Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						1	5	2	1	/	3	F	Signature	

Paper Reference(s)

1521/3F

Edexcel GCSE

Science: Single Award A [1521]

Paper 3F

Foundation Tier

Friday 15 June 2007 – Morning

Time: 1 hour

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
Total	

Materials required for examination
Calculator

Items included with question papers
Nil

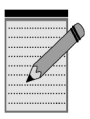
Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature. The paper reference is shown above.
Answer **ALL** questions in the spaces provided in this book.
Show all stages in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets: e.g. **(2)**.
This paper has seven questions. There are two blank pages.

Advice to Candidates



This symbol shows where the quality of your written answer will also be assessed.

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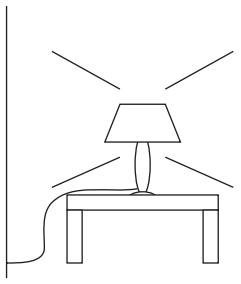
1. The box contains the names of different forms of energy.

chemical	**elastic potential**	**electrical**	**gravitational potential**
kinetic	**light**	**sound**	**thermal**

(a) The diagram shows a table lamp, lighting up a room.

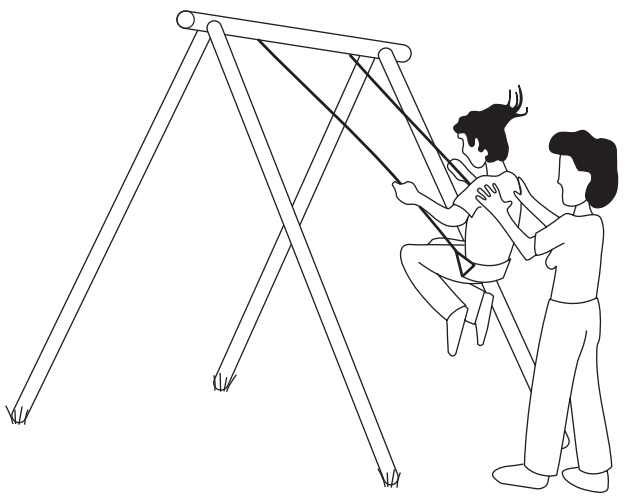


Use words from the box to describe the energy transfer taking place.

..... energy to ..... energy

(2)

(b) The diagram shows a child on a swing.



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Use words from the box to complete the following sentences.

When the child swings downwards, his .....

energy increases and his ..... energy decreases.

The swing gradually loses energy in the form of

..... energy.

This lost energy is replaced when an adult pushes the swing. The adult gets energy

from the ..... energy in food.

(4) **Q1**

(Total 6 marks)

TURN OVER FOR QUESTION 2

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2. (a) Tick the boxes next to **four** objects which are in our solar system.

black hole	
comet	
Earth	
galaxy	
nebula	
Sun	
Venus	
white dwarf	

(4)

(b) Name the force which keeps satellites in orbit around the Earth.

.....

(1)

Q2

(Total 5 marks)

TURN OVER FOR QUESTION 3

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3. The table shows some information about two electrical appliances.

appliance	voltage (V)	current (A)	power (W)
food processor	230	2.0	
dishwasher	230	12.2	2800

(a) Use the equation

power = voltage × current

to calculate the power of the food processor.

.....

.....

.....

..... W
(2)

(b) What is the power of the dishwasher measured in kilowatts?

..... kW
(1)

(c) The dishwasher is switched on for 30 minutes.

Calculate the electrical energy used in kW h.

.....

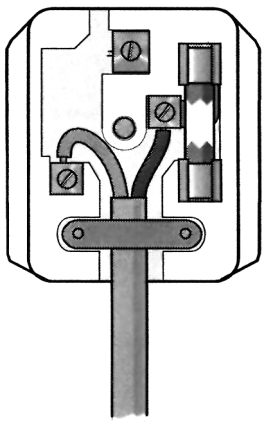
.....

.....

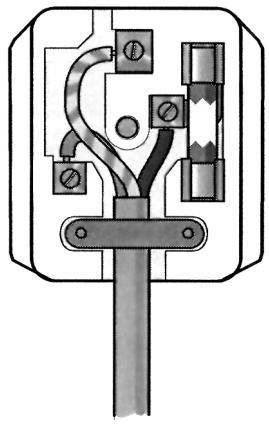
..... kWh
(2)

Leave blank

(d) The diagrams show the wiring in the plugs attached to the food processor and the dishwasher.



plug attached to the food processor



plug attached to the dishwasher

(i) What is the correct colour of the insulation on the neutral wire?

.....

(1)

(ii) What is the correct colour of the insulation on the live wire?

.....

.....

(1)

(iii) Explain why the dishwasher has an earth wire and the food processor does not.

.....

.....

.....

.....

.....

.....

(3)

Q3

(Total 10 marks)

TURN OVER FOR QUESTION 4

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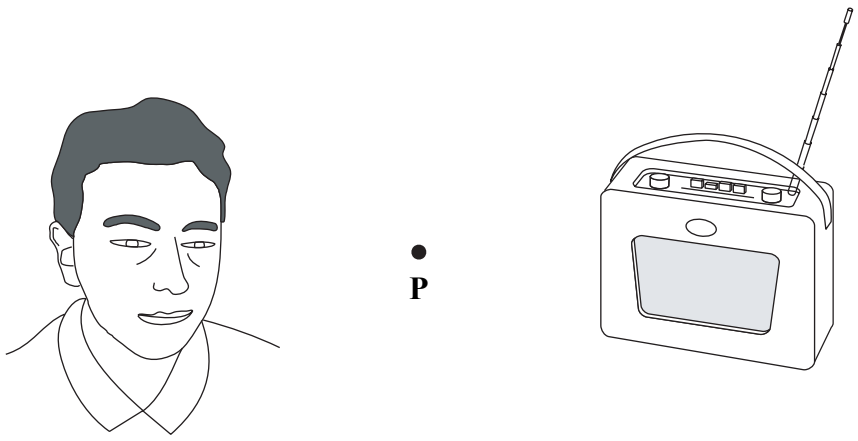
4. (a) The diagram shows someone listening to the sound waves produced by a radio.



Sound is a longitudinal wave.

Draw **two** arrows on the diagram at point **P** to show how the air is vibrating.

(2)

(b) (i) What is meant by the frequency of a sound wave?

.....

.....

(1)

(ii) Give the unit of frequency.....

(1)

(c) We can hear ordinary sound waves.

Why are we not able to hear ultrasound waves?

.....

.....

.....

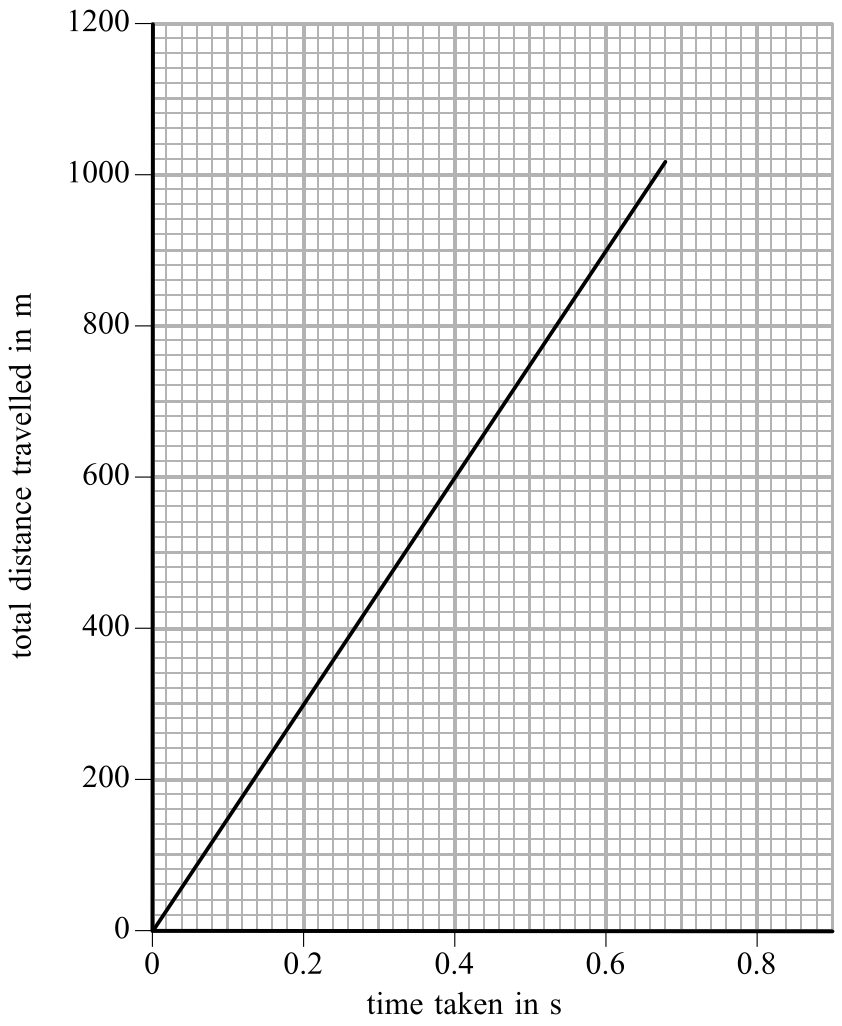
.....

(2)

Leave blank

(d) Ultrasound is used to measure the depth of the sea. A pulse of ultrasound from a ship is reflected off the seabed. The time between the pulse leaving and arriving back at the ship is measured.

The graph shows the relationship between the time taken and the total distance travelled by ultrasound in water.



(i) Use the graph to determine the depth of the sea where the time taken is 0.4 s.

.....

.....

(2)

(ii) State one other use for ultrasound.

.....

.....

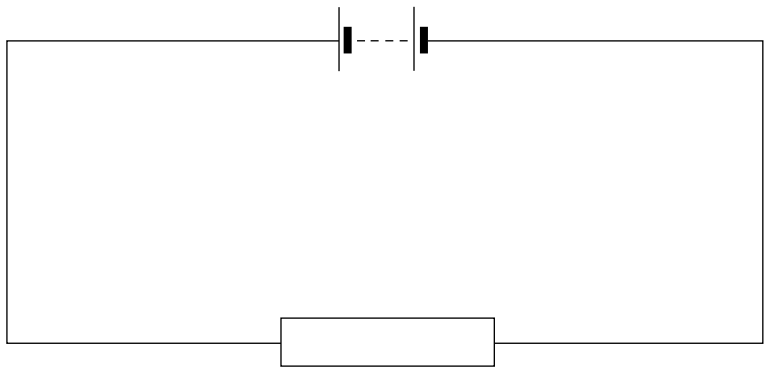
(1)

Q4

(Total 9 marks)

Leave blank

5. The diagram shows a circuit used by a student to investigate the relationship between the resistance of a circuit and the current in the circuit.



(a) Using the correct symbol, add to the circuit a meter which would measure the current in the resistor.

(2)

(b) The current in the resistor is 0.4 A and the resistance is 20 Ω.

(i) Write down an equation which could be used to calculate the voltage across the resistor.

.....

(1)

(ii) Calculate the voltage across the resistor.

.....

.....

.....

.....

(2)

Leave blank

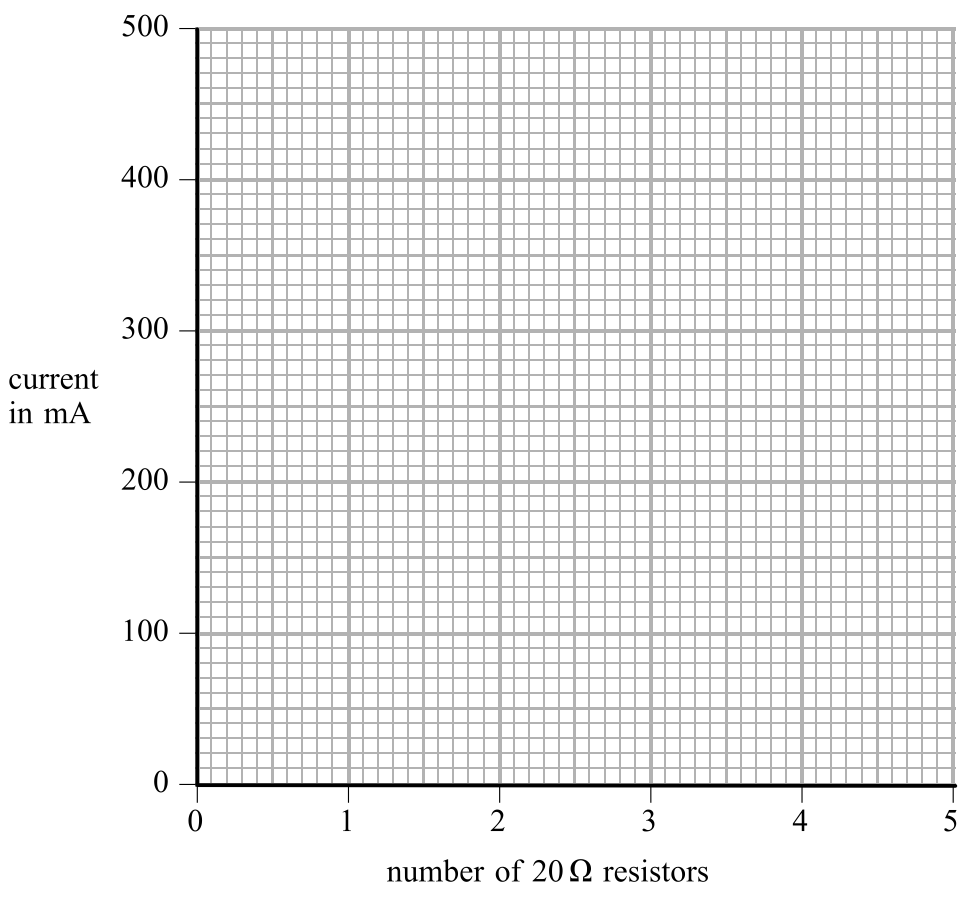
(c) The student has four more 20 Ω resistors. She adds these to the circuit one at a time in series with the first resistor. After she adds each resistor, she records the current.

Her results are shown in the table.

number of 20 Ω resistors	current (mA)
1	400
2	200
3	130
4	100
5	80

(i) Use the grid to draw the graph of current against number of resistors.

(3)



(ii) The student repeats the experiment but this time she uses five 40 Ω resistors.

Use the grid to sketch the curve you would expect her results to produce this time.

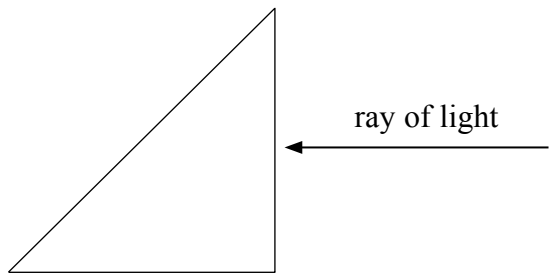
(1) **Q5**

(Total 9 marks)

Leave blank

6. (a) The diagram shows a ray of light approaching a glass prism.

Complete the diagram to show the path of the ray as it travels inside the prism and out again.



(2)

(b) Light is an electromagnetic wave.

Which colour has the longest wavelength?

.....

(1)

(c) The diagram shows the electromagnetic spectrum. Two of the electromagnetic waves are not named.

B	microwaves	**A**	light	ultraviolet	X-rays	gamma

(i) Name the wave in box **A**.

.....

(1)

(ii) Name the wave in box **B**.

.....

(1)

Leave blank

(d) The table shows some statements about electromagnetic waves.

Tick the boxes next to the **three** correct statements.

they are all transverse	
they are all longitudinal	
they all have the same frequency	
they all travel at the same speed in a vacuum	
they can all travel through concrete	
they can all transmit energy	

(3)

(e) All electromagnetic waves can be diffracted.

The diffraction of microwaves can be observed using a 3 cm gap.
Suggest why the same size gap could not be used to show the diffraction of X-rays.

.....

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.....

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(3)

Q6

(Total 11 marks)

TURN OVER FOR QUESTION 7

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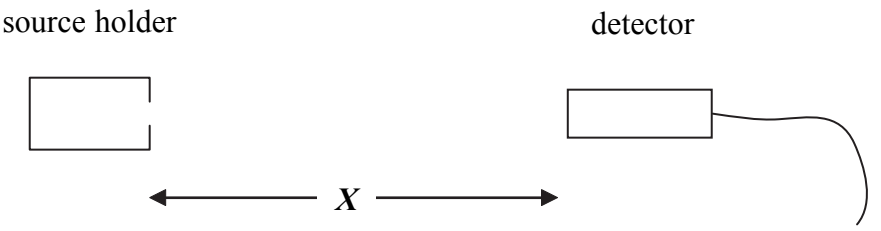
7. The diagram shows the apparatus used to measure the activity of different radioactive sources. A radioactive source is placed in the holder and its activity is measured using the detector. The distance ***X*** can be changed.



(a) Name a suitable detector.

.....

(1)

(b) The activity of three sources is measured at three distances ***X***.
Each source emits only one type of ionising radiation.

The results are shown in the table.

	activity (Bq)		
	X = 1 cm	***X*** = 7 cm	***X*** = 100 cm
no source	3	2	4
source 1	230	4	3
source 2	230	200	5
source 3	230	233	228

(i) Why does the detector still record some activity when there is no source in the source holder?

.....

.....

(1)

Leave blank

(ii) Use the results to help you to complete the following table about the three sources.

	type of ionising radiation	**charge**
source 1		
source 2		negative
source 3	gamma	

(4)

(c) Source 1 is americium–241. The symbol for a nucleus of americium–241 is

$$^{241}_{95}\mathrm{Am}$$

(i) How many protons are there in a nucleus of americium–241?

.....

(1)

(ii) How many neutrons are there in a nucleus of americium–241?

.....

(1)

(iii) Americium–241 is used in home smoke detectors.
Suggest why it is used instead of source 2 or source 3.

.....

.....

.....

.....

.....

(2)

Q7

(Total 10 marks)

TOTAL FOR PAPER: 60 MARKS

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