



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

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TWENTY FIRST CENTURY SCIENCE

0608/03

Paper 3

May/June 2012

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

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

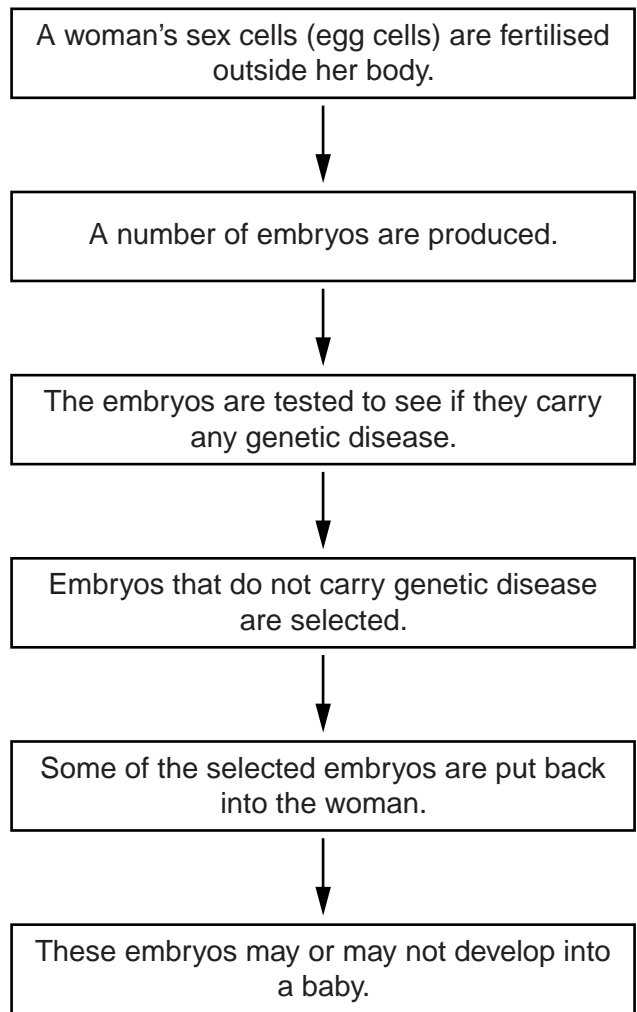
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2	
3	
4	
5	
6	
7	
8	
9	
Total	

This document consists of **16** printed pages.



1 Look at the diagram which describes the process of testing embryos for embryo selection.



(a) Name the type of cells that are used to fertilise the woman's egg cells.

..... [1]

(b) Use the flow diagram to explain why the process is not always successful.

.....
..... [1]

(c) Lee and Margaret want a baby.

(i) Lee and Margaret are **both** carriers of cystic fibrosis. Cystic fibrosis is caused by a recessive allele.

They are advised to have their embryos tested for embryo selection. Explain why.

.....
.....
..... [2]

(ii) During this process, there are lots of embryos produced that are not needed. These embryos are thrown away.

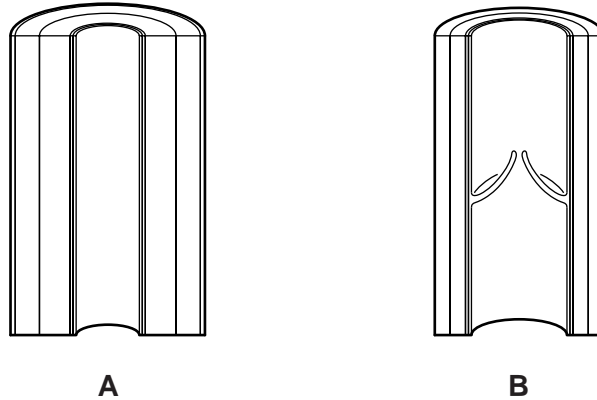
This means that some people are against embryo selection whatever the circumstances. Suggest why.

..... [1]

[Total: 5]

2 The diagram shows the cross-sections of two different types of blood vessel, **A** and **B**.

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(a) (i) Name these two types of blood vessel.

blood vessel **A**

blood vessel **B**

[1]

(ii) Use the diagram to explain how the structure of blood vessel **A** is related to its function.

.....
.....
..... [2]

(b) There are blood vessels that supply blood to the heart muscle. These blood vessels can sometimes become blocked. This can lead to a heart attack.

(i) State what the blockage in the blood vessel could be.

..... [1]

(ii) Explain how the blockage could lead to a heart attack.

.....
.....
..... [2]

- (c) Leanne is a smoker. She reads the following information on the side of a cigarette packet.

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Smoking increases the risk of heart disease

This suggests there is a correlation between smoking and heart disease.

- (i) Name the factor and the outcome in this example.

factor

outcome

[1]

- (ii) Suggest another lifestyle factor which might increase the chance of this outcome.

..... [1]

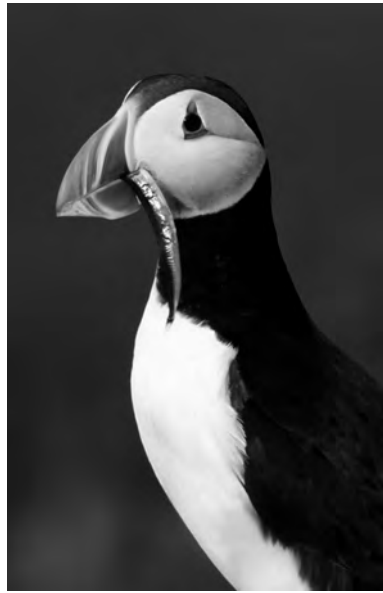
- (iii) Describe the correlation between smoking and heart disease.

.....
..... [1]

[Total: 9]

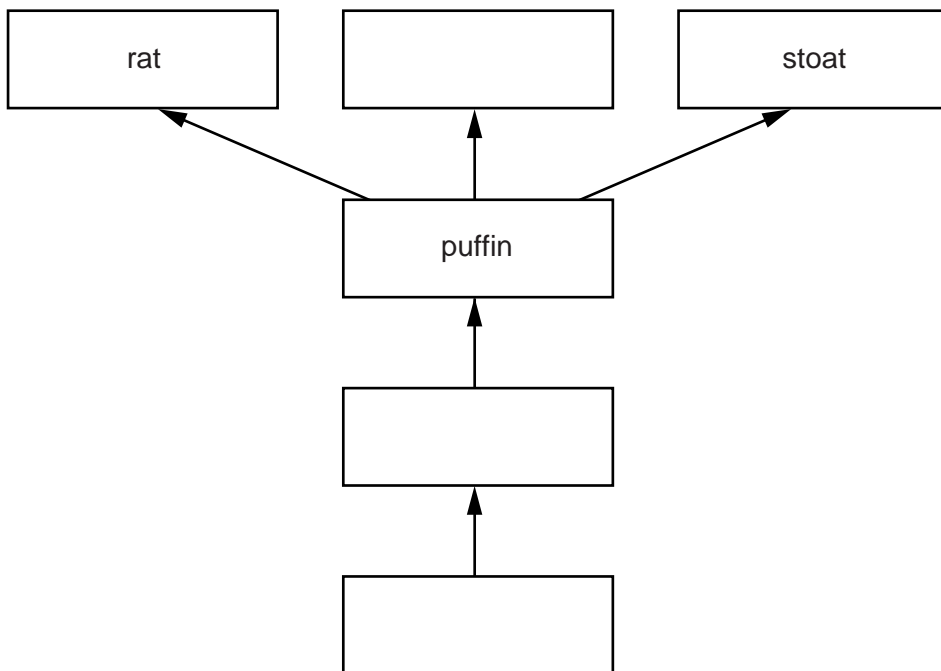
- 3 A puffin is a seabird found living around the coast of the UK.

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Puffins eat sand eels (small sea fish) which feed off plankton (small plants found in the sea). Puffins are predated by rats, stoats and seagulls.

- (a) Complete the food web using the information above.



[2]

(b) In recent years, the number of puffins has decreased.

Look at the statements below.

- A Oil pollution in the sea increases.
- B The number of seagulls decreases.
- C Fishing of sand eels increases.
- D Hunting puffins for food decreases.
- E The number of rats increases.

Complete the table below by writing the letter of each statement, **A** to **E**, in the correct column.

likely to increase the number of puffins	likely to decrease the number of puffins

[2]

(c) (i) Suggest what might eventually happen to the puffins if their numbers continue to decrease.

.....
 [1]

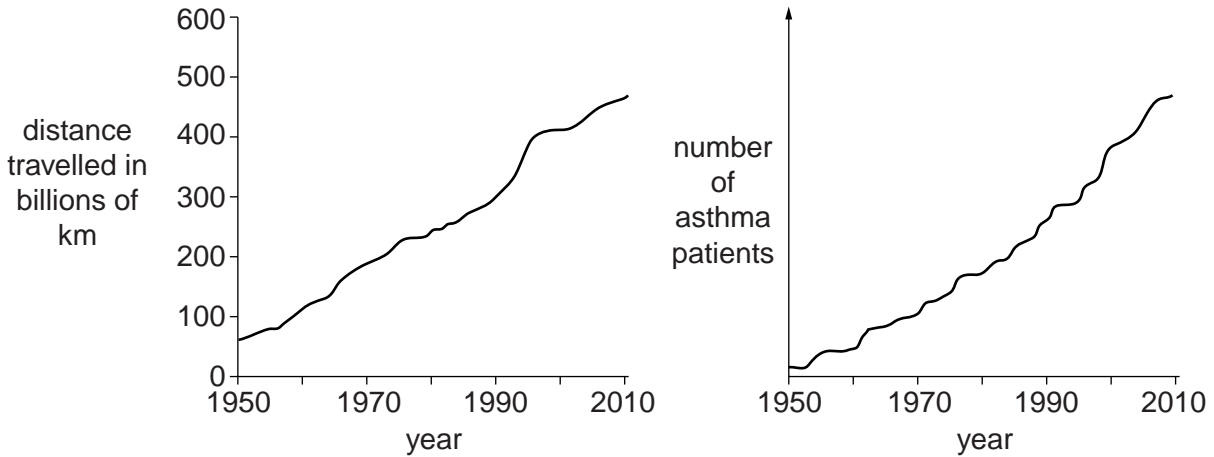
(ii) Name one species to which this has already happened.

..... [1]

[Total: 6]

4 Scientists look at data from an industrialised country.

They compare the distance travelled by motor vehicles and the number of asthma patients.



(a) The scientists see a connection between the data shown in the two graphs.

(i) Finish the sentence to describe this connection.

When the distance travelled by motor vehicles the number of asthma patients [2]

(ii) What term is used to describe this type of connection?

..... [1]

(b) The scientists think that particulates produced by vehicle engines can cause asthma.

(i) What are particulates?

..... [1]

(ii) How are particulates produced by vehicle engines?

..... [2]

(c) Suggest **two** ways that the amount of particulates produced by motor vehicles in this country could be reduced.

.....
.....
.....
..... [2]

[Total: 8]

- 5 Scientists test the tensile strength of low density poly(ethene), LDPE, and high density poly(ethene), HDPE. Tensile strength is a measurement of how much the material can be pulled before it breaks.

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	tensile strength/kPa	
	LDPE	HDPE
sample 1	112	285
sample 2	106	279
sample 3	108	286
sample 4	111	282
sample 5	107	289
sample 6	110	283
best estimate	109	
range	106 to 112	

- (a) (i) Work out the best estimate for the tensile strength of HDPE by calculating the mean of the six values.

Show your working.

tensile strength of HDPE = kPa [2]

- (ii) What is the range for the HDPE data?

..... to

[1]

(b) Suggest which of the two types of poly(ethene) would be more suitable for making rope.

Explain your choice.

.....
.....
..... [2]

(c) Poly(ethene) is made by joining together many ethene molecules into long chains.

What name is given to this type of reaction?

..... [1]

[Total: 6]

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6 The table shows some chemicals commonly used to colour processed foods.

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name	colour	source
beta-carotene	orange	carrots
carmoisine	red	synthesised
lycopene	red	tomatoes
sunset yellow	yellow	synthesised
tartrazine	yellow	synthesised
xanthophyll	yellow	plant leaves

(a) Suggest why these chemicals are added to processed foods.

.....

 [2]

(b) Some data suggest that carmoisine, sunset yellow and tartrazine may cause hyperactivity in children.

There is no evidence to suggest that beta-carotene, lycopene or xanthophyll cause hyperactivity.

Use information in the table to suggest which sort of food colourings may cause hyperactivity and which do not.

.....

 [2]

(c) Suggest what action could be taken by a government and by individuals to reduce the risk of food colouring causing hyperactivity in children.

government

.....

individuals

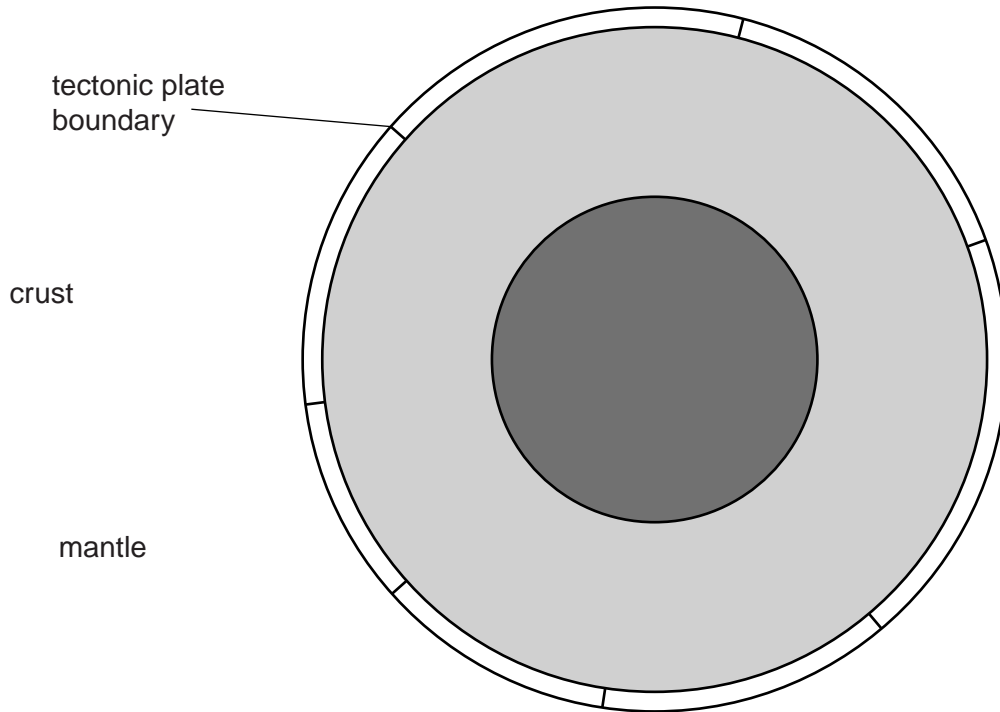
..... [2]

[Total: 6]

7 This question is about tectonic plates and earthquakes.

(a) This diagram shows a section through the Earth.

Draw two lines to label the **crust** and the **mantle**.



[2]

(b) The idea that the continents moved on the surface of the Earth was first suggested by Alfred Wegener.

Scientists at the time did not accept these ideas.

(i) Write down **one** piece of evidence supporting Wegener's theory.

.....
..... [1]

(ii) Give **one** reason why scientists in Wegener's time did not accept his ideas.

.....
..... [1]

(c) When tectonic plates move against each other, earthquakes can occur.

The table shows the effect of different magnitude earthquakes and how often they happen.

magnitude	effect	how often they happen in a typical year
2.0 – 2.9	detected only by special equipment	1 300 000
3.0 – 3.9	just noticeable indoors	130 000
4.0 – 4.9	most people notice them – windows rattle	13 000
5.0 – 5.9	everyone notices them – slight damage to buildings	1 300
6.0 – 6.9	serious damage – bridges are twisted and walls break	130

(i) Anita is describing an earthquake.



Anita
I was in the house and I could just feel a very slight shaking. My brother was out swimming and didn't notice anything.

Estimate the magnitude of the earthquake described by Anita.

estimated magnitude = [1]

(ii) The table does not show data for earthquakes of magnitude 7.0 – 7.9.

Look at the data in the table.

Explain why you would expect there to be more than 10 earthquakes of magnitude 7.0 – 7.9 each year.

.....

.....

.....

..... [2]

[Total: 7]

8 This question is about microwaves.

(a) Use words from this list to complete the sentences below.

- | | | |
|------------------------|----------------------|----------------|
| electrons | protons | photons |
| electromagnetic | electrostatic | visible |

Microwaves are part of the spectrum.

Microwaves have of lower energy than X-rays.

[2]

(b) A microwave oven cooks food quickly. The microwaves do not harm the person using the oven.



(i) Explain, using the correct scientific terms, how a microwave oven cooks food.

.....
.....
..... [2]

(ii) State how a microwave oven is constructed to protect the user from microwave radiation.

.....
..... [1]

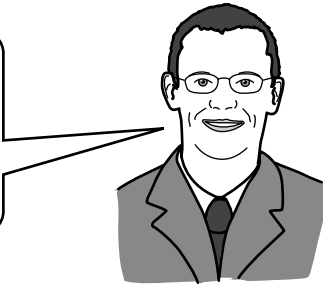
(c) Mobile phones also use microwaves.

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James has read that there is a possibility that mobile phones could damage the brain. He is worried about letting his children use them.

James
I know that the risk is probably very small, but I don't want to take any chances with my children's health. I'm not letting my children have mobile phones.



Write down an argument that you could use to persuade James that he should let his children have mobile phones.

You need to suggest

- one benefit of having the phone,
- one way of making sure the risk is kept as small as possible.

one benefit

.....

.....

one way of making sure the risk is small

.....

..... [2]

[Total: 7]

9 This question is about radioactive decay.

- (a) Raoul tests the radiation given out by a radioactive material. He uses a radiation detector and sheets of paper, aluminium and thick lead. He shows that the radiation given out is **beta** radiation. Describe how he does this.

.....

 [2]

- (b) The table below shows different radioactive materials, the activity of a tiny sample of each and their half lives.

material	activity in thousands of counts each second	half life
A	4600	8 days
B	37 000 000	1 minute
C	8	27 years
D	500	1 month

- (i) Which of these four materials would be the most dangerous to be close to?
 answer [1]

- (ii) Which of these four materials will take the longest time for its radioactivity to die away?
 answer [1]

- (c) Helen has been told by her doctor that she should have radiation therapy to treat a cancer.

She is worried about the effect of radiation on her body cells.

Explain to Helen why it would be sensible to have this treatment.

Include ideas about risk and benefit in your answer.

.....

 [2]

[Total: 6]

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