Candidate Name	Centre Number	Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

PHYSICS 4023/2

PAPER 2 Theory

SPECIMEN PAPER 2 hours 15 minutes

Candidates answer on the question paper.

Additional materials:
Electronic calculator
Answer paper

Time 2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page and on any separate answer paper used.

Section A

Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B

Answer any **three** questions.
Write your answers on the separate answer paper provided.
At the end of the examination fasten the answer paper used securely to the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question.
Candidates are reminded that **all** quantitative answers should include appropriate units.

This question paper consists of 11 printed pages and 1 blank page.

Candidate Name | Centre Number | Candidate Number

Section A

*Answer **all** questions from this section.*

1. **(a)** The total mass of a cyclist and the bicycle is 90 kg. The cyclist accelerates from rest with a driving force of 135 N against a frictional force of 30 N.

Calculate the acceleration.

[3]

(b) State any **two** factors that affect the size of the frictional force in **(a)**.

.....

.....

[2]

2 **(a)** Distinguish between displacement and distance.

.....

.....

.....

[1]

(b) **Fig. 2.1** shows a stone attached to a string being whirled around at a constant speed of 10 m/s.

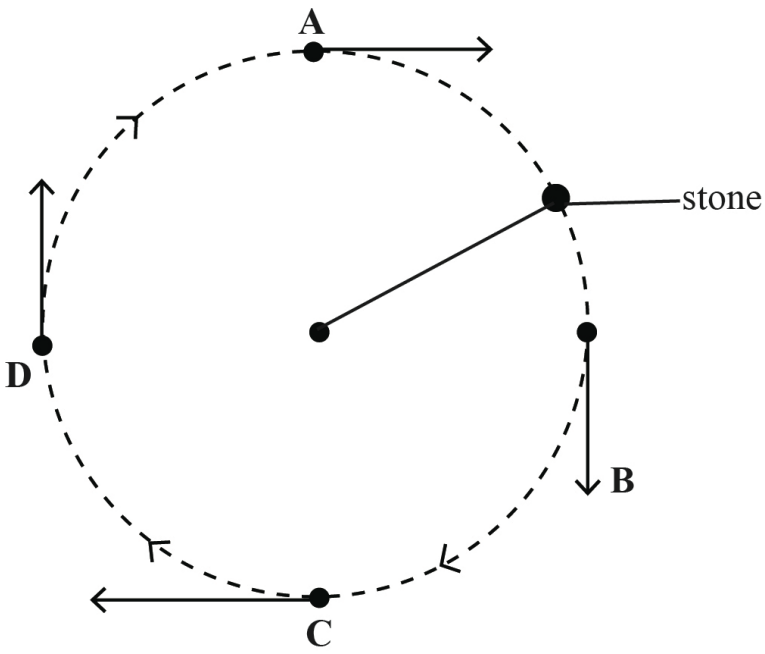

Fig. 2.1

(i) State the velocity at B and velocity at D.

velocity at B .....

velocity at D .....

[2]

(ii) Explain why the stone in **Fig. 2.1** is accelerating.

.....

.....

.....

[2]

3. **(a)** State any **two** reasons why concrete dam walls are usually arch shaped.

1 .....

2 .....

[2]

(b) Suggest any **three** environmental hazards associated with dam construction.

1 .....

2 .....

3 .....

[3]

4. **(a)** **Fig. 4.1** shows a liquid being heated.

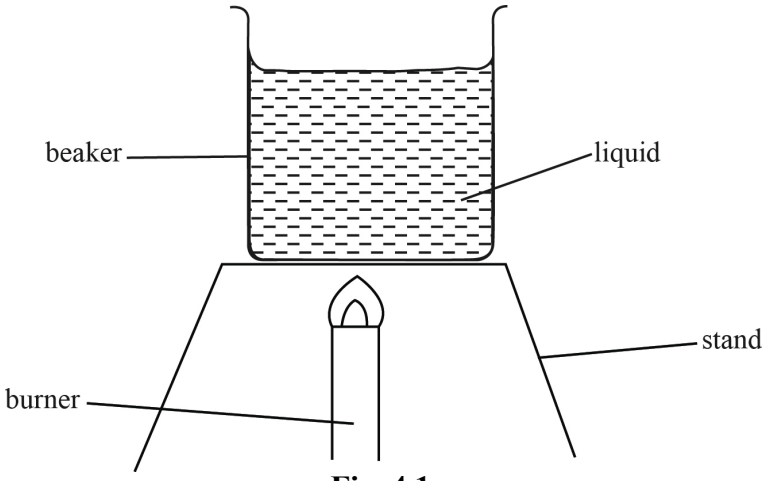

Fig. 4.1

Draw arrows to show convectional currents on **Fig.4.1**.
[1]

(b) Explain how convectional currents are produced when a liquid is heated.

.....

.....

.....

[2]

(c) Describe heat transfer by conduction.

.....

.....

.....

[2]

5. **(a)** Define *specific latent heat*.

.....

.....

.....

[2]

(b) Calculate the amount of heat required to melt 80 g of ice at 0 °C.
[specific latent heat of fusion of ice = 330 J/g]

heat required = _____ J.

[2]

(c) State the effect of impurities on the melting point of ice.

.....

.....

[1]

6. **(a)** In an experiment, a plastic rod was charged by rubbing it on a piece of cloth.

State the type of charge on the cloth.

.....

[1]

(b) Describe how the rod became charged.

.....

.....

.....

.....

[2]

(c) The charged rod was brought close to small pieces of paper.
Explain why the pieces of paper were attracted to the rod.

.....

.....

.....

.....

[2]

7. **(a)** State any **one** limitation of Ohm's law.

.....

[1]

(b) Sketch an I-V characteristic graph for a filament lamp.

[2]

(c) A 3 Ω resistor is connected to a 1.5 V supply. Calculate the amount of current passing through the resistor.

[2]

8. **(a)** Two atoms of mass numbers 20 and 21 have a proton number of 10.

(i) State the name given to the atoms.

.....

[1]

(ii) Determine the number of neutrons in the atom of mass number 21.

.....

[1]

(b) A radioactive sample has a mass of 10 g and a half-life of 5 days.

Calculate the number of days taken for the sample to decay to 1.25 g.

[3]

Section B

*Answer **any three** questions from this section.*

9 **(a)** **(i)** State the SI unit of density.

(ii) Describe how the density of a regular object is measured.

(iii) Explain why ice floats on water. [6]

(b) **Fig. 9.1** shows a velocity-time graph of a body in motion.

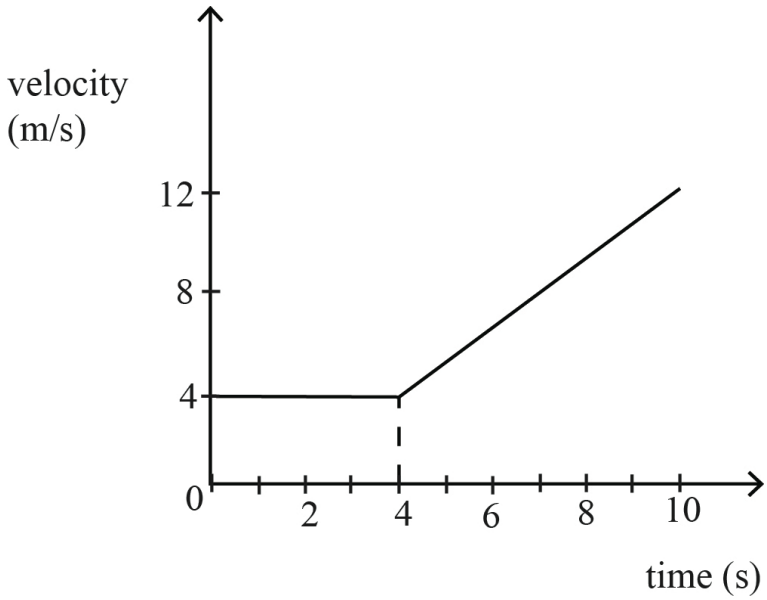

Fig. 9.1

(i) Define *acceleration*.

(ii) Calculate the displacement in 10 seconds.

(iii) Determine the acceleration between 4 seconds and 10 seconds. [6]

(c) **(i)** State **two** conditions necessary for a body to be in free fall.

(ii) Describe how a falling body attains terminal velocity.

(iii) Suggest good experimental techniques to be observed during an experiment to determine terminal velocity of an object dropped into oil. [8]

10. (a) **Fig. 10.1** shows a pulley system used to lift a load of mass 20 kg with an effort of 95 N.

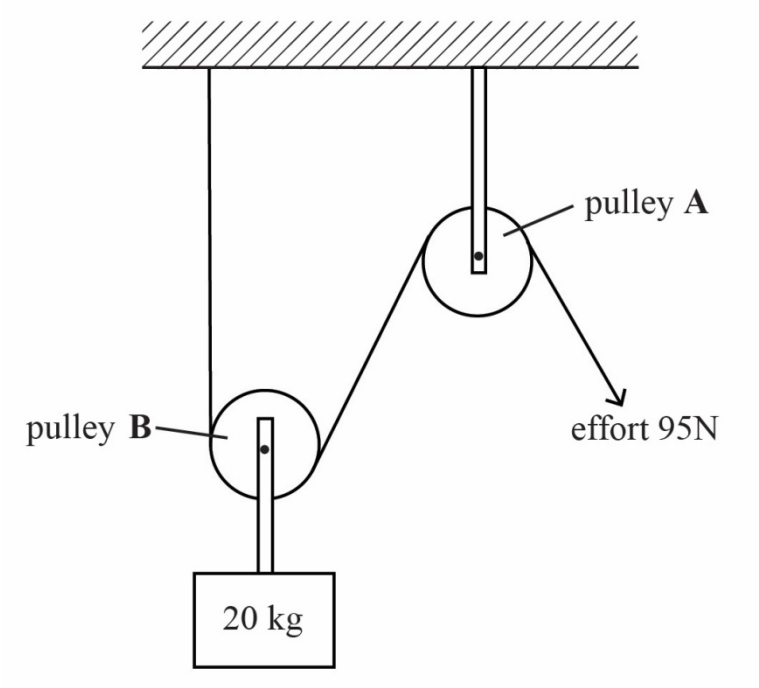

Fig .10.1

(i) Name a single pulley that has the same velocity ratio as the pulley system in **Fig. 10.1**.

(ii) State the purpose of pulley A.

(iii) Calculate the mechanical advantage of the pulley system.

(iv) Suggest why the mechanical advantage can never be greater than the velocity ratio for any pulley system. [6]

(b) Water in a river flows over a cliff 70 m high.

(i) Calculate the change in gravitational potential energy of each kilogram of the water.

[g = 10 ms^{-2}]

(ii) Determine the speed at which a kilogram of the water hits the bottom of the cliff.

(iii) State the assumption made in **(ii)**. [6]

(c) **(i)** Name **two** methods of welding.

(ii) State any **two** safety precautions taken during welding.

(iii) Give a reason for cleaning metal surfaces before welding.

(iv) Suggest, giving **two** reasons, a method of joining a capacitor to a computer motherboard. [8]

11. **(a)** **(i)** State what happens to electromagnetic waves when they

1.change medium,
2. pass through a magnetic field.

(ii) State any **two** uses of visible light.

(iii) Explain why the frequency of ultra violet light is greater than that of microwaves. [6]

(b) **(i)** Define a *wavefront*.

(ii) Sketch a diagram showing straight wavefronts for a water wave passing normally from shallow end to deep end.

(iii) State **two** characteristics of a wave which will change if the water in **(ii)** passes the boundary at an angle. [6]

(c) Temperature measurement involves two fixed points.

(i) Define the

1. lower fixed point,

2. upper fixed point.

(ii) The length of a mercury thread in a thermometer is 10 mm at ice point and 110 mm at steam point.

Calculate the temperature that corresponds to 70 mm length of mercury.

(iii) Suggest, with a reason why a mercury in glass thermometer **cannot** measure melting point of carbon dioxide. [8]

12. (a) (i) Describe how electricity may be used to

1. make a permanent magnet,

2. demagnetise a magnet.

(ii) Explain why an electric current can be used to separate iron from copper. [6]

(b) (i) State **four** differences between the magnetic properties of iron and steel.

(ii) A piece of metal was found in the school yard.

Describe how a student may determine whether the metal is a magnet or not. [6]

(c) In household circuits, several components are connected across two common points.

(i) Suggest **two** advantages of connecting the components in this way.

(ii) State **two** dangers of electricity.

(iii) Suggest a suitable rating for a fuse to be used on an appliance rated 800 W, 240 V.

(iv) Explain why the fuse must be connected to the live wire. [8]

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