

S.4 PHYSICS Assignment (UCE Style)

535/2

PAPER 2

TIME: 2¼ HOURS

Attempt the Work and Submit to Mr. Ssendawula in the eLearning Platform Physics Forum or on WhatsApp +256 700 377992 . You could do the work on paper and scan or photograph it using a Smartphone

Instructions:

Answer any five questions

Any additional questions answered will not be marked

These values of physical quantities may be useful to you;

Acceleration due to gravity $= 10\text{ms}^{-2}$

Specific latent heat of vaporization of water $= 2.26 \times 10^6\text{Jkg}^{-1}$

Specific heat capacity of water $= 4200\text{Jkg}^{-1}\text{K}^{-1}$

1. (a) (i) Name the suitable instrument for measuring the diameter of a pendulum bob. (1 mark)
(ii) Describe how the density of a small piece of stone can be determined. (4 marks)
- (b) A builder has 2.5m^3 of concrete delivered to a building site. If he wants it to be carried up on a wheelbarrow which carries a load of 600N per trip, determine the number of trips he will make given that the density of concrete is 3000kgm^{-3} (5 marks)
- (c) (i) Define the term pressure and state its SI unit. (2 marks)
(ii) A nurse applies a force of 6N to inject a patient. If the area of the sharp end of the needle is $8 \times 10^{-6}\text{m}^2$, find the pressure exerted on the patient's body. (2 marks)

- (d) In a hydraulic brake system;
- (i) Give one reason why oil is used instead of air. (1 mark)
 - (ii) What would be the effect if an air bubble enters the system? (1 mark)
2. (a) Define the following terms with respect to machines.
- (i) velocity ratio. (01 mark)
 - (ii) efficiency (01 mark)
- (b) A pulley system of velocity ratio, five, is used to raise a load of 5000 through a certain height.
- (i) Draw a diagram to show the pulley system. (02 marks)
 - (ii) Determine how far the load is raised when the effort is moved down by 4. (02 marks)
- (c) A uniform beam AB of length 1m and weight 20N is suspended using a string at a distance of 0.40m from A.
- (i) State the principle of moments. (1 mark)
 - (ii) Draw a diagram to show the forces acting on the beam. (1 mark)
 - (iii) Find the distance from A at which a weight of 8N should be suspended so that the beam is in equilibrium (3 marks)
- (d) Explain why it is easy to open a door when the door handle is fixed away from the hinge. (2 marks)
- (e) A man pushes a block of mass 24kg along a rough horizontal floor using a force of 90N. The friction force between the floor and the block surface is 48N. Determine the acceleration of the block. (3 marks)
3. (a)(i) State Boyle's law as applied to gases. (1 mark)
- (ii) With the aid of a labeled diagram, describe an experiment to verify the Boyle's law. (5 marks)
- (b) Dry air at a pressure of 3500 Nm^{-2} and a temperature of 27°C is heated at a constant volume to a pressure of 4950 Nm^{-2} . Find the new temperature. (3 marks)

- (c) Use the kinetic theory of matter to explain what happens to the pressure of a fixed mass of gas when compressed at constant temperature. (2 marks)
- (d) (i) Define latent heat of vaporization (1 mark)
 (ii) Water of mass 600g at 30°C is contained in a brass colorimeter of mass 500g. If 70g of pure steam is bubbled into the water and the temperature rises to 89.5°C, find the specific heat capacity of brass. (4 marks)
4. (a) With the aid of a labeled diagrams, explain regular and diffuse reflection. (4 marks)
- (b) Give two reasons why convex mirrors are suitable for use as driving mirrors. (2 marks)
- (c) An object of height 4cm is placed 10cm in front of a concave mirror of focal length 15cm perpendicular to the principal axis. Use a scale diagram to find;
 (i) the position and nature of the image formed. (5 marks)
 (ii) the magnification (2 marks)

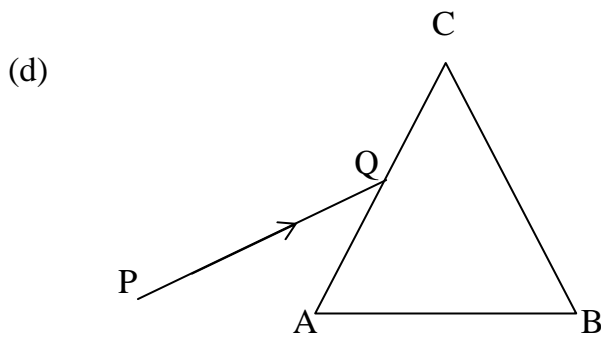


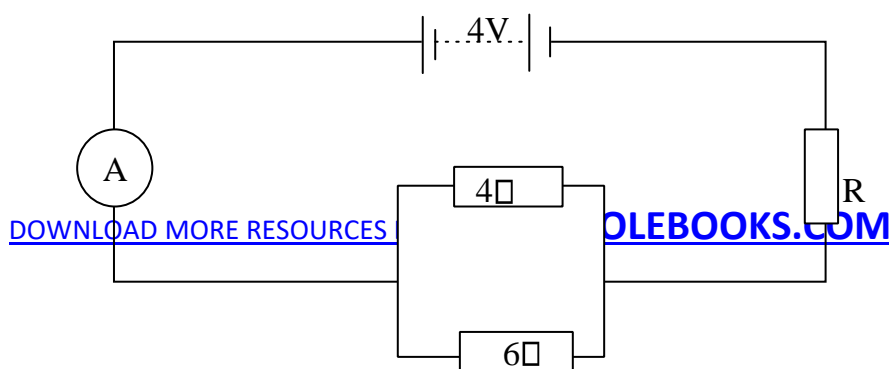
Fig 1

The diagram in Fig 1 shows a ray of white light incident on a glass prism. Explain what happens to the ray as it passes through the prism. (3 marks)

5. (a) Define the following terms as applied to **waves**.
 (i) amplitude (1 mark)
 (ii) wavelength (1 mark)
- (b) A progressive wave of frequency, f , and wavelength, λ , is moving at a speed, v

- Derive an equation to show the relation between f , λ and v . (3 marks)
- (c) A radio signal is transmitted at a frequency of **3.5MHz**. Find the wavelength of the signal. (2 marks)
- (d) Describe an experiment to show that sound does not travel through a vacuum (5 marks)
- (e) (i) What is **an echo**? (1 mark)
- (ii) Explain why echoes are not heard in a small room. (3 marks)

6. (a) (i) What is an alternating current? (01 mark)
- (ii) State any **two** advantages of alternating current over direct current. (02 marks)
- (b) Distinguish between step up and step down transformer. (02 marks)
- (c) (i) A transformer with a secondary to primary ratio of 1:60 draws power from the mains voltage of 240 . Determine it's out put voltage. (03 marks)
- (ii) State **two** precautions taken during house wiring. (02 marks)
- (d) Give **two** ways of minimizing power loss during transmission of electric power over long distances. (02 marks)
- (e)



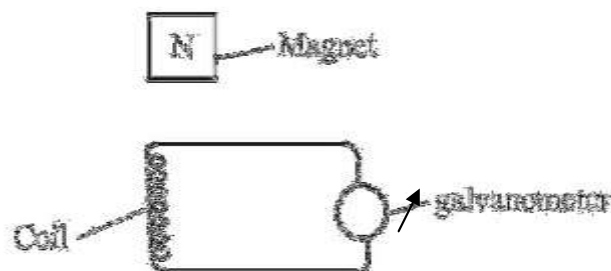


Fig. 2

State and explain what is observed when the magnet in figure 2 above is brought near and then withdrawn from the coil. (04 marks)

- 7.(a) Describe how a gold leaf electroscope can be used to detect the presence of charge on a glass rod. (3 marks)
- (b) Explain how an insulator gets charged by rubbing (3 marks)
- (c) With the aid of a circuit diagram, describe an experiment to verify **Ohm's law**. (6 marks)
- (d)

Fig 3

Fig 3 shows a battery of emf 4V and negligible internal resistance connected to resistors of resistances 4Ω , 8Ω and $R\Omega$. Determine the value of R if the ammeter reading is 0.5A (4 marks)

- 8. (a) Define the term half life. (1 mark)
- (b) A nitrogen nuclide ${}_{7}^{16}\text{N}$ decays to become an oxygen nuclide by emitting a β^- beta particle.
 - (i) Write down an equation to show this process. (1 mark)
 - (ii) If the half life of the nuclide ${}_{7}^{16}\text{N}$ is 6.5minutes, calculate the fraction of the original radioactive isotope remaining after 32.5minutes. (3 marks)
 - (iii) Give **two** medical uses of radio isotopes. (2 marks)

- (c) State the functions of the *cathode, time base, and anodes* of a CRO. (03 marks)
- (d) (i) Describe briefly how x-rays are produced. (04 marks)
- (ii) Distinguish between hard and soft x-rays. (02 marks)

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