New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

GSD31

WEDNESDAY 14 NOVEMBER 2012, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all ten** questions.

INFORMATION FOR CANDIDATES

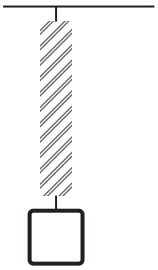
The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in question **9(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Examiner Only	
Marks	Remark

1 What type of energy is represented by the drawings below?

(i) A stretched spring



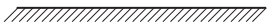
_____ energy [1]

(ii) A rolling ball

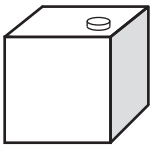
_____ energy [1]

(iii) A raised ball

_____ energy [1]



(iv) A can of diesel

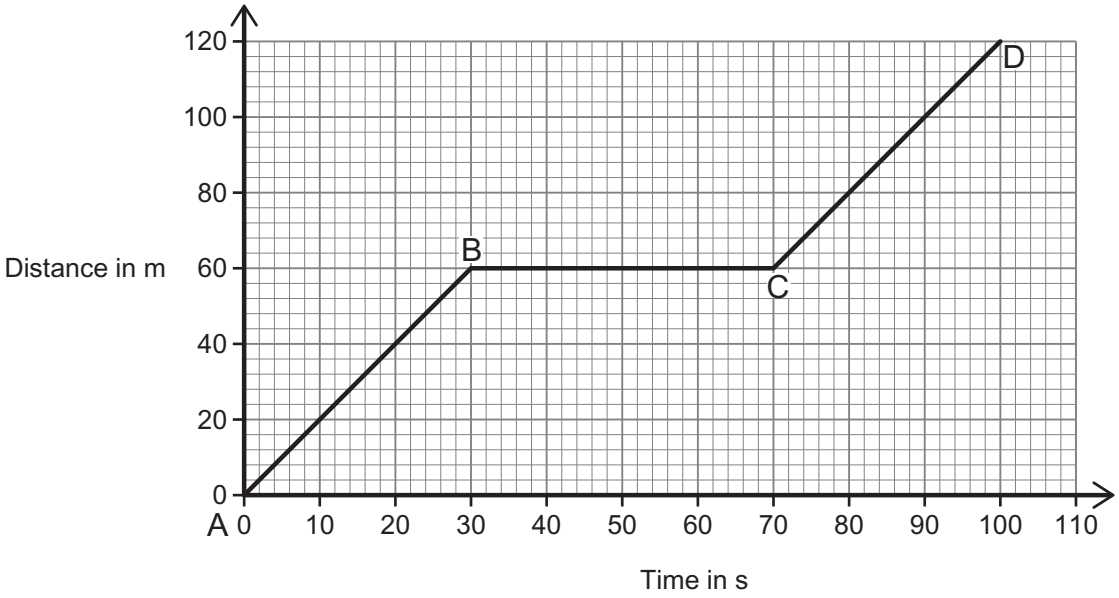


_____ energy [1]

2 **(a)** What is the difference between distance and displacement?

_____ [1]

(b) Fred walks to the local shop and the distance–time graph for his journey is shown below.



(i) Describe Fred's motion during BC.

_____ [1]

(ii) Calculate Fred's average speed for the whole journey.

You are advised to show your working out.

Average speed = _____ m/s [3]

Examiner Only	
Marks	Remark

3 An object of mass 3 kg sits on a rough bench.

(a) (i) The object exerts a force on the bench. What is this force called?

_____ [1]

(ii) What is the size of this force?

_____ N [1]

(iii) The bench exerts a force on the object. Give the name, the size, and the direction of this force.

Name _____

Size _____ N

Direction _____ [3]

(b) The object is now pulled to the right over the surface of the rough bench.

What is the name of the force which acts in the opposite direction?

Force is called _____ [1]

Examiner Only	
Marks	Remark

4 Clare pushes a lawnmower across her lawn. She exerts a force of 75 N and moves the lawnmower a distance of 12 m, at a speed of 1.5 m/s.

(i) Calculate the amount of work Clare does.

You are advised to show your working out.

Work = _____ J [3]

Clare needs chemical energy to do this work.

(ii) Where does Clare get her chemical energy from?

Answer _____ [1]

(iii) Clare uses 4500 J of chemical energy to do this work.
Calculate her efficiency.

You are advised to show your working out.

Efficiency = _____ [3]

5 **(a)** What is meant by the centre of gravity of an object?

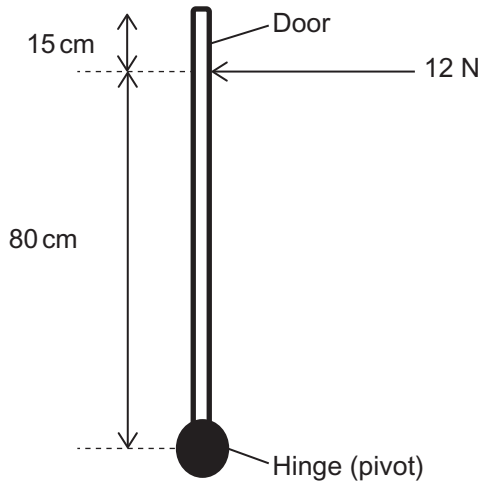
_____

_____ [2]

Examiner Only

Marks	Remark

(b) A plan view of a door is shown. Mary pushes with a force of 12 N as shown.



(i) Calculate the moment exerted by Mary.
Remember to include the unit.

You are advised to show your working out

Moment = _____ [4]

(ii) What is the direction of the moment exerted by Mary?

Direction is _____ [1]

Examiner Only

Marks	Remark

6 **(a)** **(i)** Jamie is given a stone with an irregular shape and asked to find its volume. Describe how Jamie could find the volume of the stone.

_____

_____

_____

_____

_____

_____

_____ [3]

(ii) State **one** precaution Jamie should take to ensure an accurate result.

_____ [1]

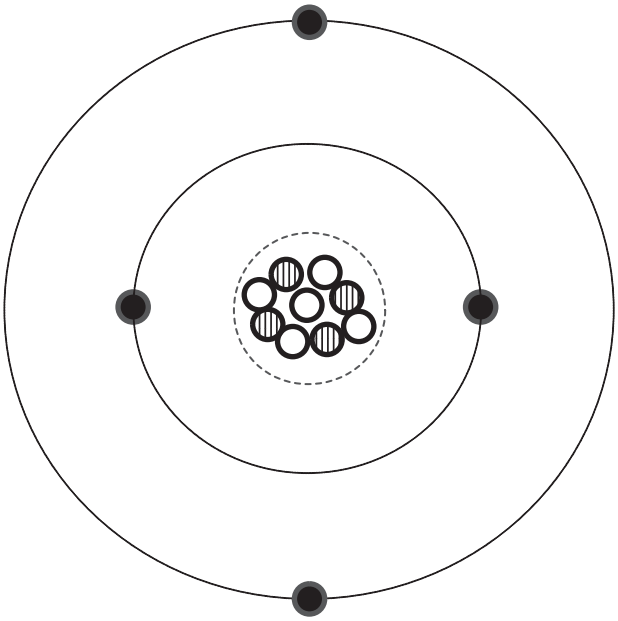
(b) The stone has a mass of 320 g and Jamie finds the volume to be 40 cm^3.

Calculate the density of the stone, in g/cm^3.

You are advised to show your working out.

Density = _____ g/cm^3 [3]

7 A beryllium atom is represented by the diagram below.



Complete the table below giving the name, relative mass and relative charge of all the particles in an atom of beryllium.

Particle	Name	Relative mass	Relative charge
●		negligible	
◍			+1
○	neutron		

[6]

Examiner Only

Marks	Remark

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(Questions continue overleaf)

Examiner Only	
Marks	Remark

8 Radioactive substances emit up to three types of radiations, alpha, beta, and gamma. These radiations can travel different distances in air. A source of radiation is placed at one end of a laboratory bench.

A detector is placed at points A, B and C in turn.

(a) (i) At which point A, B or C, will the detector record only gamma radiation?

Answer = _____ [1]

(ii) At which point A, B or C, will the detector record alpha, beta, and gamma radiation?

Answer = _____ [1]

(iii) At which point A, B or C, will the detector record only beta and gamma radiation?

Answer = _____ [1]

(b) (i) When alpha or beta particles pass through air they collide with the air molecules, causing them to become charged. What is the name of this process?

Name of this process is _____ [1]

(ii) How do the air molecules become charged?

_____ [1]

(c) Workers who use radioactive sources must take steps to protect themselves. Give two ways in which they can do this.

1. _____

2. _____ [2]

(d) The half-life of a radioactive source is a measure of how quickly it decays. What do we mean by “half-life”?

_____

_____ [2]

Examiner Only	
Marks	Remark

9 **(a)** Describe, in detail, how you would measure your personal power.

Examiner Only	
Marks	Remark

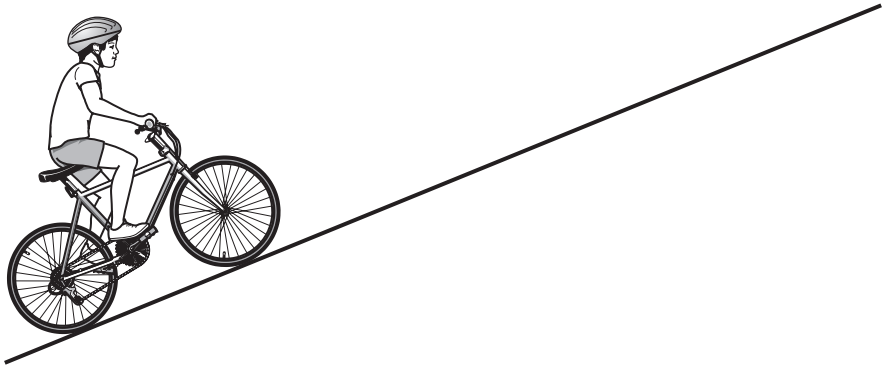
In your account you should include:

- the measurements you make and the measuring instruments;
- how you use your measurements to measure your personal power.

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

[6]

(b) Jim does 3800 J of work when riding his bicycle up a hill as shown.



It takes 5 seconds to travel from the bottom of the hill to the top.

Calculate the power developed by Jim.

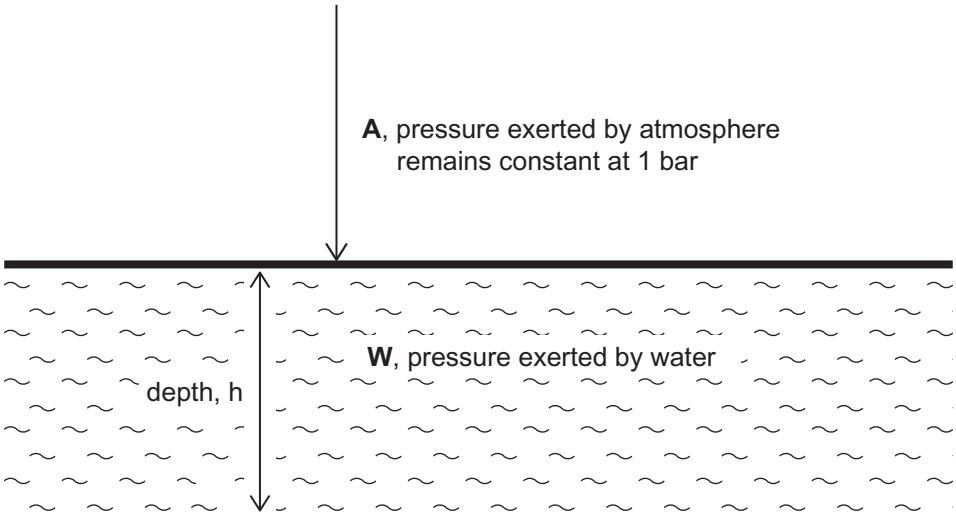
Give your answer in kW.

You are advised to show your working out.

Power = _____ kW [3]

Examiner Only	
Marks	Remark

10 When divers go underwater the pressure exerted on them changes with depth.



The total pressure exerted at a depth h is equal to the pressure exerted by the water, W, plus the pressure exerted by the atmosphere, A. This means:

Total pressure at a depth h = A + W

The pressure exerted by the atmosphere, A, **remains constant at 1 bar**. The bar is a unit of pressure.

Each 10 m depth of water adds 1 bar of pressure as shown in the second row of the table.

(i) Complete the table below to show the total pressure. One value has been entered for you.

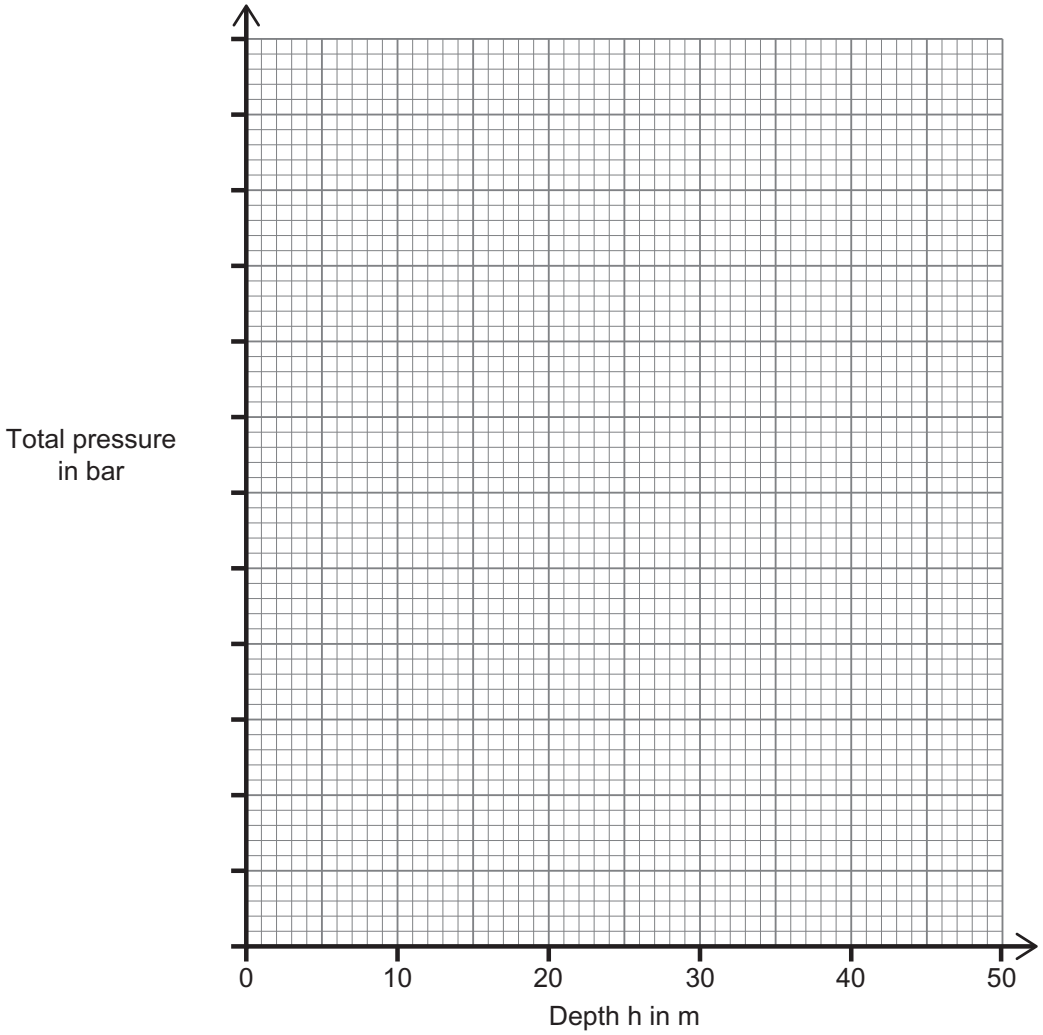
Depth h in m	**0**	**10**	**20**	**30**	**40**	**50**
W in bar	**0**	**1**	**2**	**3**	**4**	**5**
Total pressure in bar				**4**		

[2]

(ii) Choose a suitable scale on the graph opposite for the vertical axis. Plot a graph of total pressure against the depth h. [4]

Examiner Only

Marks	Remark



(iii) Draw a straight line of best fit. [1]

(iv) What feature **of the graph** indicates that the pressure exerted by the atmosphere alone is 1 bar?

_____ [1]

(v) A diver is at a depth of 35 m. Use the graph to find the total pressure acting on the diver.

_____ [1]

(vi) What feature of the graph tells us that total pressure is **not** directly proportional to depth?

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark