sound waves can NOT pass through

A.   Fresh water

B.   Concrete

C.   The earth

D.   Outer space

9. Vacuum flask has double wall glasses with a vacuum between them. Which processes of heat transfer are reduced by the vacuum?

     A. Convection and radiation

     B. Conduction and radiation

     C. Convection and conduction

     D. Conduction, convection and radiation

10. What is the measurement on the ruler pointed by the arrow
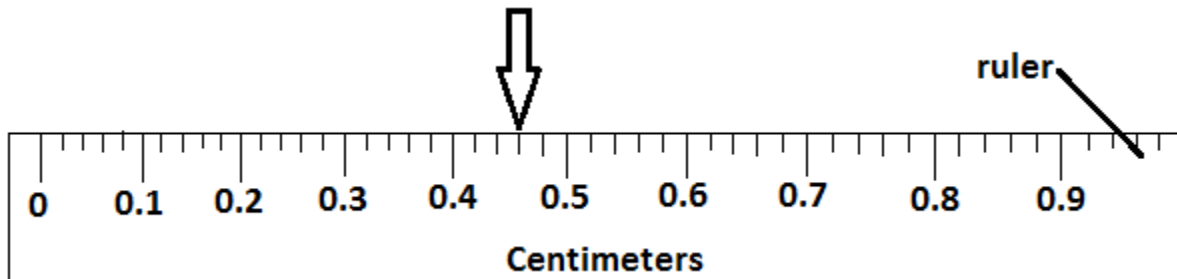
     A. 0.46 cm

     B. 0.42 cm

     C. 0.425 cm

     D. 0.45 cm

PART TWO: STRUCTURED QUESTIONS   (90 MARKS)

Answer ALL the questions in the spaces provided. All answers must be written on this exam paper.

QUESTION ONE: MEASUREMENT   (6 MARKS)

Some fat purchased from a shop is supplied as the block shown below.
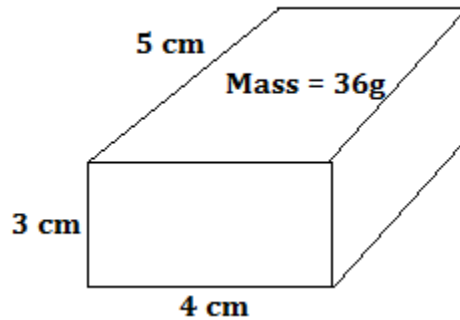
A. Use the information on the diagram to calculate

I.   Volume of the block

………………………………………………………………………………………………………
………………………………………………………………………………………… (2 marks)

II.   The density of the block

………………………………………………………………………………………………………
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(2 marks)

B. Briefly explain the relation between volume and the density.

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(2 marks)
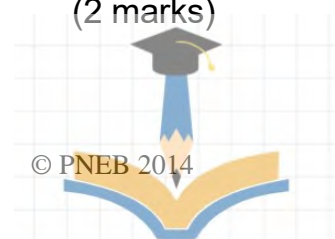
QUESTION TWO: PROPERTIES OF MATTER   (5 MARKS)

A. State the change of state that occurs in each of the following situations.

  I.   Water vapour forms droplets on a cold bathroom mirror

………………………………………………………………………………………………

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

 II.   Candle wax melts as the candle flames

………………………………………………………………………………………………

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

III.   Water dries out on the surface of a cloth that has just been cleaned

………………………………………………………………………………………………

………………… ………………………………………………………………… (1 mark)

B. Use the kinetic theory of matter to explain why liquid can be poured from one cup

into another.

………………………………………………………………………………………………

……………………………………………………………………………………… (2 marks)

QUESTION THREE: WORK AND ENERGY   (7 MARKS)

A.   The table gives data for some energy sources used to generate electricity.

	Energy source	**Generating cost in dollar per kwh**	**Number of grams of carbondioxide produced per kwh**
A	Coal	1.6	1000
B	Gas	1.2	500
C	Hydroelectric	2.4	20
D	Nuclear	2.5	5

Use the data in the table above to match energy sources, A, B, C and D, with the numbers **1– 4** below.

1. Produces the cheapest electricity …………………………………… (1 mark)
2. Is renewable …………………………………… (1 mark)
3. Contributes least to global warming ……………………………….... (1 mark)
4. Contributes most to global warming ……………………………….. (1 mark)

B. A car of mass 1000 kg is travelling at 10 m/s. Calculate the kinetic energy of the car.

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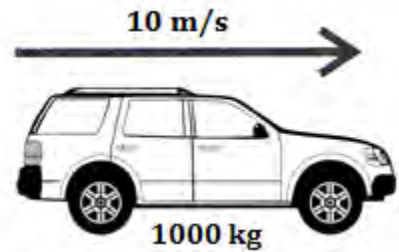
QUESTION FOUR: FORCES   **(10 MARKS)**

A. The diagram shows the principle of hydraulic car jack.

I.   If a force of 50N is applied to the small piston, calculate the pressure produced in the oil at **X**.

....
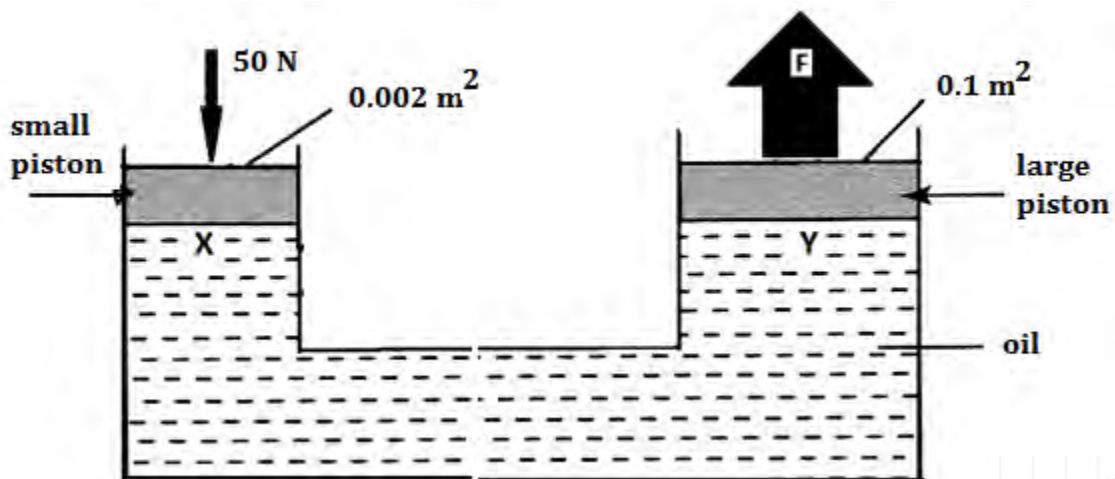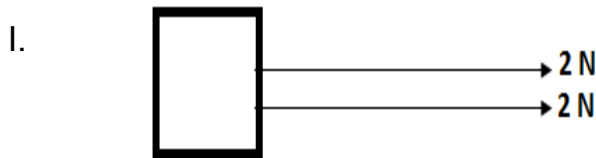
....

....(2 marks)

II.   What is the pressure exerted by the oil at **Y**?

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

III.   Calculate the upward force, **F**, acting on the large piston.

…………………………………………………………………………………………………

……………………………………………………………………………………………………

…………………………………………………………………………………(2 marks)

B. Calculate the resultant force acting on each of the boxes below

I.

→ 2 N
→ 2 N

Resultant force _____ (2 marks)

II.

2 N ←   → 2 N
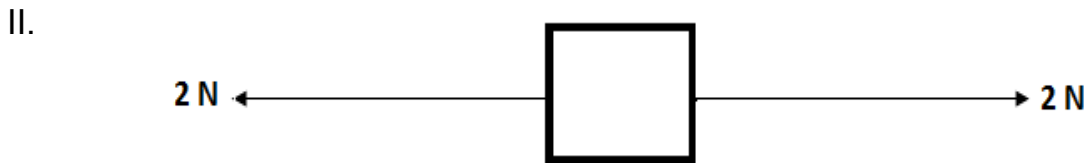
Resultant force _____ (1 mark)

III.

5 N ←   → 2 N

Resultant force _____ (2 marks)

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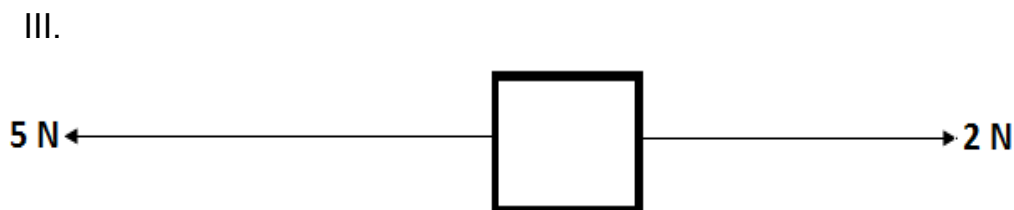
QUESTION FIVE: WAVES   (9 MARKS)

The diagram below shows the complete electromagnetic spectrum.

Radiowaves	Microwaves	A	Visible light	Ultraviolet	B	Gamma rays

A. Name the radiation found at

I.   **A** ……………………………………………………   (1 mark)

II. **B** ……………………………………………………   **(**1 mark)

B. State which of the radiations in the diagram would have

I.   The lowest frequency ……………………………………………..   (1 mark)

II. The shortest wavelength ……………………………………………   (1 mark)

C. Name one radiation in the list that is used for killing bacteria

……………………………………………………………………………………   (1 mark)

D. A radio station produces radio waves of frequency 200,000 hertz and a wavelength of 1,500 metres.

I.   Calculate the speed of the radio waves

…………………………………………………………………………………………

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…………………………………………………………………………(2 marks)

II. Another radio station produces radio waves at 500,000 hertz. What is their wavelength?

…………………………………………………………………………………………

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………………………………………………………………… (2 marks)

QUESTION SIX: ELECTRICITY AND ELECTRONICS   **(12 MARKS)**

A. Two capacitors of 2μF and 3μF are connected in parallel and a potential difference of 12V is applied across them. Calculate

I. The combined capacitance of the two capacitors

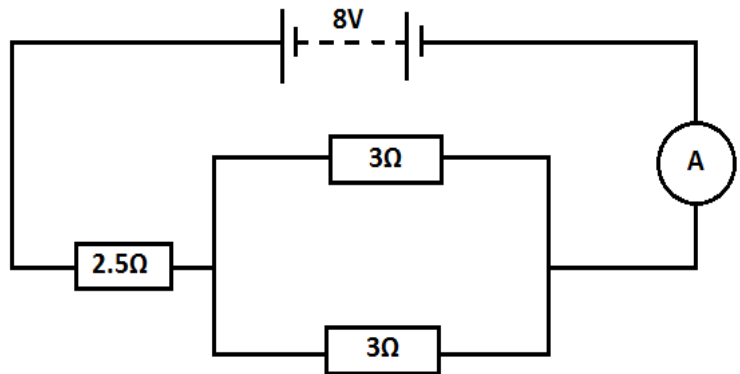……………………………………………………………………………………………………
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II. The total charge stored by the arrangement

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

B. The diagram shows a circuit set by a student in Al-waha secondary school.

I. Calculate the total resistance of the three resistors

…………………………………………
…………………………………………
…………………………………………
…………………………………………

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……………………………………………………………………………………………………
………………………… …………………………………………………………………..(4 marks)

II. Find the current flowing through the ammeter

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……………………………………………………………………………………………………
…………………………………………………………………………………………......(2 marks)
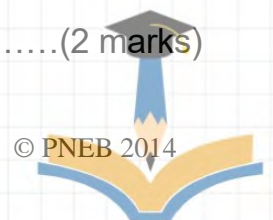
C. Complete the output column of the truth table using the logic gate shown below.

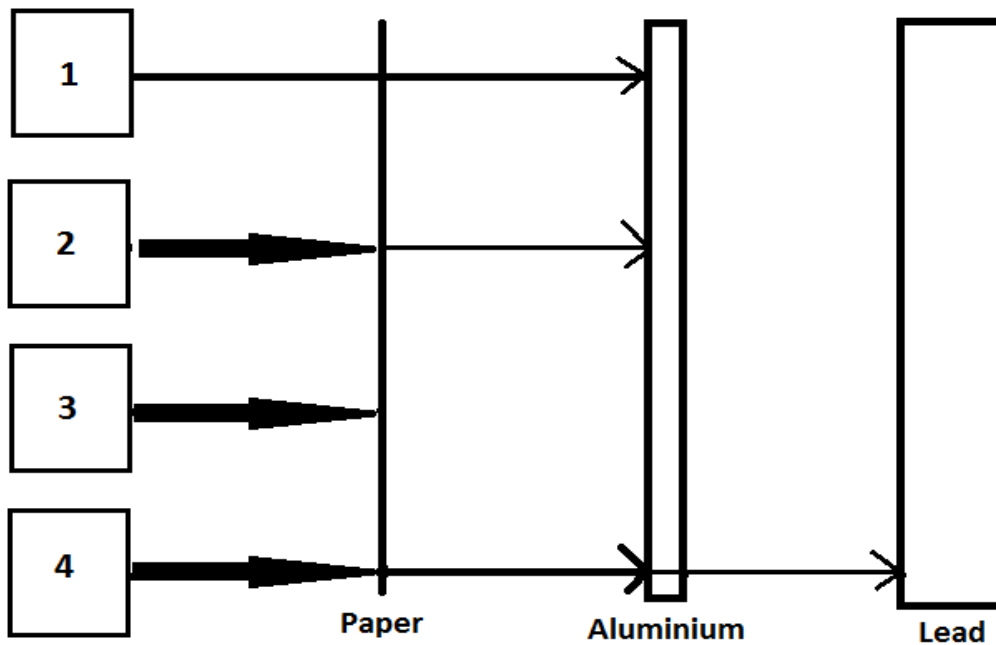| INPUTS		OUTPUT
A	**B**	**Q**
0	0	
0	1	
1	0	
1	1	
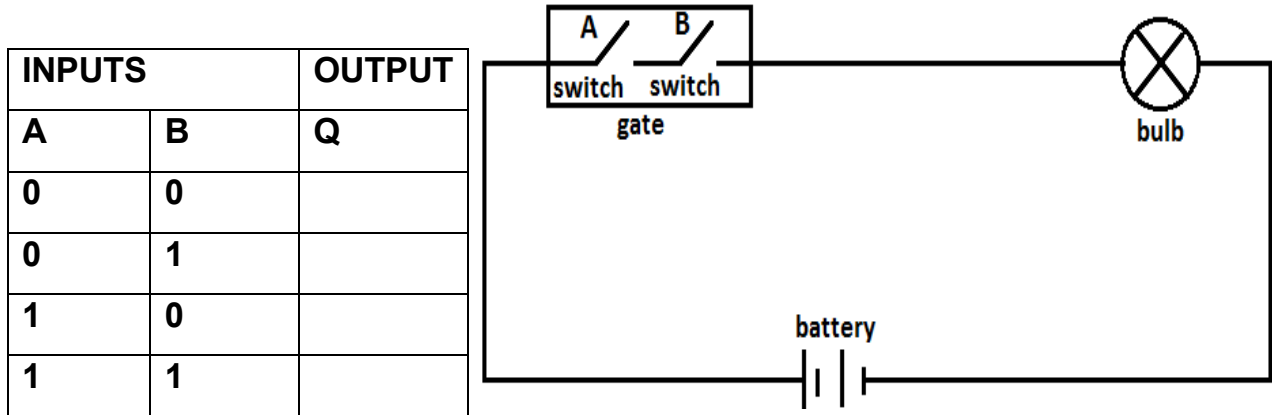
(2 marks)

QUESTION SEVEN: RADIOACTIVITY   (6 MARKS)

A. Three absorbers are placed in front of four sources of radiation, **1**, **2**, **3** and **4**.

The amount of radiation is represented by the thickness of the horizontal arrows.

Match the statements, **I**, **II**, **III** and **IV**, with the labels **1– 4** on the diagram.

I. Source gives off alpha radiation only. ………………………………… (1 mark)

II. Source gives off alpha and beta radiation only. ……………………… (1 mark)

III. Source gives off alpha, beta and gamma radiation. ……………………… (1 mark)

IV. Source gives off beta radiation only. ………………………………… (1 mark)

B. State two properties of beta radiation (β)

I. …………………………………………………………………………(1 mark)

II. ………………………………………………………………………… (1 mark)
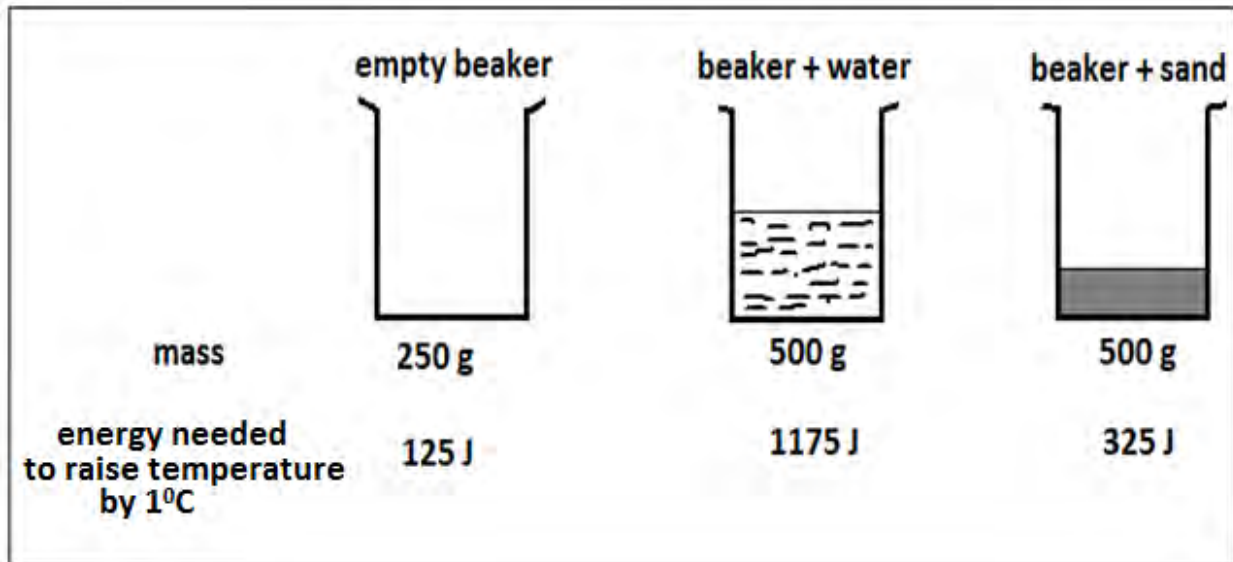
QUESTION EIGHT: HEAT　　　　(7 MARKS)

A. Complete the following sentence.

The temperature of a body rises when the ………………………… energy of its molecules is increased.　　　　　　　　　　　　　　(1 mark)

B. The diagram gives details about an empty beaker and the same beaker with different substances in it.

	empty beaker	beaker + water	beaker + sand
mass	250 g	500 g	500 g
energy needed to raise temperature by 1^{0}C	125 J	1175 J	325 J

I. Which of the arrangements has the highest thermal capacity?

…………………………………………………………………………… (1 mark)
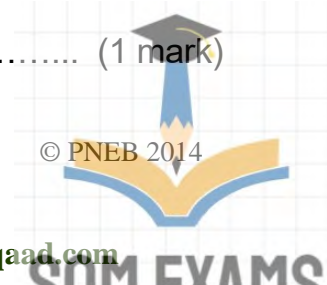
II.   How much energy is needed to raise the temperature of the water by 1^0 C?

………………………………………………………………………………………………………

………………………………………………………………………………… (1 mark)

III.   How much energy is needed to raise the temperature of the sand by 1^0 C?

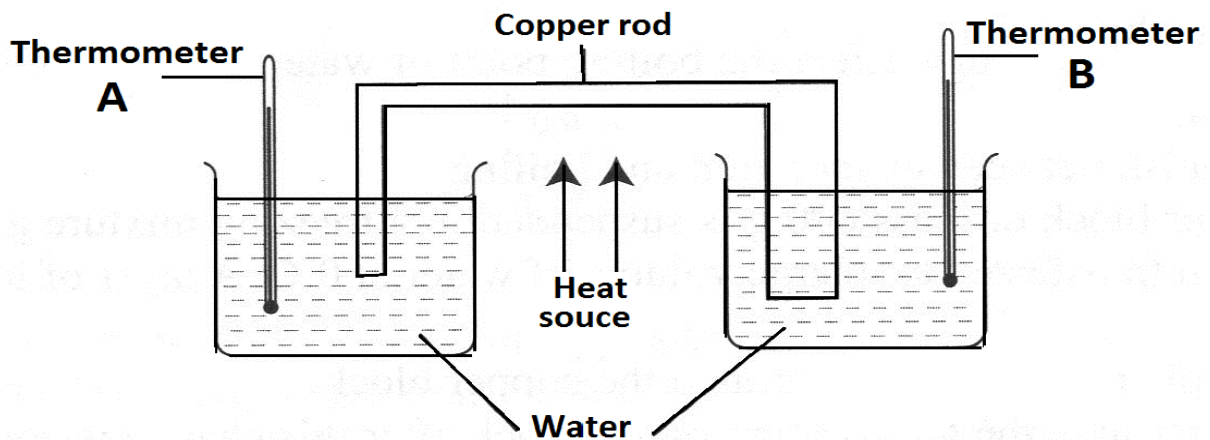………………………………………………………………………………………………………

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

IV.   Use your answers above to suggest why on a sunny day, the temperature of the sand on a beach rises faster than the temperature of the sea.

………………………………………………………………………………………………………

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

C. A form two student set the apparatus shown. The reading of the thermometers was the same initially. She heated the metal rod at the middle.

Which thermometer was at higher temperature? Explain.

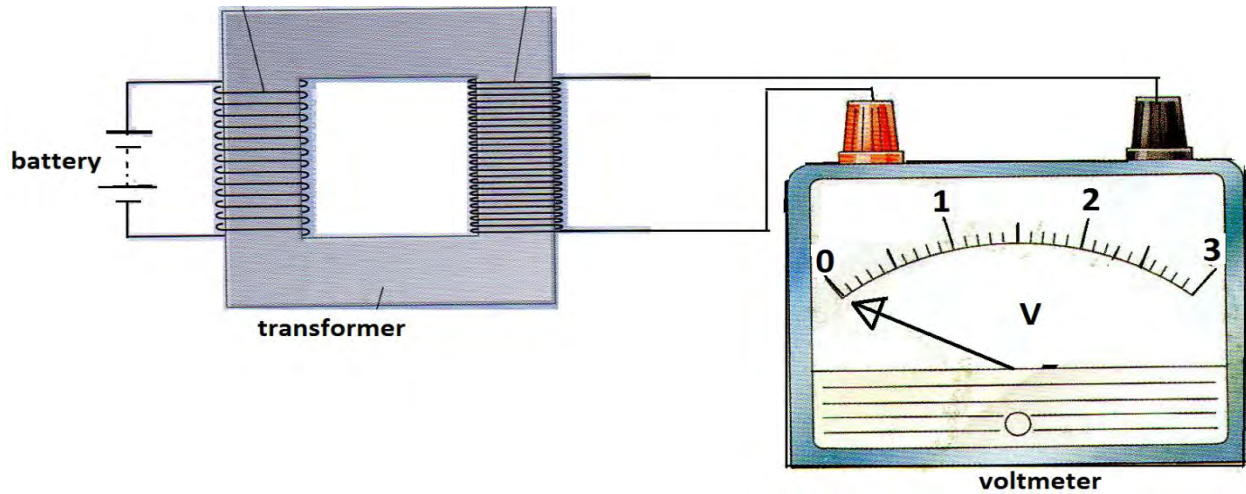………………………………………………………………………………………………………

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(2 marks)

QUESTION NINE: ELECTROMAGNETIC INDUCTION   (8 MARKS)

Ahmed is trying to test a transformer using a battery.

A. Explain why the voltmeter connected to the secondary coil reads 0 V?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

………………………………………………………………………………………(2 marks)

B. Ahmed finds an AC power supply and reconnects the transformer. His results are:

   V_p = 12 V, I_p = 2 A, V_s = 4 V.

I.   Calculate the power input to the transformer

…………………………………………………………………………………………………

…………………………………………………………………………………………………

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

II.   Calculate the current in the secondary coil, I_s.

…………………………………………………………………………………………………

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…………………………………………………………………………………………(2 marks)
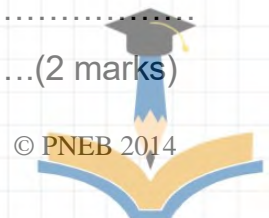
III.   The primary coil has 15 turns. How many turns must be on the secondary coil?

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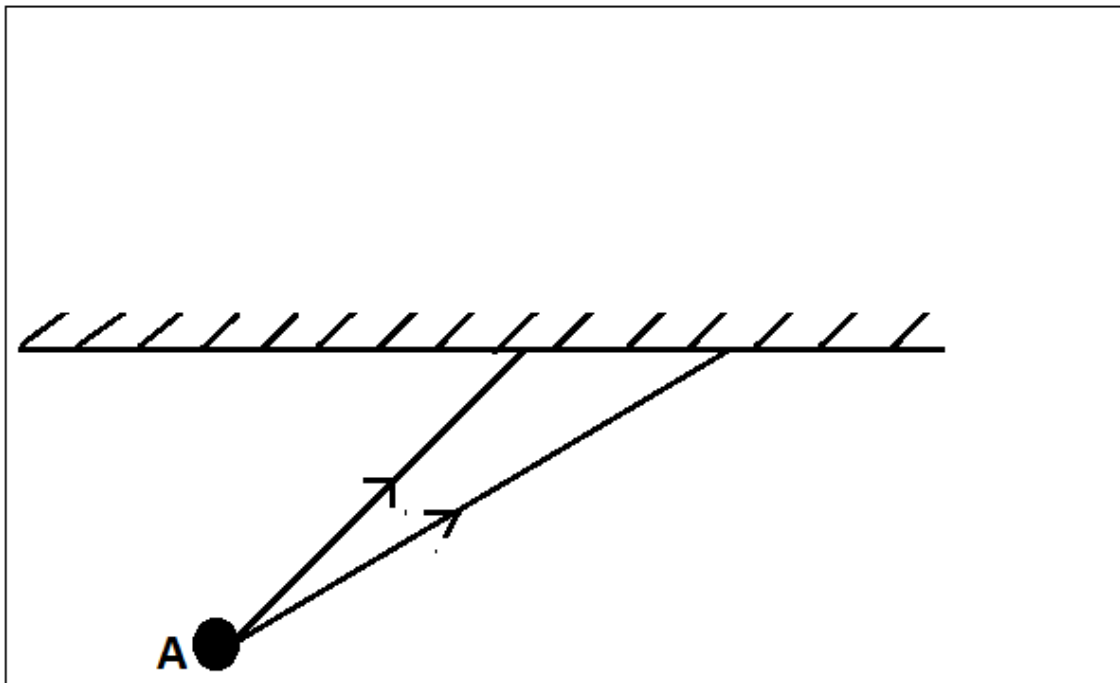………

…………………………………………………………………………………………… (2 marks)

QUESTION TEN: LIGHT   (11 MARKS)

A. The sketch shows two rays of light from a point **A** on an object. The rays are incident on a plane mirror.

I.   Complete the path of the rays as they strike on the mirror and locate the correct position of the mage formed.   (3 marks)

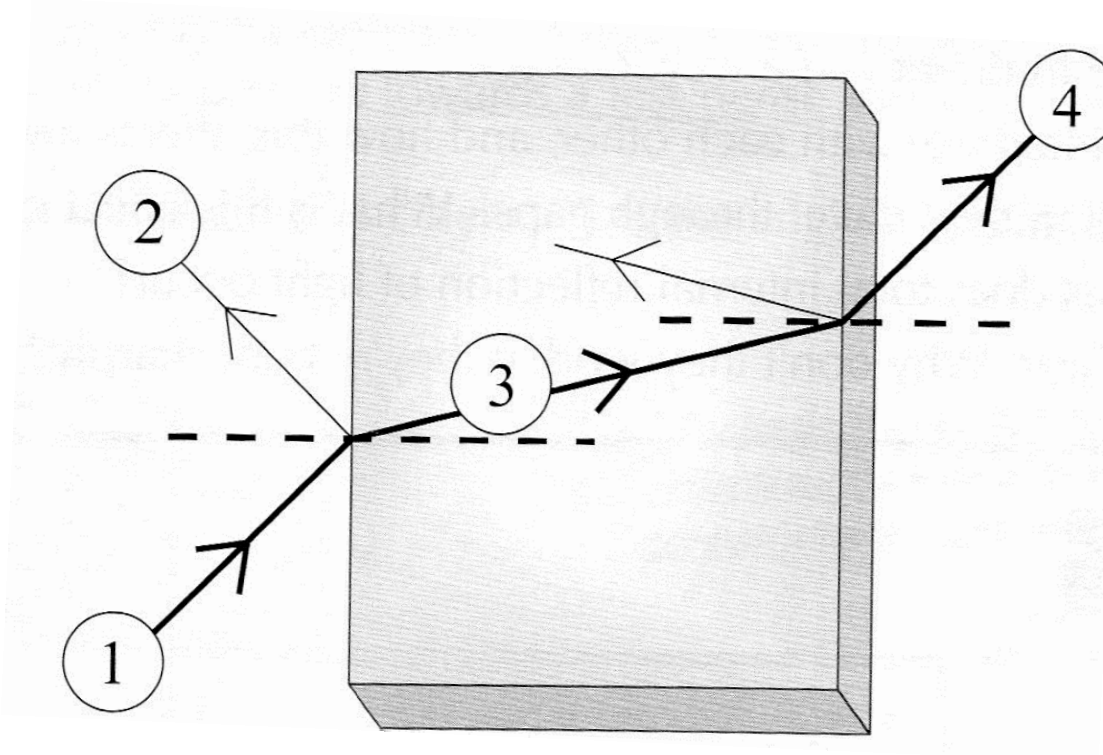I.   State two properties of the image formed by this mirror.

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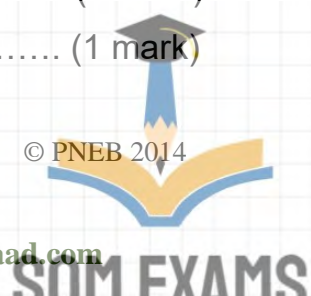
…………………………………………………………………………………………………..

(2 marks)

B. The diagram shows a light ray entering and leaving a glass block.

Match the rays **A**, **B**, **C** and **D** to labels **1**, **2**, **3** and **4** on the diagram.

A a reflected ray …………………………………………………………… (1 mark)

B a refracted ray …………………………………………………………… (1 mark)

C an emergent ray …………………………………………………………. (1 mark)

D an incident ray ……………………………………………………..……. (1 mark)

C. State two conditions necessary for total internal reflection to occur.

I. ………………………………………………………………………………………………
………… …………………………………………………………………………….......

(1 mark)

II. ………………………………………………………………………………………………
………………………………………………………………………………..…………

(1 mark)

QUESTION ELEVEN: MOTION   (9 MARKS)

The velocity-time graph represents the motion of a car along a straight road.
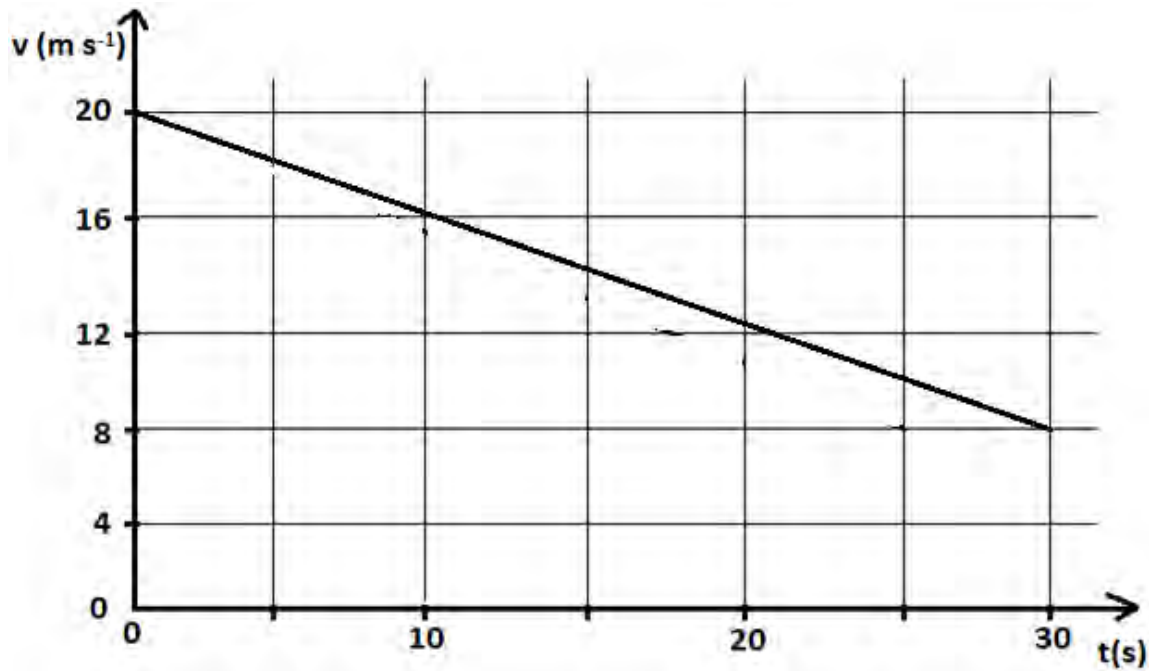
A. Describe the motion of the car in words.

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………

(2 marks)

B. From the graph, deduce the car's initial and final velocities.

I.   Initial velocity …………………………………………………………….(1 mark)

II. Final velocity …………………………………………………… (1 mark)

C. Calculate the car's acceleration

……………………………………………………………………………………………

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(2 marks)

D. What was the displacement of the car?

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(3 marks)

END