



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Physics

Unit 1

Foundation Tier



[GPY11]

GPY11

Assessment

TIME

1 hour 15 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **4(c)**.



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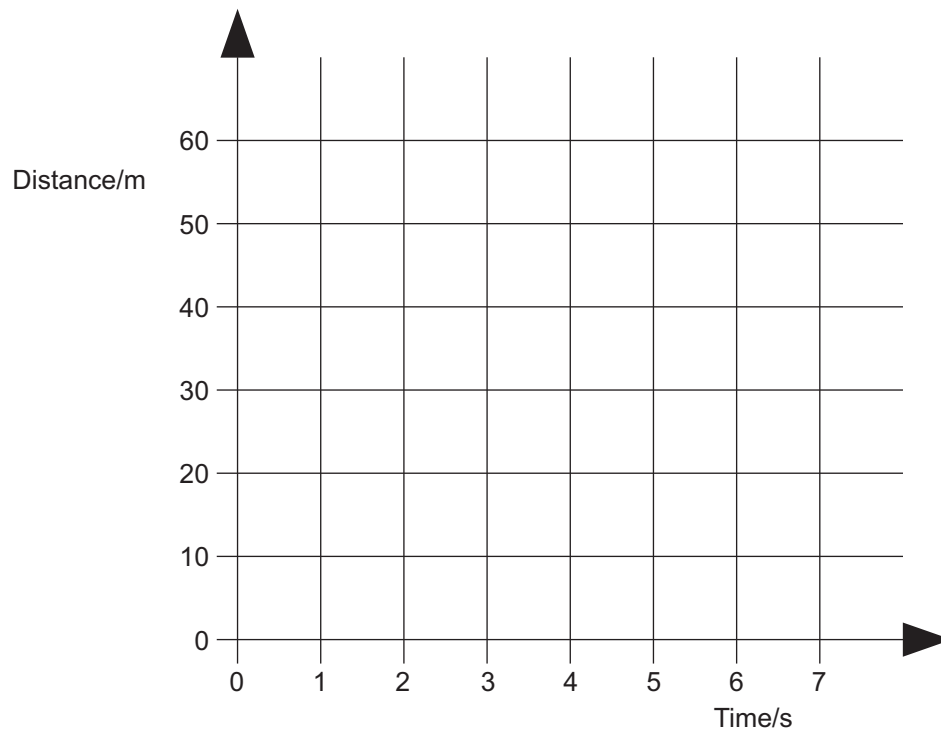


24GPY1102



- 1 (a) A cyclist travels a distance of 20 m in 3 s at a constant speed. He then travels another 40 m in a further 3 s.

- (i) On the grid below, draw the distance–time graph for the motion of the cyclist.



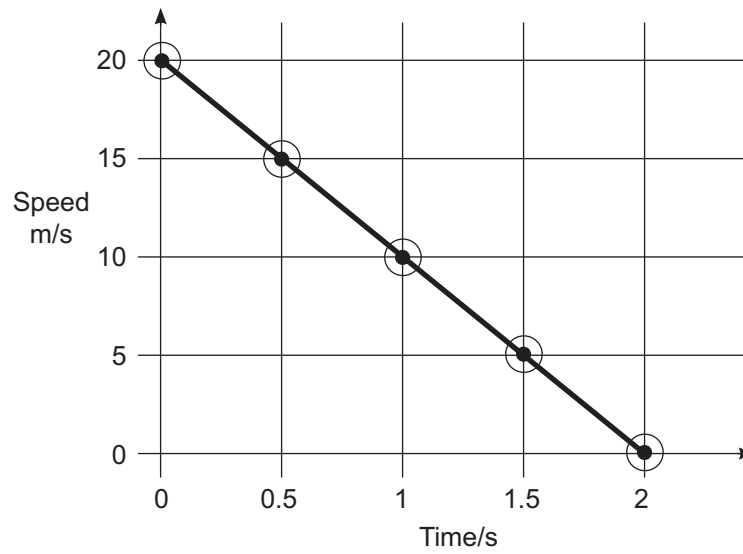
[3]

- (ii) On the grid above, draw the distance–time graph for the cyclist if the same journey had been completed at a constant speed and in the same time. [3]

[Turn over



- (b) A stone is thrown vertically upwards.
The speed–time graph for the motion of the stone is shown below.



- (i) What was the initial speed of the stone?

Speed = _____ m/s [1]

- (ii) At what time is the stone at its maximum height?
Explain your answer.

Time = _____ s

Explanation _____
_____ [2]



- (iii) Using the graph, calculate the maximum height reached by the stone.
Show clearly how you get your answer.

Maximum height = _____ m [3]

- (iv) Calculate the rate of change of the speed (acceleration) of the stone.
Show clearly how you get your answer, starting with the equation you plan to use.
Remember to give the unit with your answer.

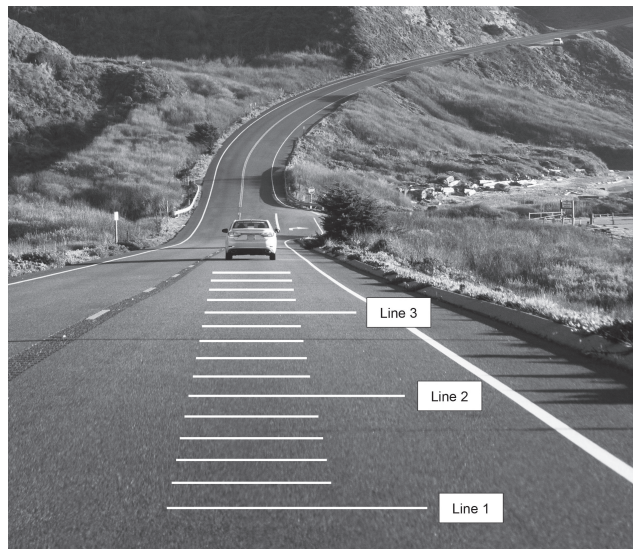
Rate of change of speed (acceleration) = _____

Unit = _____ [4]

[Turn over



- (c) Horizontal lines on the road are often used by the police to detect speeding drivers. The photograph below shows a number of such lines. Lines 1 and 2 are **2 m apart** and lines 2 and 3 are also **2 m apart**.



Adapted © Getty Images

A timer is started when a car reaches line 1.
The time is recorded when the car reaches line 2 and again when it reaches line 3.

The timings for one car are shown below.

	Time/s
Time when line 1 is reached	0.000
Time when line 2 is reached	0.055
Time when line 3 is reached	0.155



- (i) Describe the motion of the car as indicated by the time measurements shown opposite. Give a reason for your answer.

Type of motion _____

Reason _____

_____ [2]

- (ii) Calculate the average speed of the car as it travelled from line 1 to line 3. Remember lines 1 and 2 are 2 m apart and lines 2 and 3 are also 2 m apart. **Show clearly how you get your answer, starting with the equation you plan to use.**

Speed = _____ m/s [2]

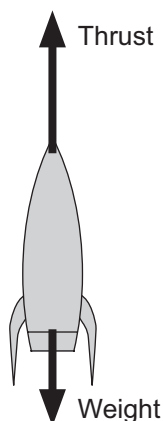
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24GPY1107

2 (a) The diagram below shows the two forces acting on a rocket at lift-off.



Source: Principal Examiner

- (i) The rocket has a mass of 50 kg.
Calculate the weight of the rocket.
Show clearly how you get your answer, starting with the equation you plan to use.

Weight of rocket = _____ N [2]

- (ii) The rocket motor provides a **constant thrust of 750 N**.

Calculate the resultant force acting on the rocket at lift-off and state its direction.

Resultant force = _____ N Direction _____ [2]



- (iii) Using your answer to part (ii), calculate the acceleration of the rocket at lift-off.
Remember the rocket has a lift-off mass of 50 kg.
Show clearly how you get your answer, starting with the equation you plan to use.

Acceleration at lift-off = _____ [3]

- (iv) Shortly after lift-off, the acceleration of the rocket is observed to show an increase.
Explain carefully why this happens.

[2]

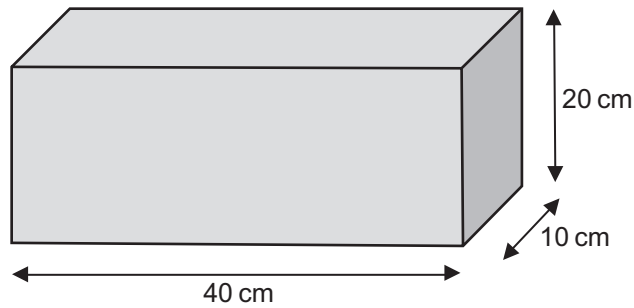
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24GPY1109

(b) The diagram below shows a cement building block sitting on a flat surface.



Source: Principal Examiner

The block has a weight of 100 N.

Calculate the pressure exerted by the block on the surface as it sits.

Show clearly how you get your answer, starting with the equation you plan to use.

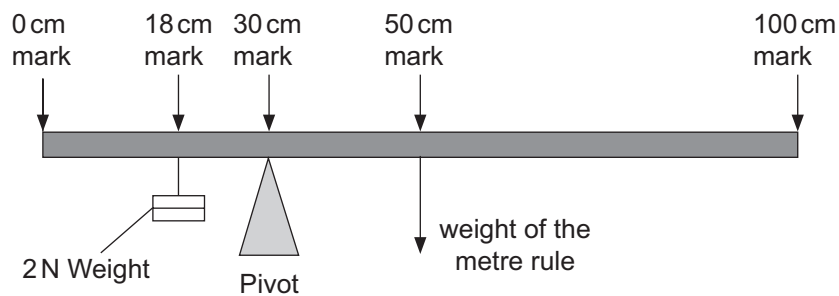
Include the unit for pressure with your answer.

Pressure = _____

Unit = _____ [5]



- (c) The diagram below shows a uniform metre rule balanced on a pivot. The pivot is placed at the 30 cm mark.



Source: Principal Examiner

- (i) Mark with an X the centre of gravity of the metre rule. [1]
- (ii) Using the Principle of Moments and information from the diagram, calculate the weight of the metre rule.
Show clearly how you get your answer, starting with the equation you plan to use.

Weight of rule = _____ N [4]

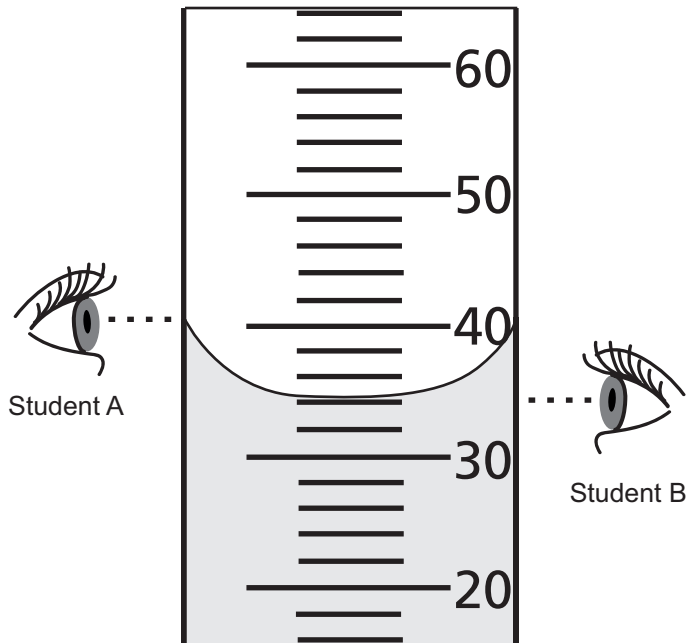
- (iii) If the 2 N weight is moved to the left, in what direction would the pivot be moved so that the metre rule remains balanced?

_____ [1]

[Turn over



- 3 (a) The diagram shows liquid in a measuring cylinder.
The markings on the scale are in cubic centimetres (cm^3).



Source: Chief Examiner

- (i) What volume does the smallest division on the scale of the measuring cylinder represent?

_____ cm^3 [1]

- (ii) Which one of the two students, A or B, is reading the volume of liquid correctly?
Explain your answer.

Student _____

Explanation _____

_____ [1]

- (iii) What volume of liquid is shown in the diagram above?

_____ cm^3 [1]



(b) (i) The density of a liquid is 0.8 g/cm^3 .
Explain carefully, **without giving an equation**, what this means.

[2]

(ii) A liquid in a container has a mass of 240 g.
The volume of the liquid is 320 cm^3 .
Calculate the density of the liquid.
Show clearly how you get your answer, starting with the equation you plan to use.

Density = _____ g/cm^3 [3]

(c) The kinetic theory of matter describes matter as a large number of particles and uses this idea to explain the properties of solids.

(i) Why do solids have a fixed shape and volume?

[1]

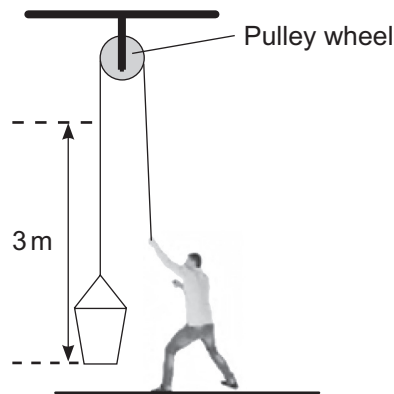
(ii) Using **one word**, describe the motion of the particles in a solid.

_____ [1]

[Turn over



4 (a) George raises a bucket of water of mass 5 kg as shown in the diagram below.



Source: Principal Examiner and © Getty Images

(i) Calculate the potential energy gained by the bucket when it is raised by 3 m. **Show clearly how you get your answer, starting with the equation you plan to use.**

Potential energy = _____ J [3]

(ii) George does 195 J of work when lifting the bucket 3 m. Calculate the efficiency of lifting the bucket in the way shown. **Show clearly how you get your answer, starting with the equation you plan to use.**

Efficiency = _____ [3]

(iii) The useful energy produced is potential energy. Name two forms of non-useful energy that are produced.

_____ [2]



(b) (i) Fossil fuels are described as non-renewable.
What is meant by non-renewable?

[1]

(ii) Give the names of two fossil fuels.

1. _____

2. _____

[2]

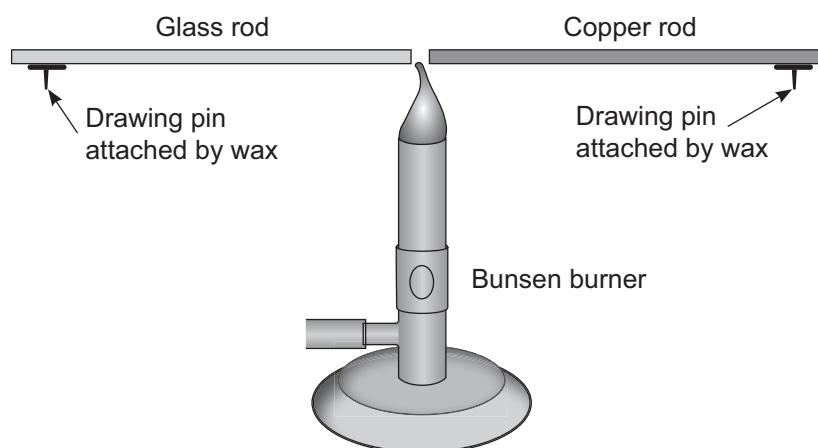
(iii) Describe in detail the effect burning fossil fuels to produce electricity has on the environment.

[3]

[Turn over



- (c) To investigate the transfer of heat by two different solids, a student proposed setting up the apparatus shown below. A drawing pin is attached to the end of each rod by a small piece of wax. When the wax melts, the drawing pin will drop off.



Source: Principal Examiner

Describe in detail how the student should carry out this investigation.

In your description you should state:

- the method of heat transfer being investigated;
- how a fair test is ensured;
- what the student will observe and conclude;
- why, in terms of particles, the heat is able to transfer more quickly through one of the rods.

In this question you will be assessed on your written communication skills including the use of specialist science terms.

Write your answers in the appropriate spaces on the opposite page.



Method of heat transfer _____

How a fair test is ensured _____

Observation and conclusion _____

Particle explanation _____

[6]

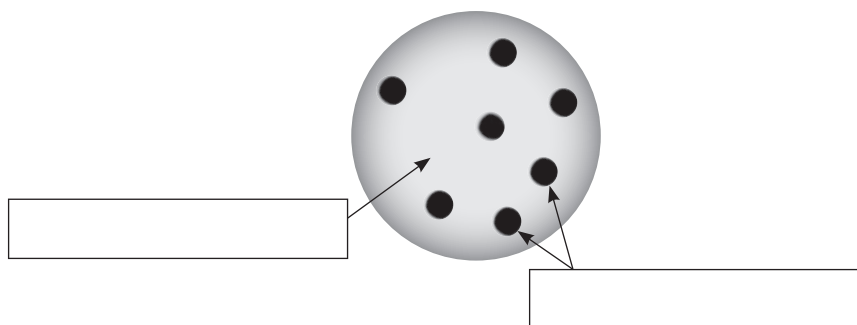
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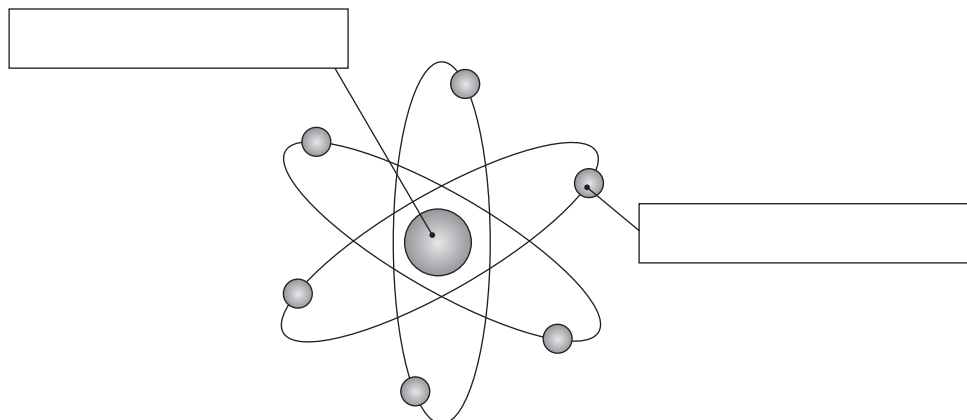
- 5 (a) An early model of the atom was known as the “Plum Pudding” model. The diagram below shows how this model of the atom was pictured. On the diagram, label the **electric charge** of the parts indicated by arrows.



Source: Chief Examiner

[1]

- (b) In the following years, experiments showed that the “Plum Pudding” model was wrong. The model we accept today is known as the Rutherford–Bohr model and is shown below. Write the names of the parts of the Rutherford–Bohr model in the boxes provided.



Source: Chief Examiner

[2]



- (c) (i) Some atoms are unstable and disintegrate. This is known as radioactivity. As they disintegrate they emit radiation. Complete the table below to show the names and nature of the radiation emitted.

Name of the radiation	Nature of the radiation
	Electromagnetic wave of high energy
Beta (β)	
	Helium nuclei

[3]

- (ii) The radiation emitted from radioactive materials causes ionisation. Explain what is meant by ionisation and why it is dangerous to humans.

[2]

[Turn over



- (d) The activity of a radioactive material is measured as 1000 counts per second. The radioactive material has a half-life of 60 seconds.

Calculate its activity 120 seconds after this first measurement of activity.

Activity = _____ counts per second [2]

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Question Number	Marks
1	
2	
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Total Marks	
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Examiner Number

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