

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
TWENTY FIRST CENTURY SCIENCE  
PHYSICS A**

Unit 1 Modules P1 P2 P3  
FOUNDATION TIER  
**MONDAY 25 JUNE 2007**

**F A331/01**

Morning

Time: 40 minutes

Calculators may be used.  
Additional materials: Pencil  
Ruler (cm/mm)



\* C O P / T 4 3 3 6 1 \*

Candidate  
Name

Centre  
Number

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Candidate  
Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	2	
2	4	
3	2	
4	5	
5	2	
6	4	
7	8	
8	4	
9	5	
10	6	
<b>TOTAL</b>	<b>42</b>	

This document consists of **17** printed pages and **3** blank pages.

**BLANK PAGE**

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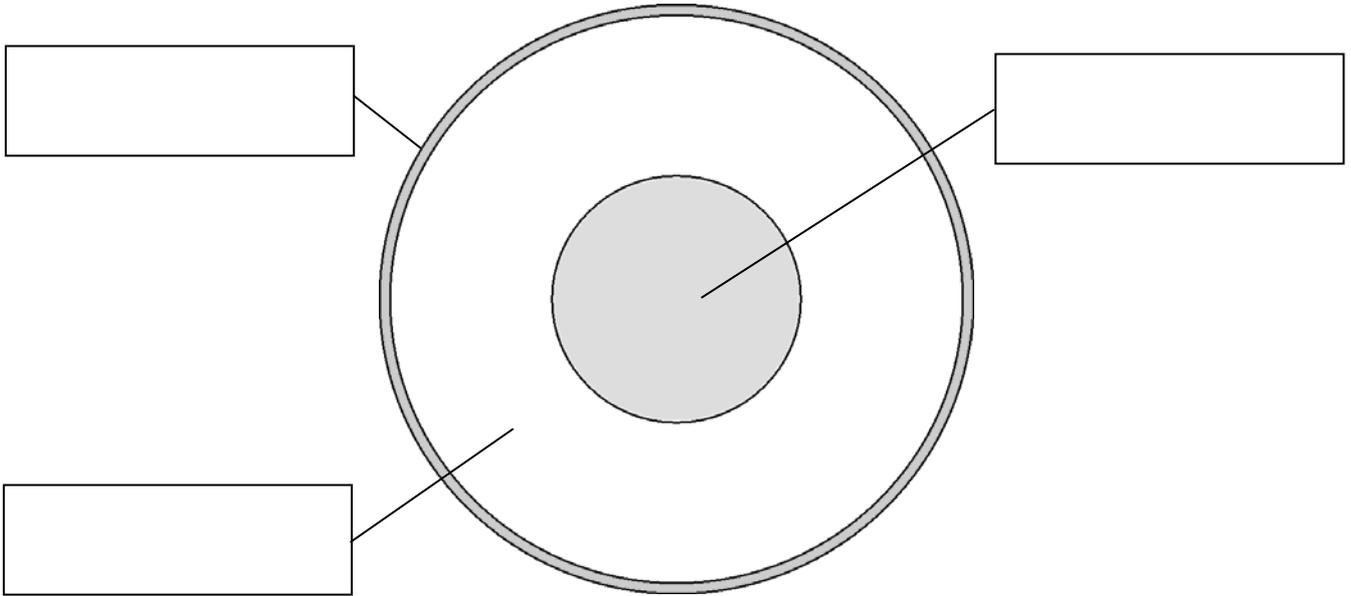
Answer **all** the questions.

- 1 The diagram shows a section through the Earth.  
Use the following words to label the diagram.

**core**

**crust**

**mantle**



[2]

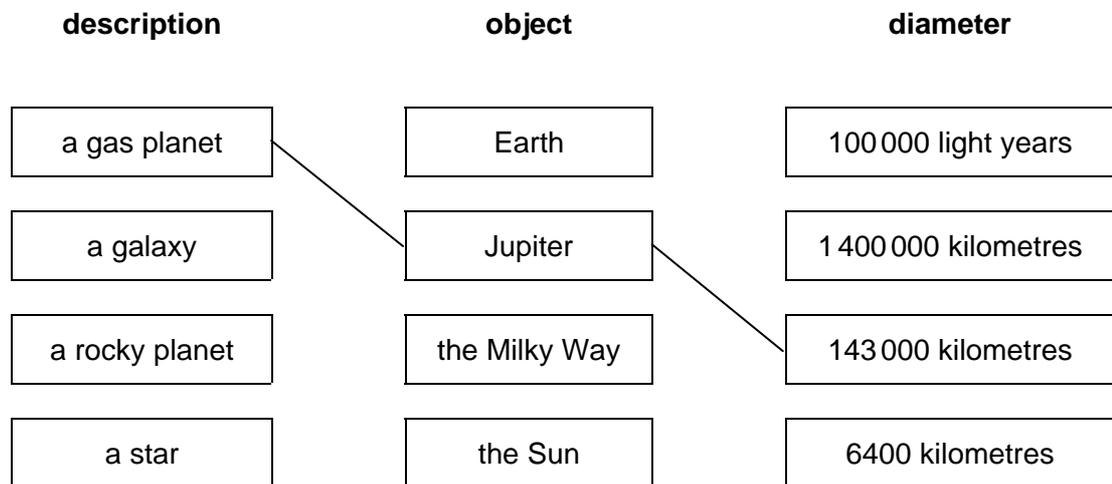
[Total: 2]

2 Here are the diameters of some astronomical objects.

Draw a straight line from each **description** to the correct **object**.

Then draw another straight line from each **object** to its **diameter**.

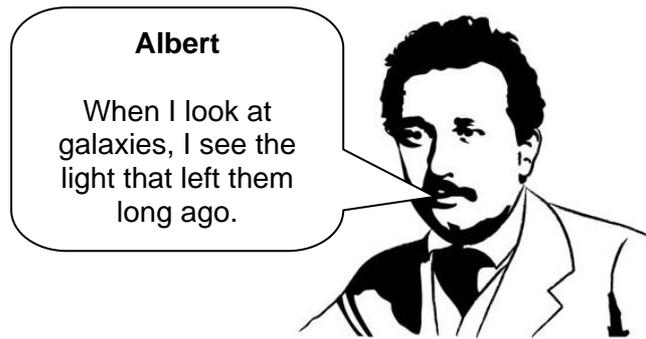
Two lines have been drawn for you.



[4]

[Total: 4]

3 Albert looks at the night sky through a telescope.



Which two of these statements justify what Albert says?

Put a tick (✓) in the **two** correct boxes.

Light travels much faster than sound.

Galaxies are very great distances apart.

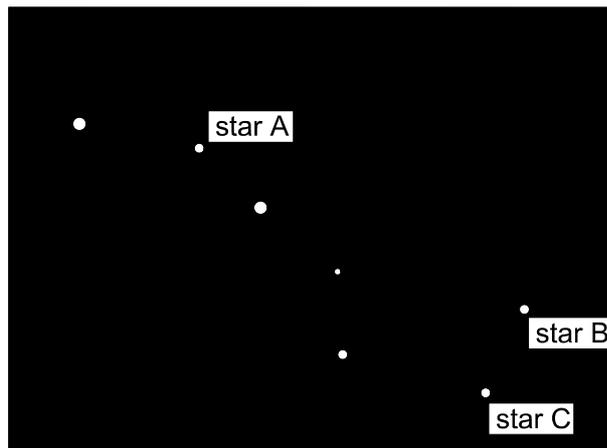
Light travels through space at 300 000 km/s.

The Earth goes once around the Sun in a year.

[2]

[Total: 2]

4 The diagram shows the stars in the constellation of the Plough.



(a) Star **A** looks as bright as star **B**, but star **A** is much closer to us than star **B**.

Which statement explains why the stars **A** and **B** look equally bright?

Put a tick (✓) in the correct box.

Star **A** gives out less light than star **B**.

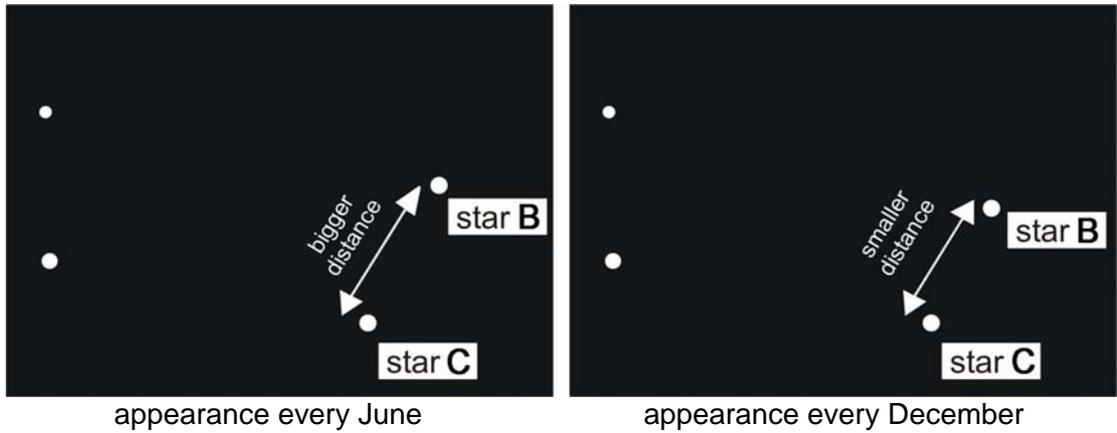
Star **A** gives out more light than star **B**.

Star **A** and star **B** give out the same amount of light.

[1]

- (b) The distance between stars **B** and **C** is measured every June and December. They always appear closer together in December.

This is shown in the diagram. The diagram is not to scale.



Which **one** of these statements is the best explanation for this observation?

Put a tick (✓) in the correct box.

- Star **B** moves towards and away from star **C** once every year.
- As the Earth moves around its orbit, we get different views of the stars.
- The Earth's axis is tilted less in December, so the stars seem closer together.

[1]

- (c) Complete the following sentences about observing stars.

Choose words from this list.

**detection    galaxies    light    planets    pollution    sound**

We can only see stars because they give out .....

People in cities find it hard to see stars because of light .....

Astronomers have found that some nearby stars have ..... in orbit around them.

[3]

[Total: 5]

[Turn over

5 Here are some descriptions of alpha, beta and gamma radiation.

Draw a straight line from each **type of radiation** to its correct **property**.

type of radiation	property
alpha	This needs thick metal to absorb it.
beta	This is absorbed by a thin sheet of paper.
gamma	This goes through a sheet of paper, but it is stopped by a thin sheet of metal.

[2]

[Total: 2]

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**Question 6 starts on page 10**

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- 6 Four families in the same street worry about radioactive radon gas in their houses.



Five measurements are made of the radioactivity of a volume of air in each house.

The table shows the results.

family	radioactivity readings in $\text{Bq/m}^3$					average of all 5 tests
	test 1	test 2	test 3	test 4	test 5	
Adams	130	140	120	80	130	120
Brown	120	110	130	130	110	120
Clark	100	90	100	80	80	90
Davies	130	120	120	110	140	124

- (a) One of the readings in the table is an outlier.

Put a ring around the outlier.

[1]

(b) Here are some statements about the radon gas levels in these houses.

Put a tick (✓) in the box next to **each** correct statement.

The Clark house has the least amount of radon gas.

The Davies house has significantly more radon gas than the Brown house.

The Brown house and the Davies house have similar amounts of radon gas.

The Adams house and the Brown house have exactly the same amount of radon gas.

[2]

(c) Radon gas can cause lung cancer.

For this reason, the Government recommends a maximum level of 200 Bq/m<sup>3</sup> in any house.

Which **one** of the following is the best description of the risk for these four families?

Put a tick (✓) in the box next to the **best** description.

There is a small risk for all these families from lung cancer due to radon gas.

There is an identical risk for all these families from lung cancer due to radon gas.

There is no risk for any of these families from lung cancer due to radon gas.

[1]

[Total: 4]

7 (a) Each way of generating electricity has a disadvantage.

Draw a straight line from each **energy source** to its **disadvantage**.

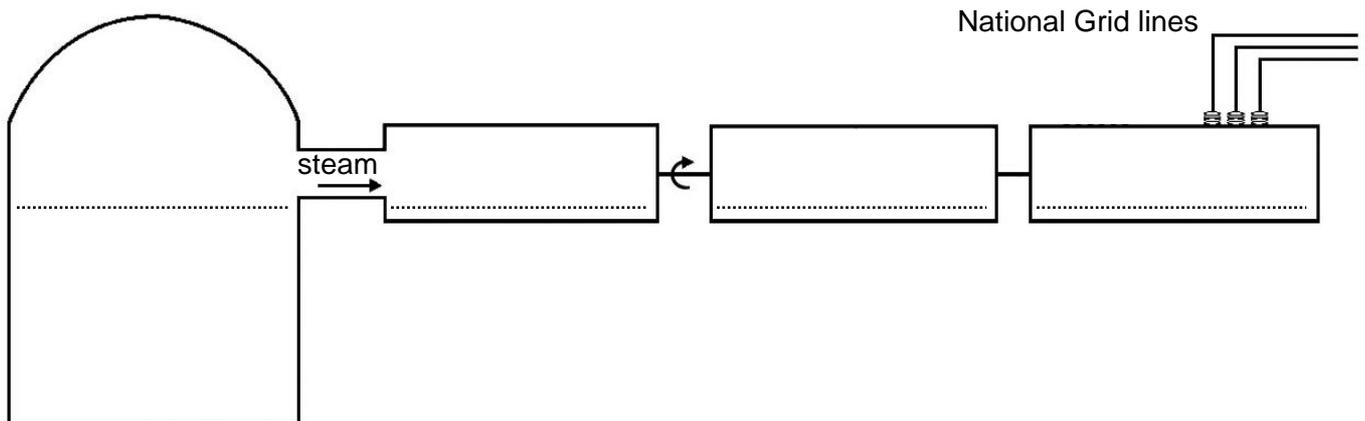
energy source	disadvantage
fossil fuel	does not give electrical power all the time
nuclear fuel	produces carbon dioxide
wind	produces radioactive waste

[2]

(b) The diagram below shows how a nuclear power station generates electricity.

Use the following words to label the diagram.

**generator**      **reactor**      **transformer**      **turbine**



[3]

(c) Workers in nuclear power stations wear special badges.

These badges contain film which is sensitive to radiation.



Complete the following statements about why workers need these badges.

Choose words from this list.

**background    cancer    cooling    dose    ionizing    ultraviolet**

People who work with radioactive materials are exposed to ..... radiation.

This radiation can damage living cells and may cause .....

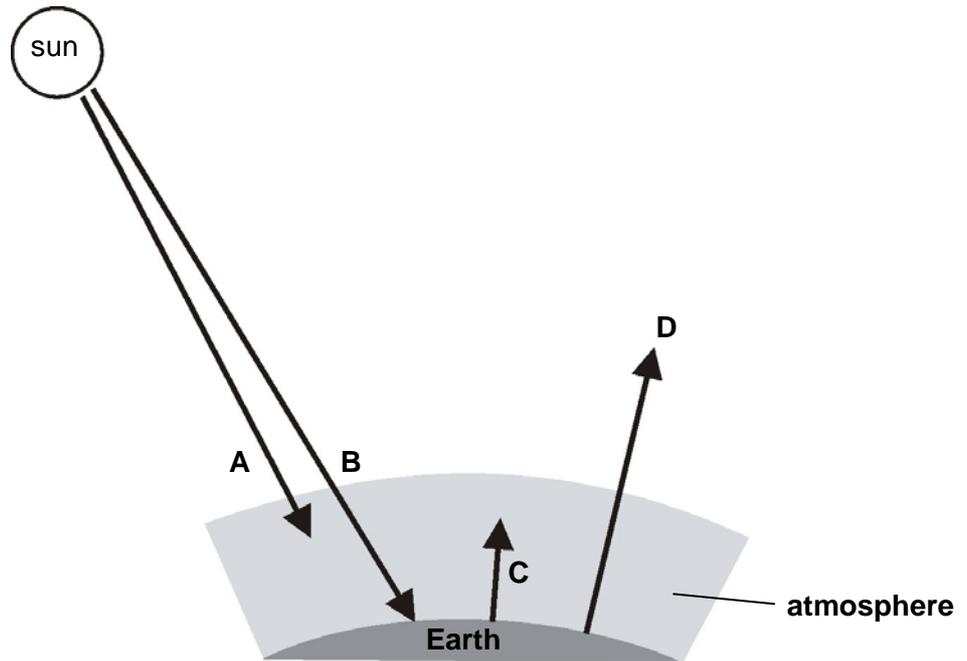
Workers wear badges to measure their radiation .....

[3]

[Total: 8]

8 This question is about the effect of electromagnetic radiation on the Earth's atmosphere.

(a) The four arrows **A**, **B**, **C** and **D** in the diagram show electromagnetic radiation.



Some of the radiation comes from the Sun, and some comes from the Earth.

The table shows different effects of the radiation.

Complete the table by writing **A**, **B**, **C** or **D** in the correct box.

effect	arrow
This warms the Earth's surface.	
This is absorbed by the ozone layer.	
This produces the greenhouse effect.	

[3]

(b) The greenhouse effect causes global warming.

Which **one** of the following could happen as a result of global warming?

Put a tick (✓) in the correct box.

The sea levels could go down.

The weather could become the same in all countries.

Some places may find it impossible to grow food crops.

[1]

[Total: 4]

- 9 (a) Nick is watching television. He finds that he can change channels by pointing the infrared remote control at the ceiling.

**An image has been removed due to copyright restrictions**

Details:  
a cartoon-style illustration of a man watching television  
with the remote control pointing upwards

The following statements explain how this works. They are in the wrong order.

<b>A</b>	Infrared radiation travels to the ceiling.
<b>B</b>	Infrared radiation reflects from the ceiling.
<b>C</b>	The TV remote control emits infrared radiation.
<b>D</b>	Nick presses the button on the TV remote control.
<b>E</b>	The detector on the TV receives the infrared radiation.

Fill in the boxes to show the right order. The first one has been done for you.

<b>D</b>				
----------	--	--	--	--

[3]

- (b) Nick does some experiments with the remote control.

Draw a straight line joining **what Nick found out** with the correct **explanation**.

**what Nick found out**

**explanation**

The remote control still works if it is in a paper bag.

The detector of infrared is at the bottom of the television.

The remote control does not work so well if it is further from the television.

Paper does not absorb infrared.

The remote control doesn't work when it points to the top of the television.

The intensity of infrared gets less as you get further from the remote control.

[2]

[Total: 5]

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**Question 10 starts on page 18**

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## 10 Read this article from a newspaper.

***Children should not use Mobile Phones***

“I don't think we can say mobile phones are totally safe,” says Professor Stewart. Scientists have no proof that the electromagnetic radiation emitted by mobile phones is not dangerous.

Professor Stewart says that new evidence suggests there may be possible health risks. He says there is enough uncertainty about mobile phones to adopt a “precautionary approach” - particularly when it comes to children.

If electromagnetic radiation poses a risk, it will affect children more than adults. This is because their skulls are thinner and their brains are still developing.

**(a)** Here are some statements about the risk from mobile phones.

Put ticks (✓) in the boxes next to each of the **four** statements that are mentioned in the article.

Adults are less at risk than children.

Mobile phones are completely safe.

Children have thinner skulls than adults.

The radiation from mobile phones causes cancer.

There may be health risks from the use of mobile phones.

Children's brains are more likely to be affected than adults' brains.

[2]

(b) Four parents have been reading the article. This is what they say.

**Abul**  
I worry about my son's health. He uses his mobile phone far too much.

**Beth**  
I'm not letting my daughter have a mobile phone until she's 18.

**Clive**  
My daughter keeps her phone in her bag. She only uses it to receive calls, so she doesn't get much radiation.

**David**  
I think this risk to my children is exaggerated. There's very little radiation from a mobile phone.

(i) Put a tick (✓) in the box next to the name of **each** parent who thinks their children are at risk from mobile phones.

Abul

Beth

Clive

David

[2]

(ii) Put a tick (✓) in the box next to the name of **each** parent who explains how they reduce the risk to their children.

Abul

Beth

Clive

David

[2]

**END OF QUESTION PAPER**

[Total: 6]

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