Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2013

Double Award Science: Physics

Unit P2

Higher Tier

[GSD62]

ML

THURSDAY 13 JUNE, MORNING

TIME

1 hour 15 minutes, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

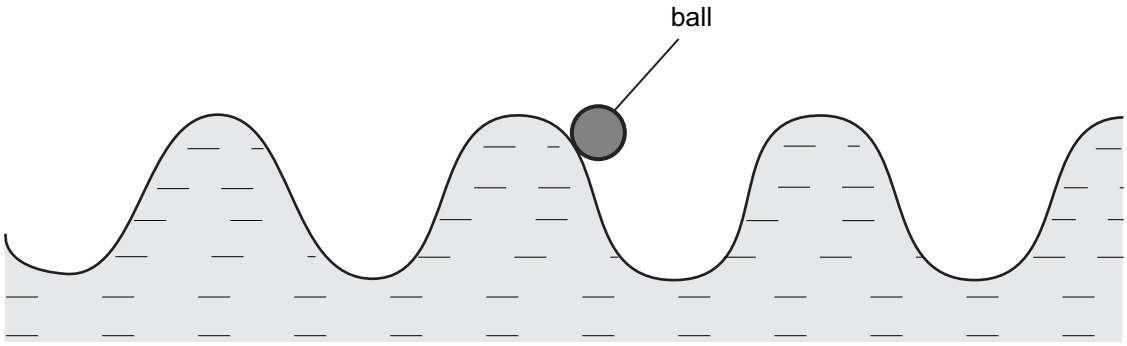
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.
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 **3(b)**.

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

1 Water waves travel on the surface of a pond.



A ball sits on the water as the wave passes.

(i) Describe the motion of the ball as the wave passes.

Choose your answer from the list below. Put a tick (✓) in the correct box.

The ball vibrates sideways about the same position. ☐

The ball vibrates up and down. ☐

The ball moves closer to the side of the pond. ☐

[1]

Jamie observes that the ball oscillates 5 times during a 20 second time interval.

(ii) How many waves are produced each second?

_____ waves each second [1]

(iii) What is the frequency of the wave?
Remember to include the correct unit.

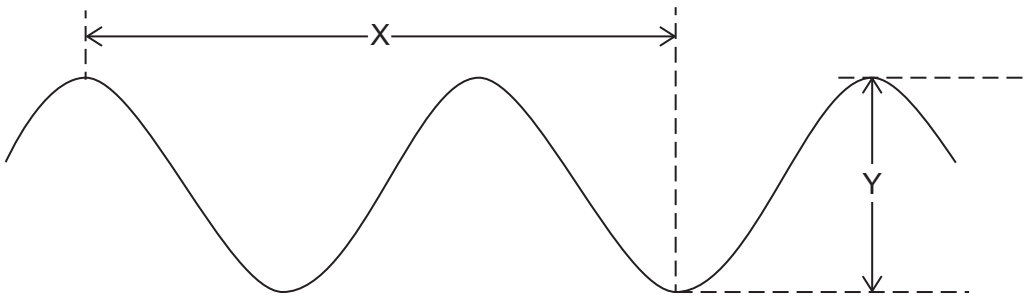
Frequency = _____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

(iv) Jamie is told that the amplitude of the wave is 5 cm and its wavelength is 12 cm. Part of the wave is shown below with two dimensions "X" and "Y" marked.



Record the distances "X" and "Y" below.

Distance X = _____ cm Distance Y = _____ cm [2]

(v) Use your answer to part **(iii)** to calculate the speed of the water wave in cm/s. Remember the wavelength of the wave is 12 cm.

Show your working out.

Speed = _____ cm/s [3]

(vi) Water waves belong to a family of waves called transverse waves. Write down two other examples of transverse waves.

1. _____

2. _____ [2]

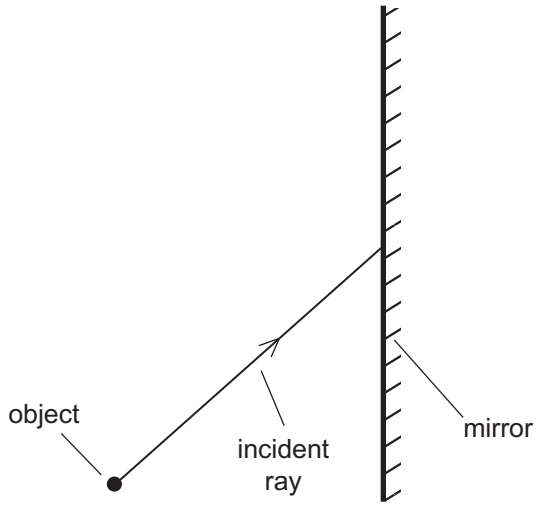
Examiner Only	
Marks	Remark

2 In a plane mirror the image of an object is as far behind the mirror as the object is in front.

(a) (i) Write down **one** other property of the image in a plane mirror.

_____ [1]

Claire draws a ray diagram to show how we see the image in a plane mirror. The diagram is **not** complete.



(ii) Draw in the normal. Label it N. [1]

(iii) Draw the reflected ray and mark its direction. [1]

(iv) Draw on the diagram the position of the eye if the image is to be seen. [1]

Look at the diagram below. It shows some members of the electromagnetic spectrum arranged in order of increasing wavelength.

increasing wavelength →

gamma rays	X-rays		visible	infrared		radio

(b) (i) Label the two members which are missing. [2]

(ii) Write down a property that all electromagnetic waves have in common.

_____ [1]

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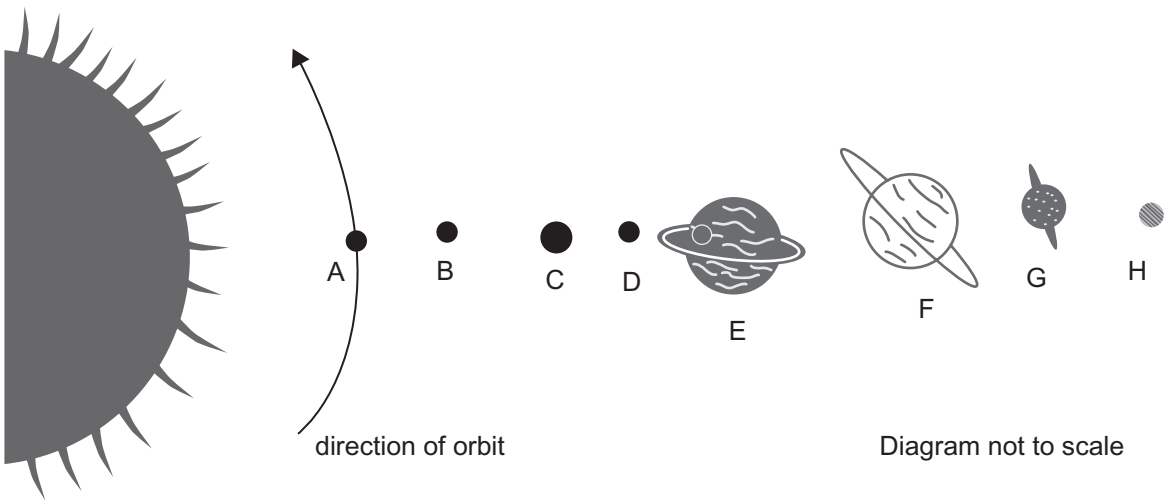
(Questions continue overleaf)

3 The diagram below shows the planets in our Solar System.



(a) (i) Write down the names of planets C and D.

Planet C _____ [1]

Planet D _____ [1]

(ii) Use a curved arrow to show the direction of orbit of planet E. [1]

(iii) Write down the name of one of the gas planets.

_____ [1]

Examiner Only

Marks	Remark

(b) Scientists believe that the Solar System was formed from a cloud of gas and dust.

Describe the different stages in the formation of the Solar System.

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

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

(c) An artificial satellite orbits the Earth.

(i) Write down the name of the attractive force which keeps the satellite in orbit.

_____ [1]

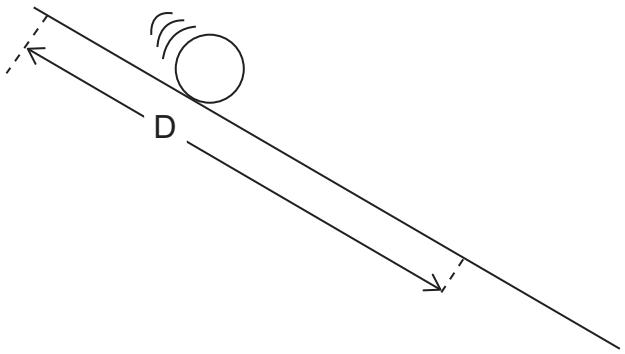
(ii) Write down two uses of artificial satellites.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

4 A pupil timed a ball moving down a slope.



The time taken for the ball to travel a distance D was measured on three occasions and the average time T was recorded. This was then repeated for different distances.

Distance D in m	0.0	0.5	1.0	1.5	2.0	2.5
Average time T in s	0.0	1.4	2.0	2.5	2.8	3.2
T^2 in s^2	0.0			6.3		

The pupil is told that distance D is related to time T by the equation

$$D = kT^2$$

where k is a constant.

(i) Complete the table by entering the missing values of T^2 to 1 decimal place. [2]

(ii) Choose a suitable scale and plot a graph of D on the vertical axis versus T^2 on the horizontal axis. [3]

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

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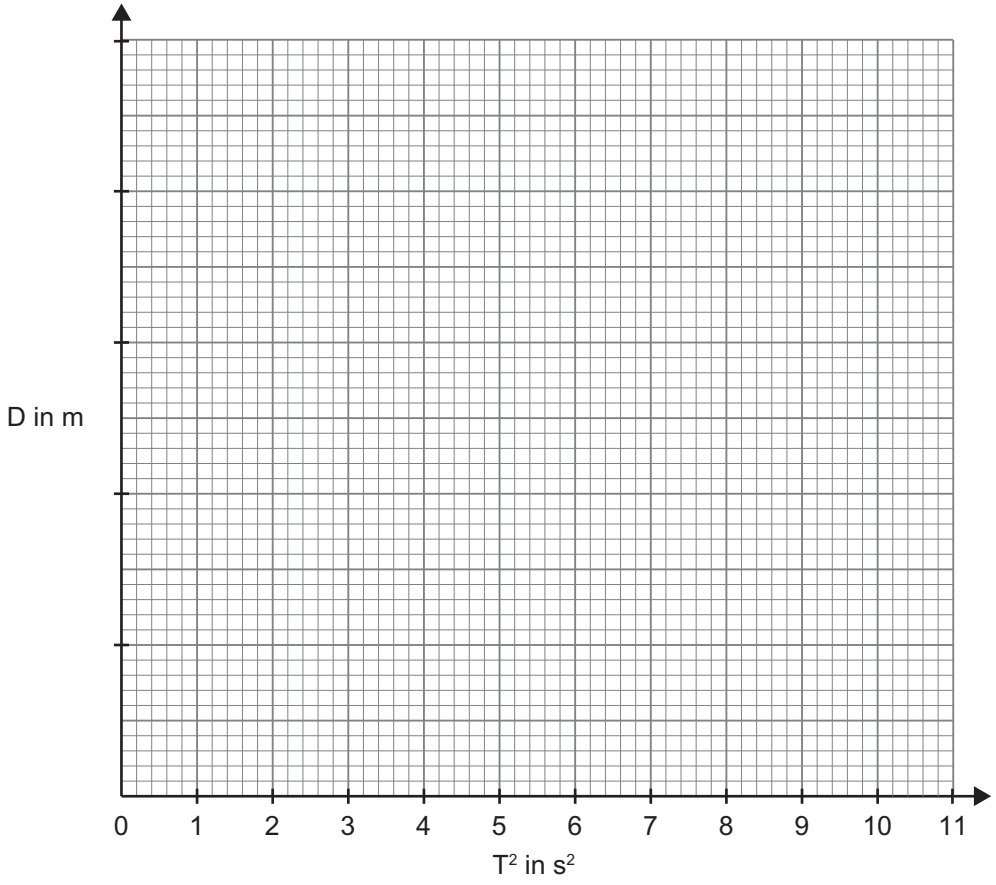
Marks	Remark



(iv) Use your graph to determine the constant k.

Remember to include the units for k.

Show your working out.

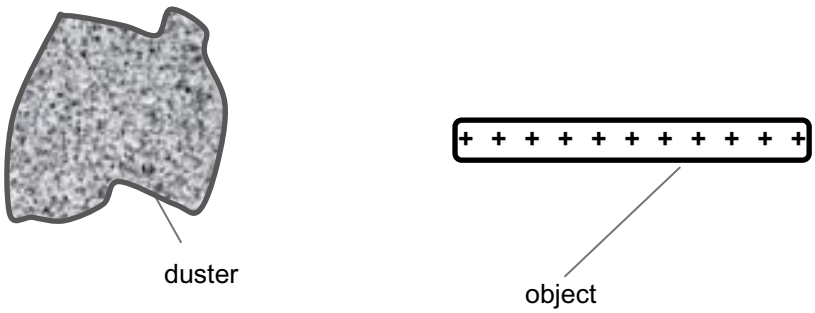
k = _____

Units = _____ [4]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** Julie wants to charge an object by rubbing it with a duster.



(i) Before she starts rubbing it, the object is uncharged. Explain why it is uncharged.

_____

_____ [1]

The object becomes positively charged when Julie rubs it with a duster.

(ii) Complete the sentence below.

The object becomes positively charged because

_____ have moved from the _____.
[2]

Julie wants to investigate how the current through a filament lamp depends on the voltage across the lamp.

Examiner Only	
Marks	Remark

(b) (i) Draw the circuit diagram of the apparatus she would use. Do this in the space below.

[5]

(ii) Describe how Julie would do the experiment.

_____

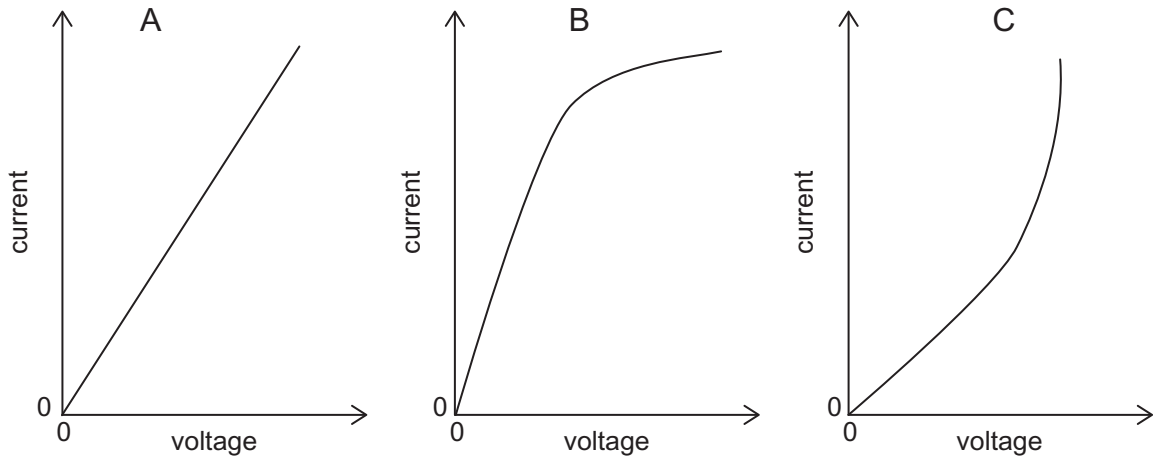
_____

_____

_____ [3]

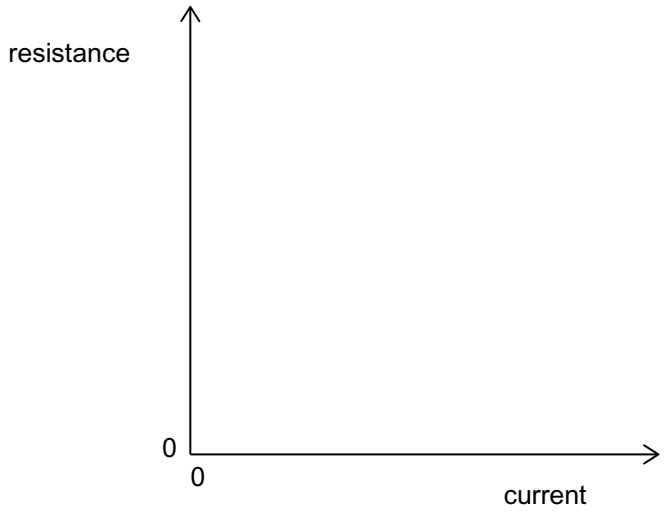
Julie plots a graph of current against voltage for the filament lamp.

(iii) Look at the graphs below. Which one do you think Julie will get?



Graph: _____ [1]

(iv) Julie plots a second graph of resistance against current. Draw the shape of graph that you would expect Julie to get.



[2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 **(a)** **(i)** Write down Ohm's Law in words.

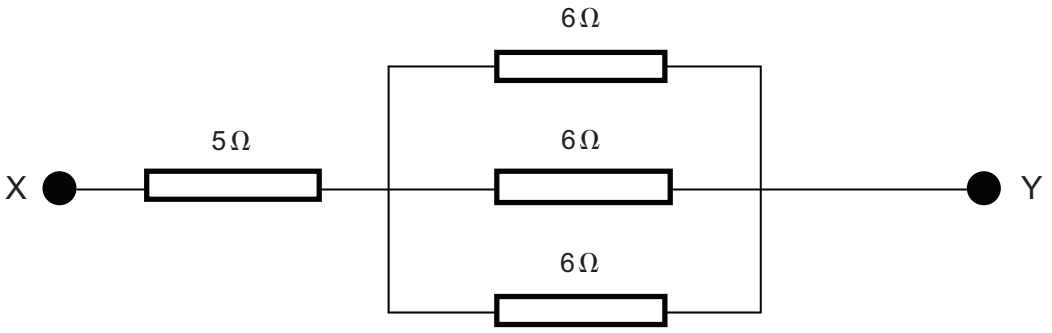
_____

_____

_____ [2]

(ii) Find the resistance between the points X and Y.

Show your working out.



Resistance = _____ Ω [4]

(b) An electric kettle has a power rating of 2800 W.

(i) What current flows through this kettle when it is plugged into the 250 V mains?

Show your working out.

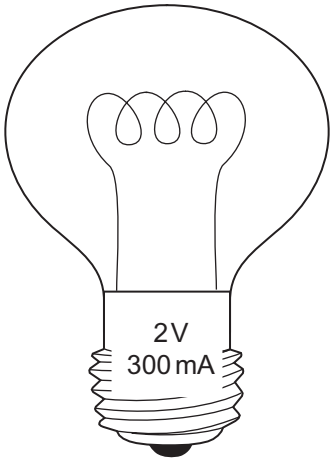
Current = _____ A [3]

The following fuses are available: 1 A, 3 A, 5 A and 13 A.

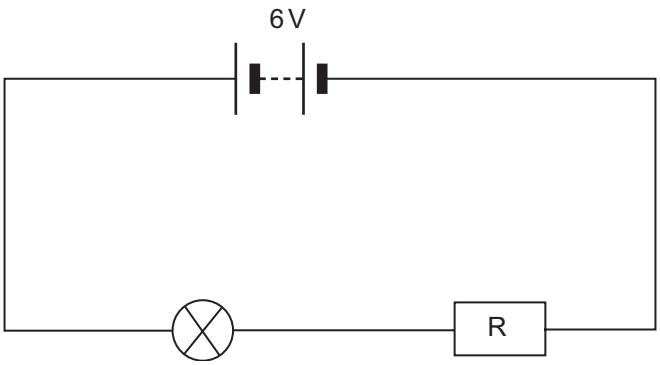
(ii) Which fuse should be used for this kettle?

Fuse _____ A [1]

(c) A lamp is rated as 2 V, 300 mA. This means that when a voltage of 2 V is applied then a current of 300 mA flows through the lamp and it glows with normal brightness.



This lamp is connected in the circuit below and it glows with normal brightness.



Calculate the resistance of the resistor R.

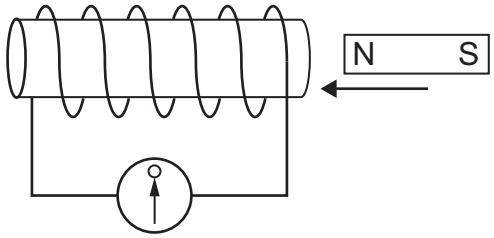
Show your working out.

Resistance = _____ Ω [4]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

7 Look at the diagram below. It shows a wire coil, a sensitive centre-zero ammeter and a bar magnet.



(a) (i) Describe fully what is seen on the centre-zero ammeter when the magnet is moved into the coil, brought to rest and then pulled back out again.

_____

_____

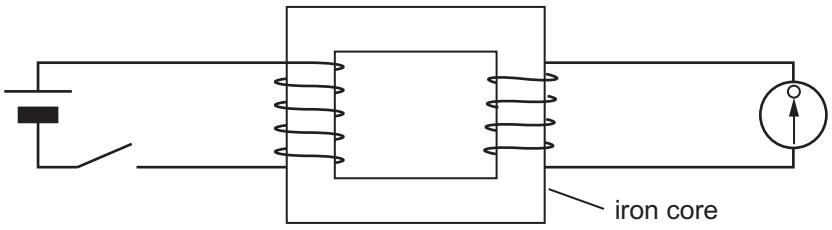
_____

_____ [3]

(ii) What name do we give to this process?

_____ [1]

The diagram below shows two coils wound on an iron core. A battery and switch are connected to one coil and a centre-zero ammeter is connected to the other coil.



(b) (i) The iron core is a conductor. Explain why the current does not flow from the left hand coil to the right hand coil.

_____ [1]

(ii) Describe fully what, if anything, is observed on the ammeter when the switch is closed.

_____

_____ [2]

(iii) Describe fully what, if anything, is observed on the ammeter when the switch is opened.

_____

_____ [2]

(c) Two types of transformer are used in the transmission of electrical power. Describe and explain what the transformer does at the generating end of an electricity transmission system.

_____

_____

_____

_____ [3]

A transformer steps the voltage up from 25 kV to 132 kV. The primary coil has 2000 turns.

(d) Calculate the number of turns in the secondary coil.

Show your working out.

Number of turns = _____ [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

8 The Earth's crust has different layers. The first layer is called the crust and the second layer is called the mantle.

(a) What does the word "lithosphere" apply to?

_____

_____ [2]

(b) Describe how a volcano is caused.

_____

_____

_____

_____

_____ [4]

THIS IS THE END OF THE QUESTION PAPER

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