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Surname					Other names			
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**Edexcel GCSE**

**Physics/Science**  
**Unit P1: Universal Physics**

**Foundation Tier**

Friday 2 March 2012 – Morning <b>Time: 1 hour</b>	Paper Reference <b>5PH1F/01</b>
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<b>You must have:</b> Calculator, ruler	Total Marks
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### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*

### Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (\*) are ones where the quality of your written communication will be assessed – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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**PEARSON**

## FORMULAE

You may find the following formulae useful

wave speed = frequency  $\times$  wavelength

$$v = f \times \lambda$$

wave speed =  $\frac{\text{distance}}{\text{time}}$

$$v = \frac{x}{t}$$

electrical power = current  $\times$  potential difference

$$P = I \times V$$

cost of electricity = power  $\times$  time  $\times$  cost of 1 kilowatt-hour

power =  $\frac{\text{energy used}}{\text{time taken}}$

$$P = \frac{E}{t}$$

efficiency =  $\frac{(\text{useful energy transferred by the device})}{(\text{total energy supplied to the device})} \times 100\%$



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**Answer ALL questions**

Some questions must be answered with a cross . If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .

**Electromagnetic spectrum**

- 1 (a) The chart shows the electromagnetic spectrum.  
Most of the parts have been labelled.

gamma rays	X-rays	ultraviolet	visible light		microwaves	
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- (i) Use words from the box to complete the chart. (2)

infrared    infrasound    radio waves    seismic waves    ultrasound

- (ii) Which part of the electromagnetic spectrum has the highest frequency? (1)

- .....
- (b) A special ink is invisible when looked at under normal light.  
It glows when ultraviolet radiation is shone on it.

- (i) Describe how this ink could be used. (2)

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- (ii) State **one** harmful effect of ultraviolet radiation. (1)

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(c) X-rays have many uses.

Describe **one** use for X-rays other than medical uses.

(2)

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**(Total for Question 1 = 8 marks)**



## Using lenses

- 2 (a) Sunita prepares some equipment for a class practical.



She measures the focal length of different lenses.  
She uses a metre rule, some white card and the light from a distant window.

Describe how she could measure the focal length of a lens using this equipment.

(2)

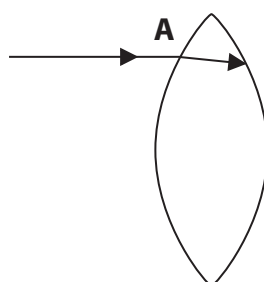
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- (b) The diagram shows the path of a ray of light through a converging lens.



- (i) The ray of light has changed direction at **A**.

State the name of this effect.

(1)

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- (ii) Complete the diagram to show the path of the ray after it has left the lens.

(1)



(c) Some students use two lenses to make a simple telescope.  
They use the telescope to look at a tree.



eyepiece lens

objective lens

Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) The objective lens

(1)

- A** forms an image outside the telescope
- B** gathers incoming light to form an image
- C** forms a magnified image
- D** forms an image the right way up

(ii) The eyepiece lens makes this first image

(1)

- A** magnified
- B** nearer to the eye
- C** real
- D** the right way up

(d) Early astronomers thought that everything orbited the Earth.  
Galileo used a telescope to observe Jupiter.

Describe what Galileo saw that made him think the early astronomers might be wrong.

(2)

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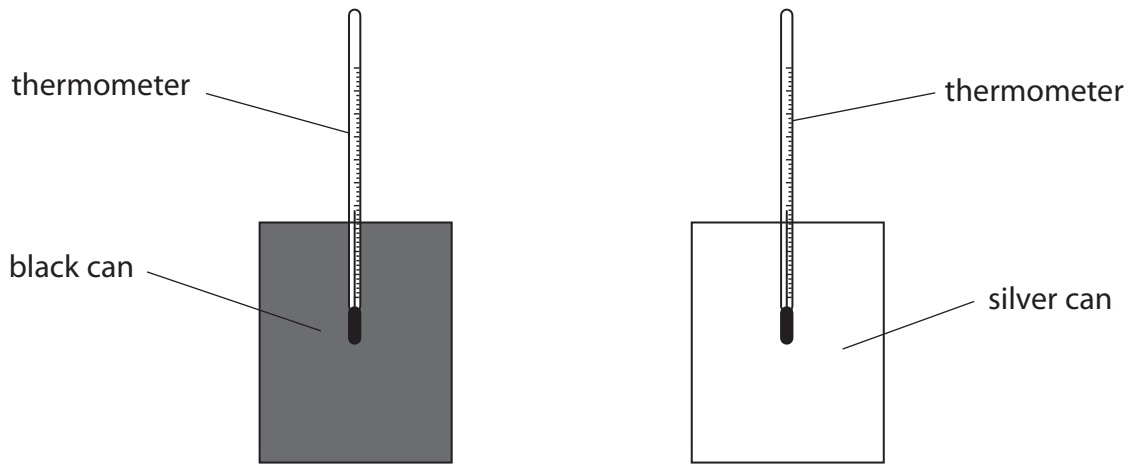
**(Total for Question 2 = 8 marks)**



### Thermal radiation

3 Some students investigate the cooling of different coloured cans.

They use two cans each fitted with a thermometer.



Hot water is poured into the cans and the temperature of the water in each can is measured every two minutes.

(a) The students want to find out if a black can cools quicker than a silver can.

Which row of the table shows the conditions they should use?

Put a cross (☒) in the box next to your answer.

(1)

	the volume of water in each can should be	the size of cans should be
<input type="checkbox"/> A	the same	the same
<input type="checkbox"/> B	the same	different
<input type="checkbox"/> C	different	the same
<input type="checkbox"/> D	different	different





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**QUESTION 3 CONTINUES ON THE NEXT PAGE**



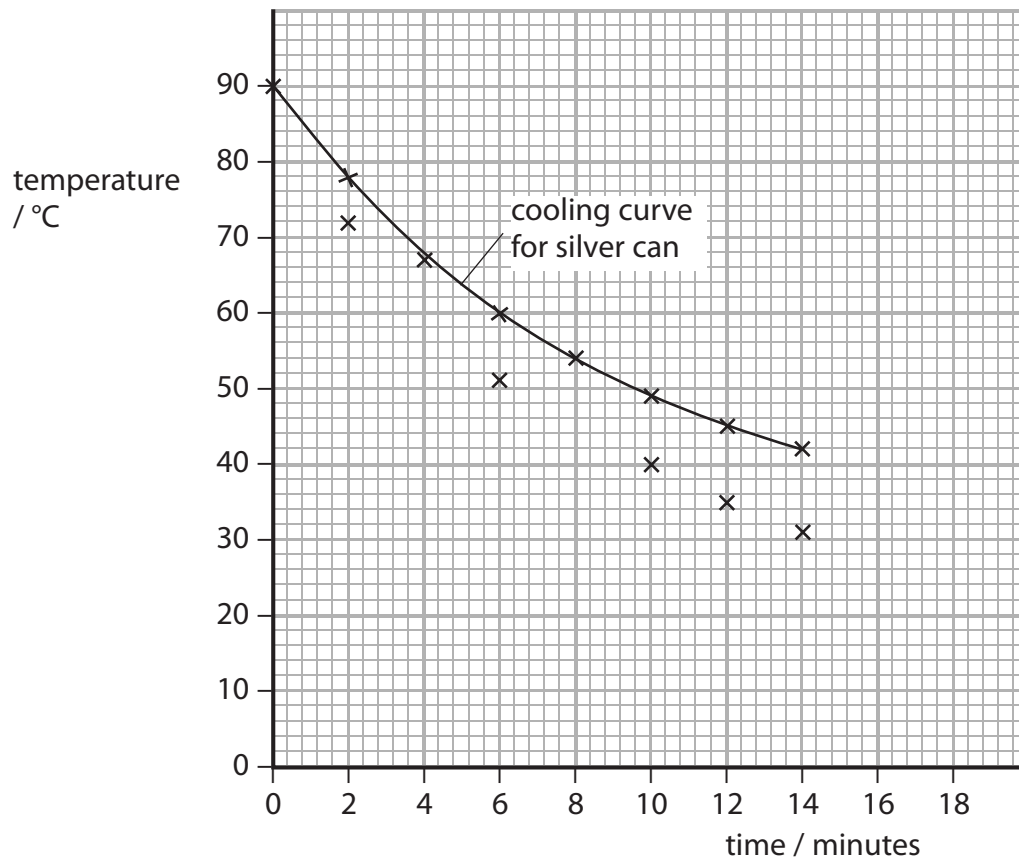
(b) The table shows the students results.

time / minutes	temperature / °C	
	black can	silver can
0	90	90
2	72	78
4	60	67
6	51	60
8	45	54
10	40	49
12	35	45
14	31	42

- (i) The graph for the silver can has been plotted on the axes.  
Six points for the black can have been plotted.

Plot the points for 4 minutes and 8 minutes for the black can.

(1)



(ii) The line of best fit has been drawn for the silver can.  
Draw the line of best fit for the black can. (1)

(iii) Estimate the temperature of the silver can when the time is 18 minutes. (1)  
temperature = .....°C

(iv) The room temperature is kept at a temperature of 21 °C.  
Suggest what the temperature of the cans will be after two hours. (1)  
temperature = .....°C

(c) The photograph shows a solar water heater.



(i) State why the pipes in the solar water heater are painted black. (1)

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(ii) The heater supplies 9000 J of thermal energy in 20 seconds.

Calculate the power output of the heater.

(2)

power output = ..... W

(iii) To produce the 9000 J of thermal energy, the heater needs 18 000 J of energy from the Sun.

Calculate the efficiency of the solar water heater.

(2)

efficiency = .....

**(Total for Question 3 = 10 marks)**

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### Observing our Universe

- 4 (a) The photograph was taken by the Hubble Space Telescope. Some of the objects in the photograph are galaxies.



- (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

A galaxy is a collection of

(1)

- A stars
- B moons
- C asteroids
- D planets

- (ii) The photograph was taken using visible light. Describe a benefit of using a telescope in space.

(2)

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(b) This photograph shows a line of radio telescopes.



(i) Name **one** type of electromagnetic radiation that they can detect.

(1)

(ii) Radio telescopes are one type of modern telescope.

Describe how the use of modern telescopes like these has helped our understanding of the Universe.

(2)

(c) The Hubble telescope has recently detected a nebula like the one in this picture.



(i) State what a nebula is.

(1)



(ii) A nebula eventually becomes a star.

Describe how a nebula becomes a star.

(3)

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**(Total for Question 4 = 10 marks)**



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## Ultrasound

5 (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

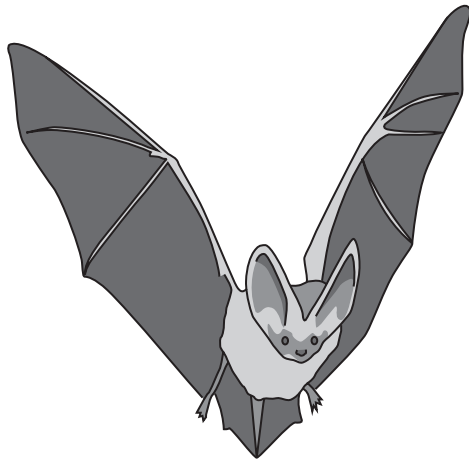
The frequency of ultrasound is

(1)

- A less than 20 Hz
- B between 20 Hz and 2000 Hz
- C between 2000 Hz and 20 000 Hz
- D more than 20 000 Hz

(b) Describe how bats use ultrasound to locate prey.  
You may add to the diagram to help with your answer.

(2)



bat



moth

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\* (c) Ultrasound and X-rays are used for medical scans.

Compare and contrast the advantages of using ultrasound and X-rays for medical scans.

(6)

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(d) Ultrasound is used to scan metal pipes to measure their thickness.



The ultrasound wave travels through the metal and is reflected at the inner surface of the metal.

The reflected wave is detected after 0.003 ms (0.000 003 s).

The speed of the ultrasound in the metal is 5000 m/s.

Calculate the thickness of the metal.

(3)

distance = speed × time

thickness of metal = ..... m

**(Total for Question 5 = 12 marks)**



## Generating electrical energy

- 6 (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

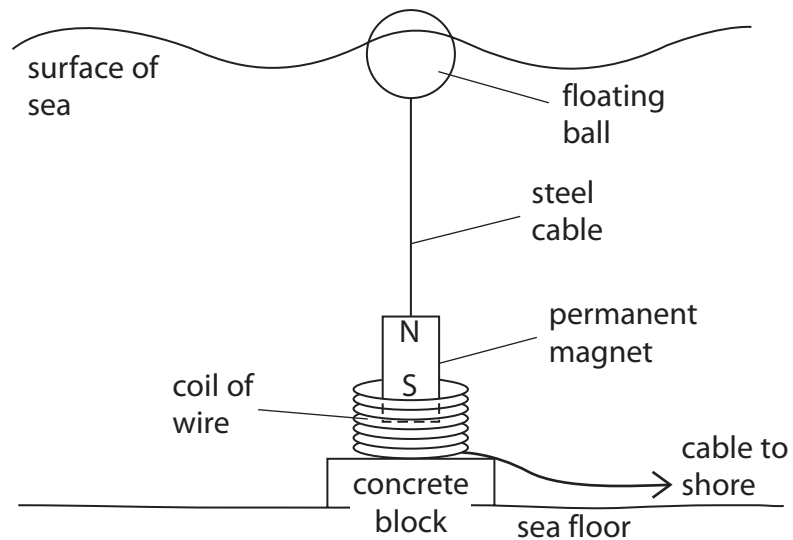
Electrical energy can be measured in

(1)

- A amps
- B kilowatt-hours
- C volts
- D watts

- (b) Scientists are looking for new ways to produce electricity from renewable resources.

The diagram shows a model of a device to generate electricity from waves.  
The coil is fixed to the concrete block.  
The magnet can move freely inside the coil.



(i) Explain how this device produces an electric current.

(3)

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(ii) Describe how the device can be altered to increase the electric current.

(2)

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\*(c) Another way of producing electricity from a renewable source is tidal power.  
A dam is built across the mouth of a river.  
Tidal water gets trapped behind the dam.



The trapped water is used to generate electricity.

Discuss the advantages and disadvantages of using tidal power rather than other methods of generating electricity.

(6)

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**(Total for Question 6 = 12 marks)**

**TOTAL FOR PAPER = 60 MARKS**



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