

Physics I

011

11/11/2016

08.30AM – 11.30AM

**YEAR
2016**

ORDINARY LEVEL NATIONAL EXAMINATIONS, 2016

SUBJECT: PHYSICS I

DURATION : 3 HOURS

INSTRUCTIONS:

- 1) Do not open this question paper until you are told to do so.
- 2) Write your names and index number as they appear on your registration form.
- 3) This paper has **THREE** sections **A, B** and **C**.

SECTION A: Attempt **ALL** question. **(55 marks)**

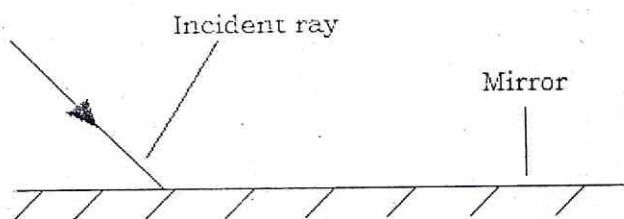
SECTION B: Attempt any **THREE** questions **(30 marks)**

SECTION C: Attempt **ONLY ONE** question. **(15 marks)**

- 4) Calculators and mathematical instruments may be used.
- 5) Use **only a blue or black pen and pencil**.

SECTION A: Attempt all questions. (55 MARKS)

- 1) Which instrument would you use to measure each of the following quantities?
 - a) The mass of a stone. (1 mark)
 - b) The diameter of 100Frw coin. (1 mark)
 - c) The weight of a stone. (1 mark)
 - d) The volume of water. (1 mark)
- 2) For each of the statements below, indicate TRUE if it is correct and FALSE if it is wrong.
 - a) Density of water is less than the density of ice..... (1 mark)
 - b) The density of ice is less than the density of water because when water freezes it expands (volume increases) while its mass remains the same..... (1 mark)
 - c) The density of ice is greater than the density of water because ice is a solid..... (1 mark)
- 3)
 - a) What is the difference between speed and velocity of a moving body? (2 marks)
 - b) How far will a cyclist travel in 2 hours if his velocity is 8m/s? (2 marks)
- 4)
 - a) Give one example in which friction is a disadvantage. (1 mark)
 - b) Explain why wheels of bicycles turn on ball bearings. (3 marks)
- 5)
 - a) When a stone is thrown up, it goes up for a while and then falls down, what causes the stone to fall down? (1 mark)
 - b) A stone is thrown vertically upwards with initial velocity of 20m/s. how high does the stone rise in air? Take $g = -10\text{m/s}^2$. (3 marks)
- 6)
 - a) A boy standing on the ground exerts a force equal to his weight on that ground. If the boy's weight is 600N and the area of his shoes in contact with the ground is 120cm^2 . Calculate the pressure he exerts on the ground. (2 marks)
 - b) If the boy in 6(a) lies flat on the ground, what effects does this position have on the pressure on the ground? Explain your answer. (2 marks)
- 7)
 - a) Convert 20°C to Kelvin scale. (1 mark)
 - b) What causes convection currents to rise when a liquid is heated? (2 marks)
 - c) What is meant by "heat transfer by radiation method"? (1 mark)
- 8) Copy the diagram below and show the path of the ray of light after reflection from the plane mirror. Name the reflected ray, the angle of incidence and the angle of reflection. (4 marks)



- 9) The table below shows how charged objects affect each other when they are brought close to each other. Copy the table and complete it. (4 marks)

Charge on object A	Charge on object B	Force
Positive		Repel
Positive	Negative	
	Positive	Attract
Negative		repel

- 10) a) When is an object in equilibrium state? (1 mark)
 b) State the condition for a body to be in a neutral equilibrium. (1 mark)
 c) A uniform meter rule is pivoted at 50 cm mark. A force of 150N placed at 70 cm mark balances a force F placed at 20 cm. Find force F. (2 marks)
- 11) a) State the law of floatation. (2 marks)
 b) A ship may travel from the sea into a river. Explain why the ship will sink deeper in the river than in the sea. (2 marks)
- 12) Below are examples of changes of matter. For each change; state whether it is a physical change or a chemical change.
 a) Thermal expansion due to heating. (1 mark)
 b) Burning a piece of wood. (1 mark)
 c) Dissolving sugar in hot water. (1 mark)
 Reaction between sodium and water. (1 mark)
- 13) The figures below are simple electric circuits. The lamp figure 1 is normally bright.

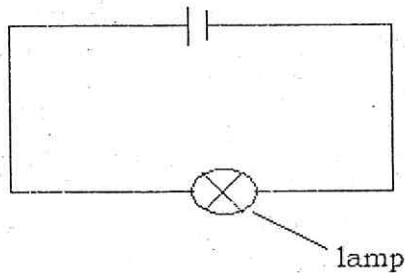


Figure 1

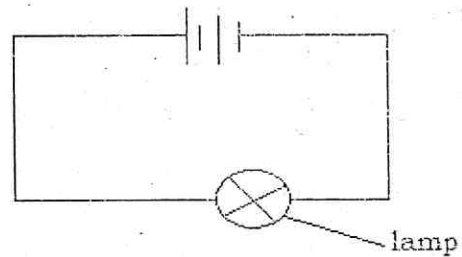


Figure 2

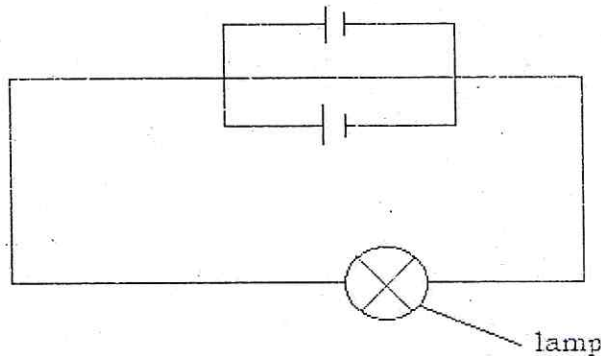


Figure 3

- a) Use the words "normal bright," "brighter than normal," "dimmer than normal bright" to describe the brightness of lamps in Figures 2 and Figure 3. (all three lamps are identical). (2 marks)
- b) Identify the arrangement of cells in:
 (i) Figure 2. (1 mark)
 (ii) Figure 3. (1 mark)
- 14) a) What is the difference between a convex lens and a concave lens? (2 marks)
 b) Which lens would you use to correct:
 (i) Long sight eye defect? (1 mark)
 (ii) Short sight eye defect? (1 mark)

SECTION: Attempt only three questions. (30 marks)

- 15) a) Copy Figure 4 below and complete it to show the path of the incident ray through the water from the air. Does the ray remain straight as it travels through water? Explain your answer.

(3 marks)

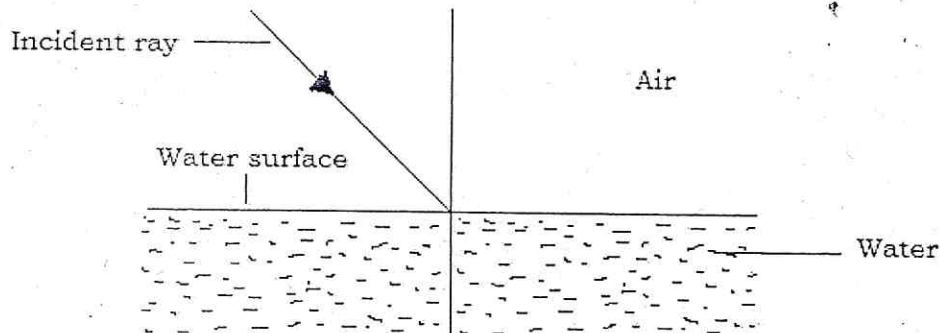


Figure 4

- b) What is meant by the “dispersion of white light”?

(2 marks)

- a) Copy the diagram below of a ray of light passing through a prism and complete it.

Show the angle of deviation.

(2 marks)



- d) Explain how a rainbow is formed.

(3 marks)

- 16) a) What is meant by “specific latent heat of fusion of a substance”?

(2 marks)

- b) How much heat will change 10g of ice water at 0°C to liquid water at 0°C ?
take specific latent heat of fusion of ice = 340J/g .

(2 marks)

- c) i) At what temperature does evaporation occur?

(1 mark)

- ii) What causes the evaporation to happen rapidly?

(3 marks)

- d) Explain how our bodies keep temperature constant after a vigorous exercise.

(2 marks)

- 17) a) State effects of electric current which show its existence.

(3 marks)

- b) The opposition of a conductor to current flow is called its resistance.

- i) What effects does increasing temperature of the filament of an electric lamp have on the resistance of the filament?

(1 mark)

- ii) Which has more resistance, a thin conductor wire and a thick conductor wire?

(1 mark)

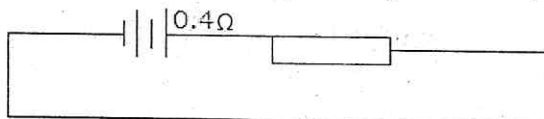
- c) Define the term ‘electromotive force of a cell’.

(2 marks)

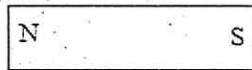
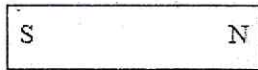
- d) The electromotive force of two dry cells is 3.0V . The internal resistance of each cell is 0.3Ω . A resistor of 0.4Ω is connected in series to the two cells which are arranged in series.

Calculate the current. (See diagram below)

(3 marks)



- 18) a) What is meant by a “magnetic material”? Give an example of a magnetic material. (2 marks)
- b) State any two methods of magnetizing a steel bar. (2 marks)
- c) The diagrams below are bar magnets.



Copy the diagrams and show magnetic lines of force around them. Show the neutral point on the diagrams.

(3 marks)

- d) Why is it bad to heat or hammer a bar magnet? (1 mark)
- e) How is a magnet used to show geographical directions on earth? (2 marks)
- 19) a) What is meant by a body with a uniform acceleration? (2 marks)
- b) A car travelling at 10m/s accelerates uniformly for 5s and reaches a velocity of 20 m/s. calculate the acceleration? (2 marks)
- c) A bus driver, travelling at 25m/s, applies his brakes and stops with uniform retardation in 2.0s.
- (i) What is meant by uniform retardation? (2 marks)
- (ii) Calculate the retardation. (3 marks)

SECTION C: Attempt one question

(15 marks)

- 20) In an experiment to determine the rate of change of temperature water when the supply of heat was constant, the following results were obtained:

Time/minutes	Temperature/°C
1	35
3	55
5	75
7	95
8	95
9	95

- a) On a graph paper, plot a graph of temperature (along y- axis) against time (along x – axis). (10 marks)
- b) Using your graph; find:
- (i) The room temperature where the experiment was conducted. (1 mark)
- (ii) The boiling temperature of water. (1 mark)
- (iii) The slope (gradient) of the graph, the state the rate of change of temperature of water. (1 mark)
- 21) In an experiment to determine the density of steel, a number of pieces of iron with different masses were used. The volume and the mass of each piece of steel were measured. The table below shows the results obtained.

Volume/cm ³	Mass/g
2	16
3	25
4	32
5	38
6	48
7	56

- a) Plot a graph of mass (along y- axis) against volume (along x – axis). (10 marks)
- b) Determine the slope of graph and show how you determine the slope. (3 marks)
- c) Determine the density of the steel. (2 marks)

END

PHYSICS I MARKING SCHEME
ORDINARY LEVEL NATIONAL EXAMINATIONS, 2016

1. a) Beam balance/electronic balance b) Vernier Calipers/micrometer c) Newton spring balance/Newton meter d) Measuring cylinder/graduated beaker.	2. a) False b) True c) False								
3. a) <table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Speed</th> <th style="text-align: center;">Velocity</th> </tr> </thead> <tbody> <tr> <td>- Distance covered in a unit time</td> <td>- Distance covered in a unit time in a specific direction.</td> </tr> <tr> <td>- Scalar quantity</td> <td>- Vector quantity</td> </tr> <tr> <td>- Distance travelled per unit time.</td> <td>- Displacement per unit</td> </tr> </tbody> </table>	Speed	Velocity	- Distance covered in a unit time	- Distance covered in a unit time in a specific direction.	- Scalar quantity	- Vector quantity	- Distance travelled per unit time.	- Displacement per unit	3. b) Distance travelled = speed×time = 8m/s × 2 × 60 × 60 = 57600m = 57.6km
Speed	Velocity								
- Distance covered in a unit time	- Distance covered in a unit time in a specific direction.								
- Scalar quantity	- Vector quantity								
- Distance travelled per unit time.	- Displacement per unit								
4. a) - It causes unwanted noise - It causes wear and tear - It causes unwanted heat - Reduction of efficiency of machine	b) - Ball bearings reduce friction between wheels and axles. - Wheels turn easily (or increase efficiency)								
5. a) Force of gravity b) $u = 20\text{m/s}$, $V = 0\text{ m/s}$, $a = 10\text{ms}^{-2}$ and $t = t(\text{s})$ $v = u + gt$, $0 = 20\text{m/s} + (10\text{m/s}^2)t$ $t = \frac{20\text{m/s}}{10\text{m/s}} = 2\text{s}$ $h = u + \frac{1}{2}gt^2$ $h = 20 \times 2 - \frac{1}{2} \times 10 \times 2^2 = 40 - 20$ $= 20\text{m}$	6. a) $P = \frac{F}{A} = \frac{600\text{N}}{120\text{cm}^2} = 5\text{N/cm}^2$ b) The area in contact with the boy's body increases and hence the pressure decreases.								