

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
PHYSICS A

Unit 1 Modules P1 P2 P3 (Foundation Tier)

SAMPLE ASSESSMENT MATERIAL
(from 2010 onwards)

Time: 40 minutes

Candidates answer on the question paper

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)

Candidate
 Forename

Candidate
 Surname

Centre
 Number

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Candidate
 Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use 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.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **42**.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	4	
2	7	
3	3	
4	7	
5	4	
6	4	
7	7	
8	6	
TOTAL	42	

This document consists of **13** printed pages and **3** blank pages.

Answer **all** the questions.

- 1 The Solar System consists of many different objects.
The Earth, Moon, Sun and asteroids are some of these objects.



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- (a) Put the following objects in order of size. Start with the smallest first.
The first one has been done for you.

Earth	Moon	asteroid	Sun
smallest	asteroid		
↓			
largest			

[2]

- (b) Here are some statements about the Earth.
Put ticks (✓) in the boxes next to the **two** correct statements.

The Earth is much older than the Sun.

The Earth is younger than the Universe.

The Earth orbits the Moon every 28 days.

The Earth orbits the Sun once a year.

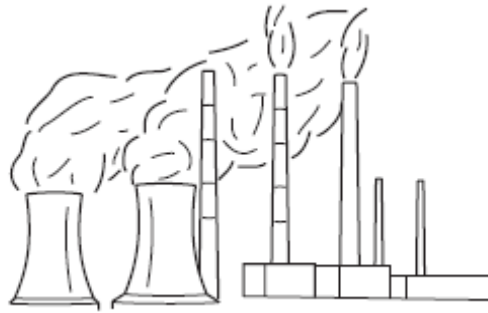
The Earth is the largest planet in the Solar System.

[2]

[Total: 4]

2 This question is about generating electricity.

You need a primary energy source to generate electricity.



(a) Draw a straight line from each primary energy source to its main waste product.

primary energy source	main waste product
nuclear fuel	produces little or no waste
fossil fuel	produces radioactive waste
solar	produces carbon dioxide

[2]

(b) Explain why electricity is a very convenient energy source.

Your answer should include ideas about

- transmission
- uses

.....

 [2]

(c) The Government is trying to encourage the use of renewable energy sources.

Explain what is meant by renewable energy sources. Give some examples, other than solar energy.

.....

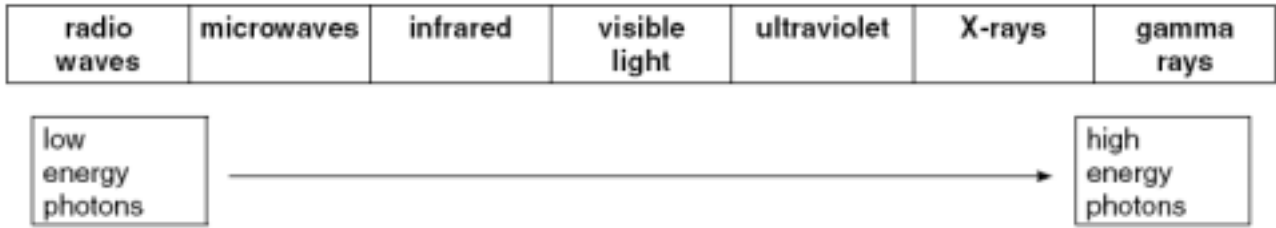
 [3]

[Total: 7]

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3 Here is the electromagnetic spectrum.



(a) What is a photon?

Put a (ring) around the best answer.

a parcel of colour

a stream of energy

a packet of energy

[1]

(b) Some types of radiation are classed as 'ionising'.

On the diagram below, put a tick (✓) in **each** box that contains an ionising type of radiation.

radio waves	microwaves	infrared	visible light	ultraviolet	X-rays	gamma rays
-------------	------------	----------	---------------	-------------	--------	------------

[2]

[Total: 3]

No phones for kids?

A mobile phone designed for young children has been withdrawn from sale by the company that makes it.

A study found that people who regularly use a mobile phone for over 10 years are four times more likely to develop cancer of the ear. The study involved 750 people.

A spokesman for the mobile phone company said: 'The decision to withdraw the product is taken because of this new evidence. It suggests that long term exposure to microwave radiation from mobile phones can damage health, especially in very young children.'

'Any risk to our children is unacceptable.'

- (a) What type of radiation do mobile phones use to make a call?

Put a **ring** around the best answer.

radio waves

sound waves

microwaves

[1]

- (b) The article describes a correlation between using mobile phones and ear cancer.

Which of the following describes this **correlation**?

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

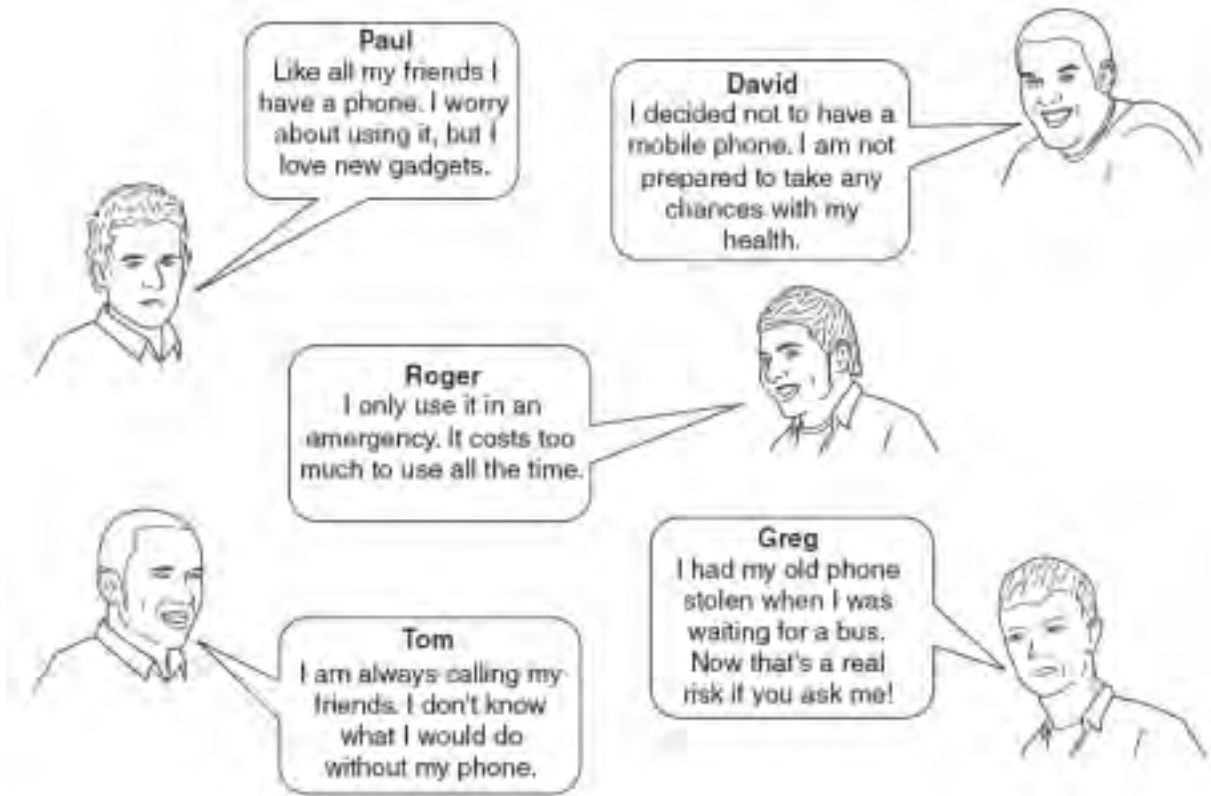
Using a mobile phone causes ear cancer.

Greater use of a mobile phone increases the risk of ear cancer.

Using a mobile phone does not increase the risk of ear cancer.

[1]

(c) A group of students are discussing their views on mobile phones.



(i) The article suggests there is a risk to using a mobile phone.

Which **two** students seem unaware of any risks?

answer and [2]

(ii) Which **two** students have done things that lead to a lower risk?

answer and [2]

(iii) How could you **explain** the decision that Paul has made?

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

He is aware of a risk, but it doesn't bother him.

He believes the benefit outweighs the risk.

He is aware of a risk and decides not to go ahead.

He believes that there is more risk than benefit.

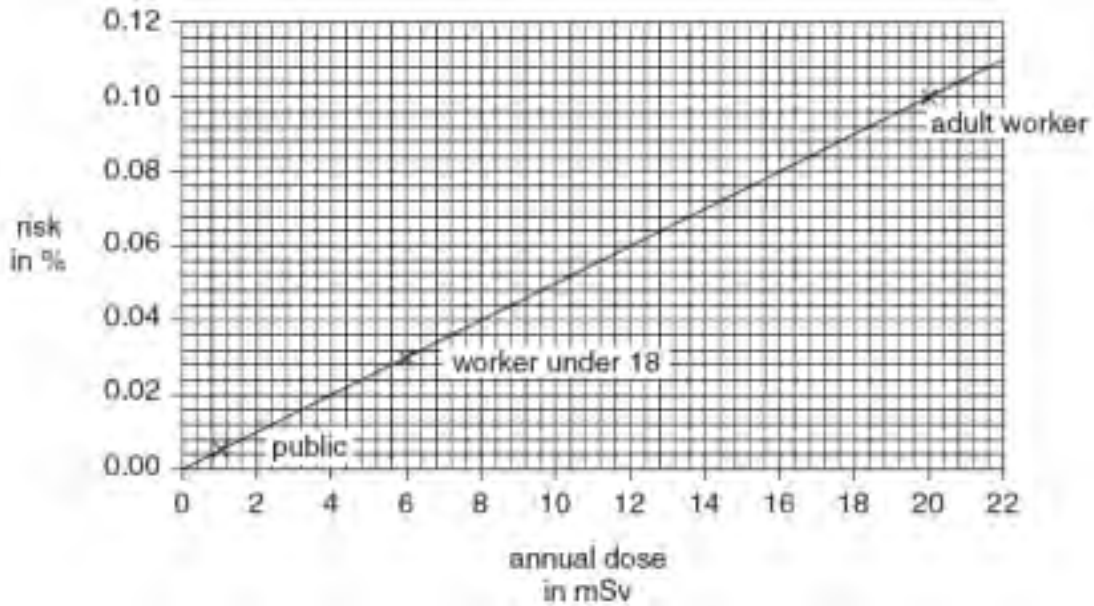
[1]

[Total: 7]

5 Workers in a nuclear power station have their radiation dose carefully monitored.

This chart shows how risk is related to radiation dose.

The **annual dose limits** for different categories of people are marked with a cross.



(a) Use the chart to answer the following question.

What is the annual dose limit for an adult worker?

Put a **ring** around the correct answer.

- 1 mSv 0.10% 6 mSv 0.06% 20 mSv zero

[1]

(b) The annual dose limit for a worker in a nuclear power station is much higher than for a member of the public.

Explain why it might be acceptable for the worker to have a higher risk.

You should include in your answer

- a general reason for society
- a personal reason for the worker
- a precaution that could be taken to reduce the risk.

.....

.....

.....

.....

..... [3]

[Total: 4]

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Question 6 continues on page 10

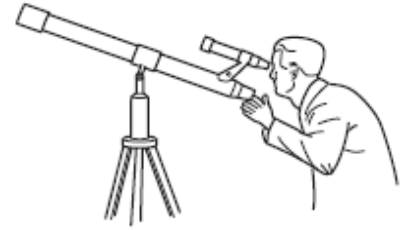
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6 Heather takes part in an astronomy club at her school in London.

Heather has a friend called Stella.

Stella takes part in an astronomy club at her school in the Welsh countryside.

Both girls use the same type of telescope to observe the night sky.



(a) Heather does not see as much detail through the telescope as Stella.

Choose the best explanation for this from the list below.

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

Stella knows more about astronomy than Heather.

Light pollution is interfering with Heather's observations.

It rains more in the Welsh countryside.

Stella's telescope is on top of a hill.

[1]

(b) Heather's teacher tells her that looking at distant stars is like looking back in time.

What did Heather's teacher mean by this statement?

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

Stars have been around for a long time.

Stars do not ever change their appearance.

It takes time for light to reach us from the stars.

New stars are being formed all the time.

[1]

(c) Heather's teacher then tells her that the star she is looking at is about 4 light-years away.

(i) What is a light-year?

Put a tick (✓) in the box next to the correct answer.

the distance that light travels in one year

the time it takes for the Earth to orbit the Sun

the time it takes for light from a star to reach the Earth

[1]

(ii) Heather then moves the telescope to look at a star that is further away.

Complete the sentence below. Choose from this list.

less

more

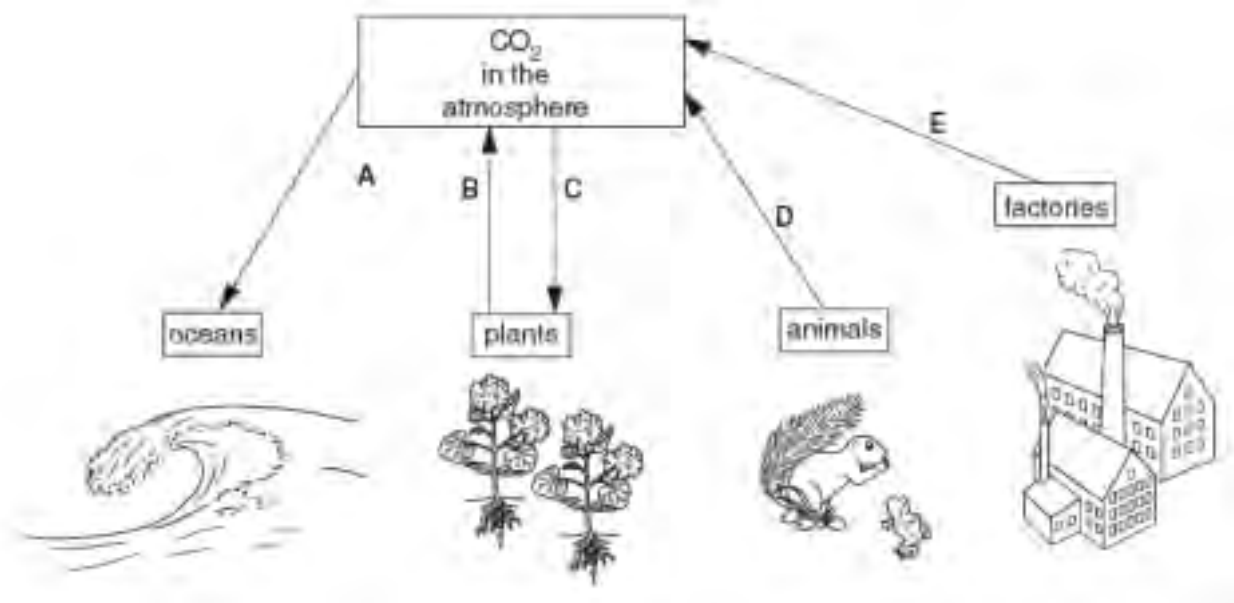
the same

Light from the more distant star takes time to reach Heather.

[1]

[Total: 4]

7 This diagram shows part of the Carbon Cycle.



(a) Which process is shown by arrow C?

Put a ring around the correct answer.

decomposition

photosynthesis

radiation

[1]

(b) Which **two** arrows, A, B, C, D or E, show respiration?

answer and [1]

(c) Which arrow, A, B, C, D or E, shows combustion?

answer..... [1]

(d) Before 1800 the amount of carbon dioxide in the atmosphere was steady for thousands of years.

In the last 200 years the amount of carbon dioxide in the atmosphere has risen.

Explain why the amount of carbon dioxide was steady, and give reasons for the recent increase.

.....

.....

.....

.....

.....

..... [4]

[Total: 7]

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Question 8 starts on page 14

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8

Around 100 years ago many scientists believed that mountains on the Earth were caused by the surface of the Earth shrinking as it cooled down.

Alfred Wegener came up with a different idea to explain how mountains formed.

In 1912 Wegener presented his big idea to a meeting of geologists in Germany.

Wegener's big idea became known as continental drift.

He published a book that described his ideas in 1922.

After 'peer review' of his work his ideas were rejected by most geologists at the time.



© Science Photo Library

(a) What is 'peer review'?

Make the best description you can by drawing **one** straight line from a box on the left to a box on the right.

The public look at your work ...

... and they give their opinion.

Scientists look at your work ...

... to see if it is interesting.

Your friends look at your work ...

... and repeat the experiments.

[1]

(b) Read the following statements about continental drift.

Some statements are data, others are explanations.

Choose which statements are **data** about continental drift and mark them with a **D**.

The continents could have once been joined together.

The outlines of the continents appear to fit like a jigsaw.

Fossils found in Africa match those found in South America.

A land bridge may once have joined Africa to South America.

[2]

(c) What reasons did the geologists of Wegener's time have to reject his ideas?

Put ticks (✓) in the boxes next to the **two** best answers.

He was an outsider to their group.

The evidence he provided was clearly wrong.

They did not know how the continents could be moved.

They agreed that similar fossils were found in Africa and South America.

[2]

(d) How does the theory of continental drift account for mountain building?

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

Land is pushed upwards when continents collide.

Weathering wears away softer rock to leave a hard lump behind.

The surface of the Earth becomes wrinkled as it cools down.

[1]

[Total: 6]

END OF QUESTION PAPER

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GCSE Unit

MARK SCHEME

SAMPLE ASSESSMENT MATERIAL
(from 2010 onwards)

Physics A (J635)
Modules P1, P2 and P3
Foundation Tier

A331/01

Maximum Mark: 42

Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	= alternative and acceptable answers for the same marking point
(1)	= separates marking points
not/reject	= answers which are not worthy of credit
ignore	= statements which are irrelevant - applies to neutral answers
allow/accept	= answers that can be accepted
(words)	= words which are not essential to gain credit
<u>words</u>	= underlined words must be present in answer to score a mark
ecf	= error carried forward
AW/owtte	= alternative wording
ORA	= or reverse argument

E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

work done = 0 marks

work done lifting = 1 mark

change in potential energy = 0 marks

gravitational potential energy = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.
7. The list principle:
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

8. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

E.g. If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Expected Answers	Marks	Rationale
1	a	<input type="text" value="(asteroid)"/> <input type="text" value="Moon"/> <input type="text" value="Earth"/> <input type="text" value="Sun"/> Moon before Earth (1) Earth before Sun (1)	2	Accept phonetically correct spelling of words.
	b	Earth is younger than the Universe <input type="checkbox"/> (1) Earth orbits the Sun once a year <input checked="" type="checkbox"/> (1)	2	2 marks for both 2 nd and 4 th box correct and no other ticks. 1 Mark for 2 nd or 4 th box correct and <u>at least</u> 3 blanks. (note if 3 boxes ticked including the 2 correct boxes, 1 mark scored.)
Total			4	

Question		Expected Answers	Marks	Rationale	
2	a		2	3 links correct 2 marks . 2 or 1 links correct 1 mark . Accept any correct matching of boxes as links.	
	b	i	easy to transmit; can be used in many different ways	2	
		ii	Idea of an energy source that is not used up / can be replaced (1) any 2 examples: wind; wave; water/hydro; geothermal; tidal; biofuel/wood;	3	
Total			7		

Question		Expected Answers	Marks	Rationale
3	a	a packet of energy (1)	1	Any clear correct choice is allowed.
	b	ultraviolet X-rays gamma rays	2	3 or 2 correctly identified 2marks . 1 correctly identified 1 mark . -1 mark for each mark in first 4 boxes. Minimum mark = 0.
Total			3	

Question		Expected Answers	Marks	Rationale				
4	a	microwaves (1)	1	Any clear correct choice is allowed.				
	b	increases the risk of ear cancer <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr></table> (1)		✓		1		
✓								
	c	i Tom (1) Roger (1)	2	Answers in either order allowed.				
		ii David (1) Roger (1)	2	Answers in either order allowed.				
		iii benefit outweighs the risk <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)		✓			1	
✓								
Total			7					

Question		Expected Answers	Marks	Rationale
5	a	20 mSv (1)	1	Any clear indication of correct choice allowed.
	b	provides needed energy; get well paid; any form of shielding/monitoring of dose	3	
Total			4	

Question		Expected Answers	Marks	Rationale				
6	a	light pollution is interfering <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)		✓			1	
✓								
	b	takes time for light to reach us <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr></table> (1)		✓		1		
✓								
	c	i	distance light travels in one year <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)	✓			1	
✓								
		ii	more (1)	1				
Total			4					

Question		Expected Answers	Marks	Rationale
7	a	photosynthesis (1)	1	Any clear indication of correct choice allowed.
	b	B and D (1)	1	both correct, any order for 1 mark.
	c	E (1)	1	Allow 'factories'.
	d	steady because: amount put into atmosphere equalled amount taken out; (1) relevant example e.g. plants absorb / animals produce (1) increased because: more fossil fuels burnt; (1) forests cut down (1)	4	accept more cars/factories
Total			7	

Question		Expected Answers	Marks	Rationale
8	a	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 80px; height: 20px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px;">give their opinion</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px;">scientists</div> <div style="margin-left: 10px;"> <div style="border: 1px solid black; width: 120px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 120px; height: 20px;"></div> </div> </div>	1	If more than one link made then 0 marks . Any clear indication of correct link is allowed.
	b	outlines appear to fit like a jigsaw <input type="checkbox"/> (1) fossils in Africa match South America <input type="checkbox"/> (1)	2	See guidance for examiners point 8 with 'D' used in place of ticks. Accept any clear indicator of correct choice.
	c	outsider to their group <input checked="" type="checkbox"/> (1) did not know how continents moved <input checked="" type="checkbox"/> (1)	2	See guidance for examiners point 8. Accept any clear indicator of correct choice.
	d	land is pushed upwards <input checked="" type="checkbox"/> (1)	1	
Total			6	
Section total			42	