



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 2010

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.

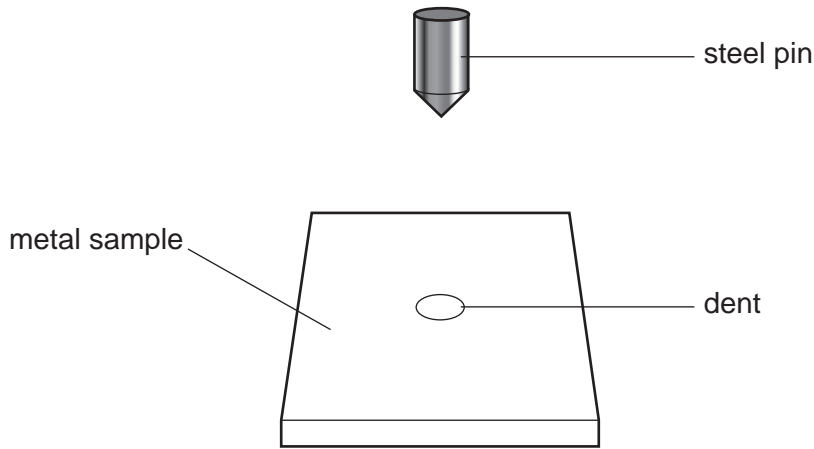
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1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

This document consists of **15** printed pages and **1** blank page.



1 Scientists compare the hardness of two metals, **A** and **B**.

They use a machine to press a steel pin into samples of each metal. The machine presses with the same force each time.



The depth of the dent produced is measured on a scale of 0 to 100.

Their results are shown in the table.

	depth of the dent					mean
	sample 1	sample 2	sample 3	sample 4	sample 5	
metal A	25	23	26	15	26	25
metal B	68	65	66	66	65	

(a) The scientists get a best estimate for the hardness of metal **A** by calculating the mean (average) of the depth of the dent for each sample.

(i) Which result for metal **A** is an **outlier**?

Put a **ring** around the correct sample number.

1 2 3 4 5 [1]

(ii) They do not use the result for this sample when calculating the mean for metal **A**.

Explain why they do not use this result.

.....
 [1]

(iii) The scientists use five samples of each metal.

Explain why this is better than using only one sample of each metal.

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

(b) (i) What is the range of the results for metal **B**?

range = to [1]

(ii) Calculate a best estimate for the depth of the dent for metal **B**.

best estimate = [2]

[Total: 7]

2 Carbon dioxide, nitrogen dioxide and sulfur dioxide are pollutant gases.

(a) Draw a straight line from each **pollutant gas** to its correct **formula**.

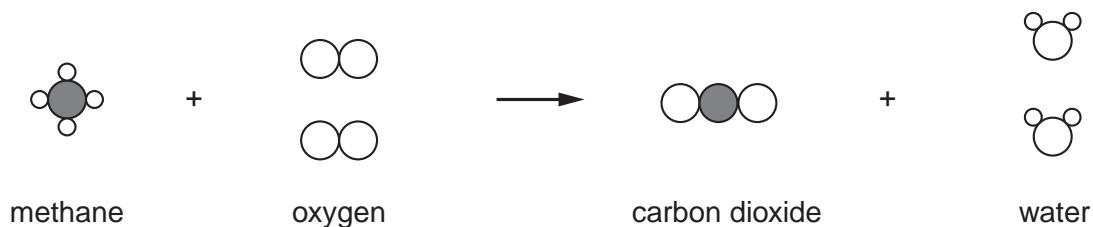
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pollutant gases	formula
carbon dioxide	SO ₂
nitrogen dioxide	CO ₂
sulfur dioxide	NO ₂

[2]

(b) A source of carbon dioxide is the burning of fossil fuels such as methane.

The diagram shows the reaction of a molecule of methane with oxygen.



(i) How many atoms are in each molecule of methane?

..... [1]

(ii) How many atoms of oxygen are involved in the reaction?

..... [1]

(c) Carbon dioxide is removed from the air by several processes.

State two of these processes.

1

2 [2]

[Total: 6]

3 In some developing countries farmers use a 'slash and burn' method of agriculture.
 Areas of forest are cut down and the trees burned.
 Crops are grown on the cleared land for a few years.
 The farmer then moves to another area of forest and repeats the process.

(a) The first year that the cleared land is used, crop yields are good.

Yields then decrease each year.

Suggest why yields decrease.

Use ideas about the requirement of plants for **nitrogen** in your answer.

.....

 [2]

(b) Slash and burn farming is **not** a sustainable development.

Explain why.

.....

 [2]

(c) The cleared land could be used indefinitely if farmers spread synthetic fertiliser on it.

But this fertiliser is too expensive for poor farmers to use.

Suggest another method they could use to achieve the same results.

.....
 [1]

(d) Crop yields may also be affected by pests.

Yields in developed countries are generally larger than those in developing countries.

Use ideas about pest control methods to explain this difference.

.....

 [2]

[Total: 7]

4 Many scientists think that the dinosaurs died after an asteroid collided with the Earth.

(a) (i) Asteroids are part of our solar system.

Here is a list of different parts of our solar system.

asteroid Earth Moon Sun

Write them in order of size, with the **smallest** first.

..... [2]
(smallest) (largest)

(ii) The solar system was formed about 5 thousand million years ago. It took a long time to form.

What was the solar system formed from?

..... [1]

(b) The asteroid which may have killed the dinosaurs landed near Mexico.

Explain how **one** asteroid landing near Mexico may have killed **all** the dinosaurs.

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

(c) This scientist has a different theory.

I think a massive volcano in India killed the dinosaurs. The asteroid crashed in Mexico 300 000 years before the dinosaurs died.



Why does this scientist disagree with the asteroid theory?

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

[Total: 6]

5 Many people from colder countries spend summer holidays in much hotter ones.
They are at risk from the Sun's ultraviolet radiation because they are fair-skinned.
The visible light and infrared radiation are not so dangerous.

(a) Explain why ultraviolet radiation is dangerous, while visible light and infrared radiation are not.

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

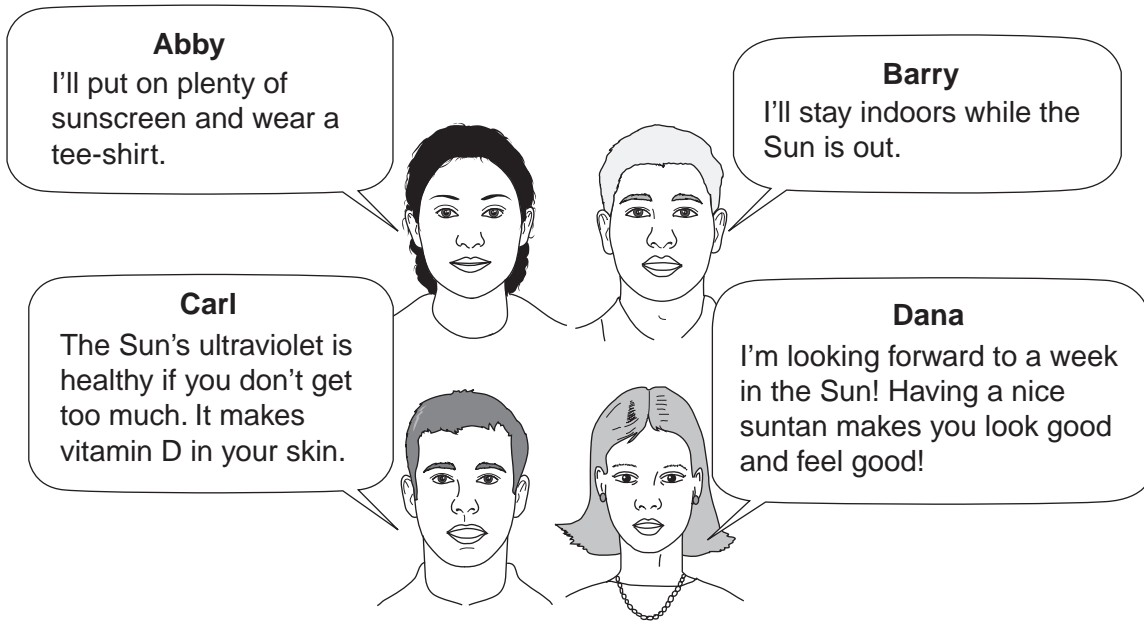
(b) Only a small part of the Sun's ultraviolet radiation that reaches the Earth's atmosphere gets down to the Earth's surface.

Explain what happens to the rest of the ultraviolet radiation.

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

(c) These four young people from Northern Europe are going to spend a week in the sunny Canary Islands.

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(i) Who is saying something which shows they realise there is a risk from the Sun's ultraviolet radiation?

Put a tick (✓) in the box next to each of the correct answers.

- Abby
- Barry
- Carl
- Dana

[2]

(ii) Who is planning to do something which will reduce this risk?

Put a tick (✓) in the box next to each of the correct answers.

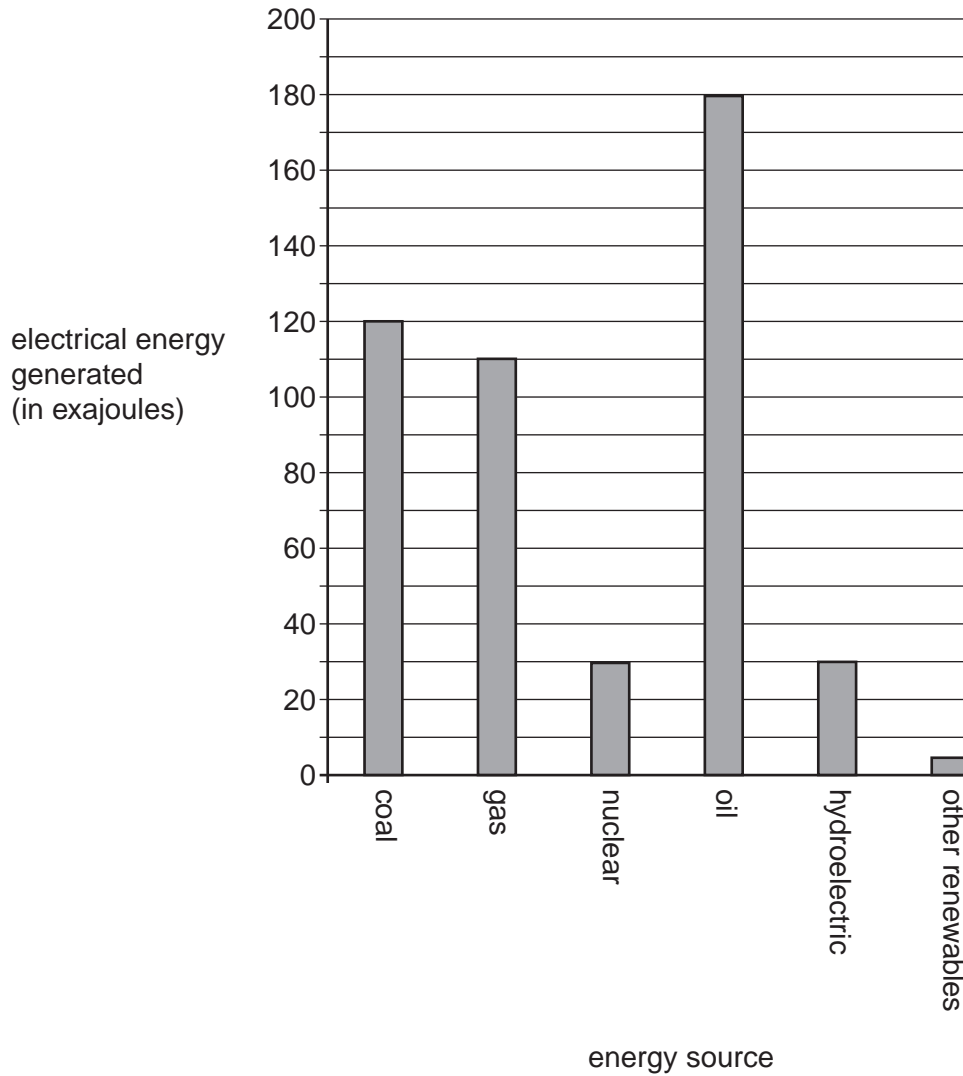
- Abby
- Barry
- Carl
- Dana

[1]

[Total: 7]

6 The bar chart compares different ways in which electrical energy was generated globally in 2004.

(One exajoule = 1 million million million joules.)



(a) Which of the energy sources in the bar chart burn carbon fuels?

..... [2]

(b) Which of the energy sources in the bar chart generated the most electrical energy in 2004?

..... [1]

(c) What is the total amount of exajoules of electrical energy generated in 2004?

Put a (ring) around the correct answer.

100 120 180 305 475 [1]

(d) Which energy sources **each** generated more than 20% of the total amount of electrical energy generated in 2004?

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..... [2]

(e) Hydroelectric energy is a renewable energy source.

Name one other renewable energy source.

..... [1]

[Total: 7]

7 (a) Look at the statements.

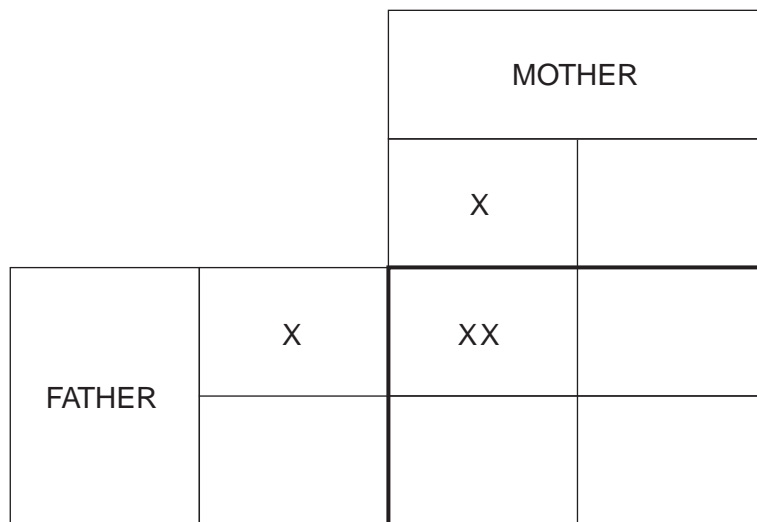
Some of them are true (T) and some of them are false (F).

Write T or F in the box next to each statement.

	T or F
each pair of chromosomes contains one chromosome from each parent	
genes are instructions for a cell that describe how to make protein	
chromosomes are found in the nucleus of cells	
chromosomes in human sex cells are found in pairs	
genes are instructions for a cell that describe how to make DNA	

[3]

(b) Complete the genetic diagram to show how the sex of a baby is inherited.



[2]

(c) The genes of an embryo can be tested in a laboratory. This means that an embryo with desired characteristics can be selected and implanted into the mother.

This can allow parents to choose the sex of their baby.

Read these different views on embryo selection.

Dao
Embryo selection will help to reduce the number of people suffering from genetic diseases. This has to be a good thing for everyone.

Ellen
It is okay to select embryos without genetic diseases but you shouldn't be allowed to select an embryo just because it is a particular sex.

Amir
Just because we are able to select an embryo does not mean it is the right thing to do. Who knows where this may lead? One day we could all be choosing our 'perfect' babies, and I don't think this should be allowed.

Chipo
It is personal choice whether a couple should use embryo selection. It will depend on their own circumstances. One rule cannot be made for all.

Badr
Embryo selection should not be allowed under any circumstances. It is unnatural and wrong.

- (i) Who thinks that embryo selection is never justified?
..... [1]
- (ii) Who suggests that the right decision is the one which leads to the best outcome for the majority of people?
..... [1]
- (iii) Who gives a reason for and against embryo selection?
..... [1]

[Total: 8]

8 This question is about bacteria.

(a) Use a straight line to join each **word** to its correct **description**.

word	description
bacteria	provides protection from microorganisms before infection
antibody	made by white cells in the body to help destroy microorganisms
vaccination	a type of microorganism

[2]

(b) Mandy has a chest infection caused by bacteria.

The doctor gives Mandy an antibiotic.

What is an antibiotic?

.....

.....

..... [2]

(c) The doctor tells Mandy that it is important for her to complete the course of the antibiotics.

Suggest why this is important.

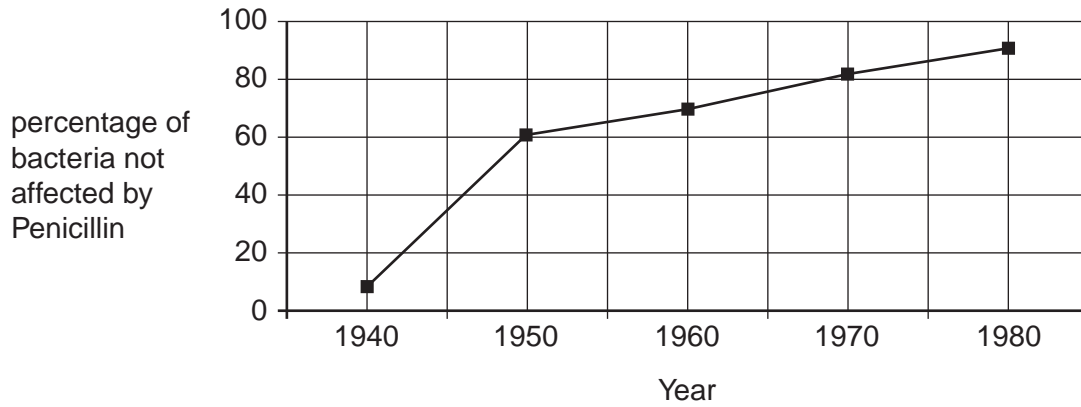
.....

..... [1]

(d) Penicillin is an antibiotic. Penicillin does not affect all bacteria.

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The graph shows the percentage of bacteria that were **not** affected by Penicillin from 1940 to 1980.



Use the graph to help you answer the questions.

(i) What is the percentage of bacteria not affected by Penicillin in 1950?

..... % [1]

(ii) What happened to the percentage of bacteria not affected by Penicillin from 1940 to 1980?

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

[Total: 7]

9 The evolution of multi-cellular organisms has led to the development of nervous and hormonal communication systems.

(a) State two differences between the nervous and the hormonal communication systems.

1

.....

2

..... [2]

(b) Apes, humans and hominids evolved from a common ancestor.

Scientists predict that humans walk upright because they have bigger brains.

Complete the table to show whether each of the observations agrees with the prediction, disagrees with the prediction, or does not affect the prediction.

Put ticks (✓) in the boxes below the correct headings. Use only **one** tick in each row.

observation	agrees with the prediction	disagrees with the prediction	does not affect the prediction
apes have small brains and cannot walk upright			
hominids had small brains and could walk upright			
humans and apes have a common ancestor			
humans have large brains and can walk upright			

[3]

[Total: 5]

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