



CONVENT OF THE HOLY INFANT JESUS SECONDARY
Preliminary Examination in preparation for
the General Certificate of Education Normal Academic Level 2024

CANDIDATE
NAME

CLASS

4/

REGISTER
NUMBER

SCIENCE

5105/02

Paper 2 Physics

2 August 2024

Paper 1 and 2: 1 hour 15 minutes

Candidates answer on the Question Paper.

No additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number in the spaces provided on the work you hand in.
Write in dark blue or black ink on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A

Answer all questions.

Write your answers in the spaces provided.

Section B

Answer one question.

Write your answers in the spaces provided.

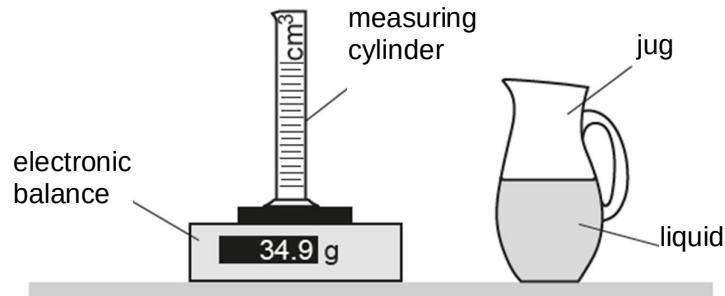
The use of an approved scientific calculator is expected, where appropriate.
In calculations, you should show all the steps in your working, giving your answer at each stage.
You are advised to spend no longer than 30 minutes on Paper 1.
You may proceed to answer Paper 2 as soon as you have completed Paper 1.

At the end of the examination hand in your answers to Paper 1 and 2 separately.
The number of marks is given in brackets [] at the end of each question or part question.

Section A (22 marks)

Answer all the questions in the spaces provided.

- 1 The diagram shows a jug of liquid and an empty measuring cylinder that is on an electronic balance.



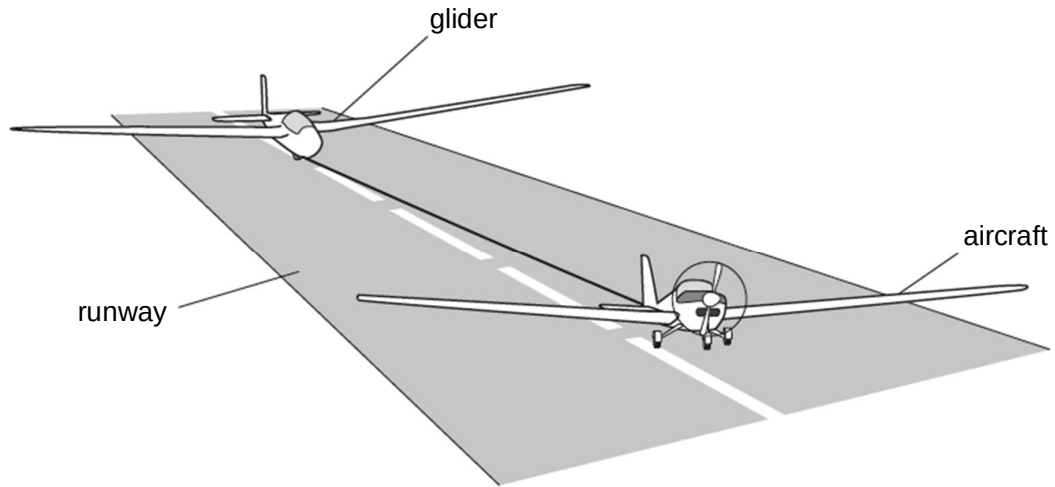
- (a) The electronic balance uses the weight of the measuring cylinder to determine its mass. Weight and mass have different units. State another way in which weight differs from mass.

.....
[1]

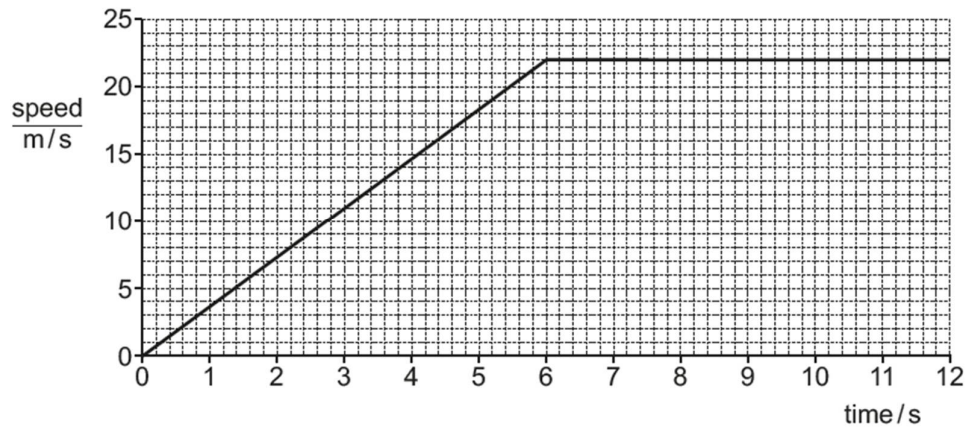
- (b) The density of the liquid is 780 kg/m^3 . Determine the volume of 0.65 kg of the liquid.

volume = m^3 [2]

- 2 An aircraft pulls a glider along a runway as shown in the diagram below



The graph below shows the speed of the glider during the first 12 s of the motion.



- (a) Describe the motion of the glider in the first 12 s.

.....

[2]

- (b) Calculate the acceleration of the glider from 0 – 6 s.

acceleration = m/s² [1]

[Turn over

- (c) Hence, calculate the mass of the glider if the resultant force acting on the glider is 1800 N from 0 – 6 s.

mass = kg [1]

- (d) Name one possible force that acts on the glider to cause the change in motion after 6 s.

.....[1]

- 3 The diagram below shows a rider on an electric scooter.



The scooter contains a battery and a motor to drive the back wheel.

- (a) State the name of the energy store in the battery.

.....[1]

- (b) Describe, in terms of work done, the stages of energy transfer from the energy store in the battery to the kinetic energy of the scooter.

.....

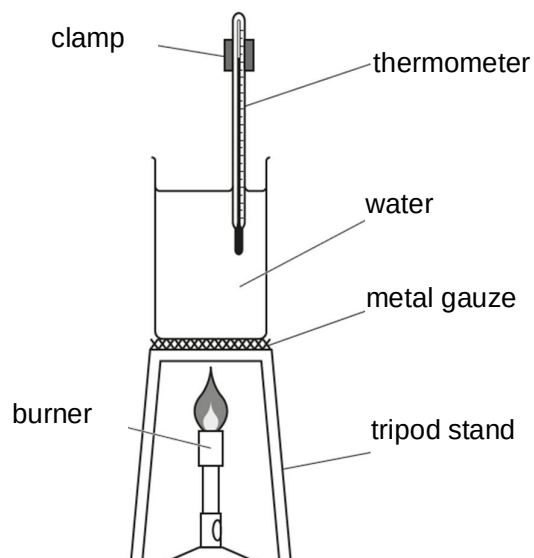
.....

..... [2]

- (c) The total mass of the scooter and the rider is 70 kg.
Calculate the total kinetic energy of the rider and scooter when the scooter has a speed of 4.0 m/s.

kinetic energy = J [2]

- 4 The diagram below shows a beaker of water being heated.



- (a) Name the main process by which energy is transferred through:

(i) the metal gauze

.....

(ii) the water

.....

[2]

- (b) The burner heats the water at the bottom of the beaker.
Describe the process by which the water at the top of the beaker becomes hotter.

.....

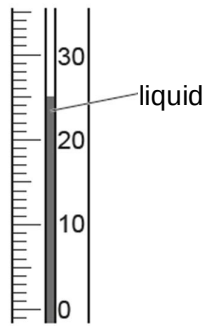
.....

.....

.....[2]

[Turn over

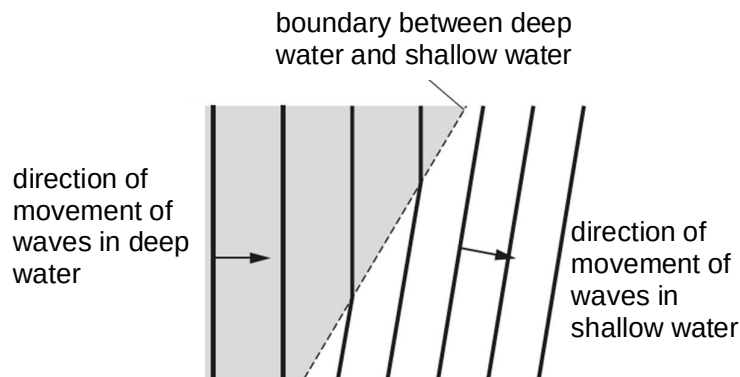
- (c) The diagram shows the liquid inside a thermometer



Use ideas about particles to explain how energy causes the liquid to move up the thermometer.

.....
[2]

- 5 The diagram shows water waves in the tank travelling from deep water to shallow water.



- (a) Define wavefront.

.....
[1]

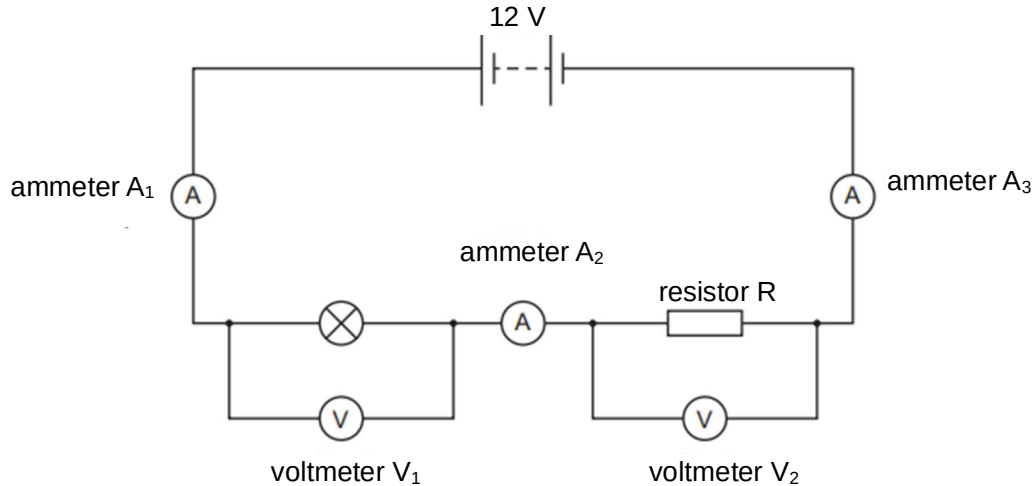
- (b) Circle the correct answer based on the diagram above.

As the water waves move from deep water into shallow water, the wavelength **increases/decreases**. Since speed = frequency x wavelength, the speed of the water waves **increases/decreases** when they travel into shallow water. [2]

Section B (8 marks)

Answer **one** questions from this section.

- 6 (a) The diagram below shows an electric circuit containing a filament lamp, a resistor R, a 12 V battery and five meters.



- (i) The reading on ammeter A_1 is 0.25 A.
The reading on voltmeter V_1 is 3.0 V.
Determine the readings on the other meters.

reading on ammeter A_2 = A
 reading on ammeter A_3 = A
 reading on voltmeter V_2 = V
 [2]

- (ii) Calculate the resistance of resistor R.

resistance = Ω [1]

[Turn over

- (iii) Calculate the power dissipated in the filament lamp.

power = W [1]

- (b) A washing machine is working normally with both the water heater and the motor switched on. The washing machine is connected to the mains supply by a cable.

- (i) The current in the live wire in the cable is 13 A.
State the size of the current in the earth wire in the cable.

current in the earth wire = [1]

- (ii) The insulation on the mains cable is now damaged and, as the washing machine vibrates, the live wire touches the metal casing.
Explain how the earth wire and fuse together prevent any more damage.

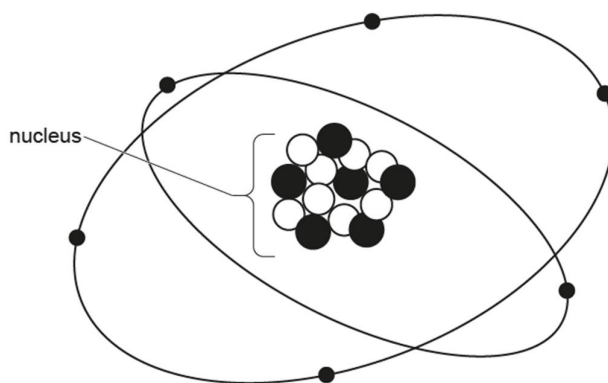
.....

[2]

- (iii) Explain why it is the live wire into which the fuse is connected.

.....
[1]

- 7 The diagram below represents all the particles in an atom which is a radioactive isotope of carbon.



- (a) The table below gives information about the particles shown in the diagram. Using the information in the above diagram, write in the empty boxes to complete the table.

name of particle	number of particles	relative charge of particle
electron		
neutron		
		+1

[3]

- (b) A museum displays an item made of ancient wood. When the wood was new, the item contained 8.00 mg of the isotope shown in the diagram above. The item now contains 2.00 mg of the isotope. The half-life of the isotope is 5700 years.

- (i) How many half-lives have passed when the mass of the isotope reduces from 8.00 mg to 2.00 mg?

.....

[1]

- (ii) Hence, calculate the age of the wood in the item.

age of wood = years [2]

[Turn over

- (c) When the isotopes shown in the diagram decay, they emit beta(β)-particles.
State the nature of a beta-particle.

A beta-particle is[1]

- (d) Emitters of beta radiation are used in medical treatments inside the human body.
Suggest why emitters used inside the body have a short half-life.

.....

..... [1]

End of Paper