Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

A211/01

TWENTY FIRST CENTURY SCIENCE SCIENCE A

Unit 1: Modules B1 C1 P1 (Foundation Tier)

FRIDAY 21 MAY 2010: Morning
DURATION: 40 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

DC (SM/SW) MEP60373 30274/1

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).**

INFORMATION FOR CANDIDATES

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

Answer ALL the questions.

1 Read the article.

> **CAN GENE TESTING PREDICT THE FUTURE?**
>
> **Recently, scientists have reported finding key genes involved in diabetes, heart disease, dementia, obesity, bowel cancer and breast cancer.**

(a) Which of the following is the best description of a GENE?

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

A gene is …

… an instruction for making a nucleus. ☐

… an instruction for making DNA. ☐

… an instruction for making a protein. ☐

… an instruction for making a fat. ☐

[1]

The article continues.

Now it is possible to pay for companies to test a person's genes.

The tests claim to predict the probability of a person getting certain disorders.

The companies claim that the tests are accurate and reliable.

Other scientists claim that the tests are a waste of money.

They say the results may cause unnecessary worry.

The Government will look at questions such as who should be allowed to sell these genetic tests, who should pay and who should be allowed to have the results of the tests.

(b) Some questions about genetic tests can be answered by using a SCIENTIFIC APPROACH, but others can not.

Put ticks (✓) in the boxes next to the TWO questions that can be answered using a scientific approach.

	CAN BE ANSWERED USING A SCIENTIFIC APPROACH
Are the tests accurate and reliable?	☐
Have all the genes that might be involved in a disorder been identified?	☐
Should everybody be allowed to have the results of the tests?	☐
Should the Government pay for the tests?	☐

[1]

(c) Colin decides to have a genetic test for heart disease.

Suggest one advantage and one disadvantage of having this test.

_____

_____

_____

_____ **[2]**

[Total: 4]

2 Cystic fibrosis (CF) is a genetic disorder.

Drugs are used to ease the symptoms.

(a) Put (rings) around the TWO correct symptoms of cystic fibrosis.

BREATHLESSNESS

DIGESTION PROBLEMS

FORGETFULNESS

TWITCHING MUSCLES

[1]

(b) 1 in 25 people in the UK are carriers of a defective CF allele.

Put ticks (✓) in <u>THREE</u> boxes to show which of the statements about <u>CARRIERS</u> are true.

Carriers of CF …	<u>TRUE</u>
… have a dominant allele for CF.	☐
… have a recessive allele for CF.	☐
… have no symptoms of cystic fibrosis.	☐
… can develop symptoms of the disease in middle age.	☐
… have a 50% chance of passing on the allele to their children.	☐
… can not pass on the defective allele to their children.	☐

[3]

(c) Scientists are trying to treat CF using cloning techniques.

Embryonic stem cells are taken from human embryos and are cloned.

Some people are against the idea of using human embryonic stem cells.

Give reasons <u>FOR</u> and <u>AGAINST</u> using embryonic stem cells.

_____

_____

_____

_____ **[3]**

[Total: 7]

3 Josh and Ryan are twin brothers.
They have the same mother and father.

They are <u>NON-IDENTICAL</u> twins.

(a) How are non-identical twins produced?

Put a tick (✓) in the box next to the <u>CORRECT</u> explanation.

One egg is fertilised by one sperm.	☐
Two eggs are fertilised by one sperm.	☐
One egg is fertilised by two different sperm.	☐
Two eggs are fertilised by two different sperm.	☐

[1]

(b) Josh and Ryan are similar but not identical.

Put a tick (✓) in the correct box to show whether each statement provides an explanation for Josh and Ryan being SIMILAR or provides an explanation for Josh and Ryan being DIFFERENT.

	SIMILAR	DIFFERENT
They inherited their alleles from the same parents.	☐	☐
Every sex cell has a unique combination of alleles.	☐	☐
The boys have the same genes but different alleles.	☐	☐

[1]

(c) Complete the sentence to explain why both Josh and Ryan are male.

Josh and Ryan are both male because they inherited one X chromosome from their mother and one _____ chromosome from their father. **[1]**

[Total: 3]

4 (a) The pie chart shows the three main gases in the air.

Label the pie chart using words from this list.

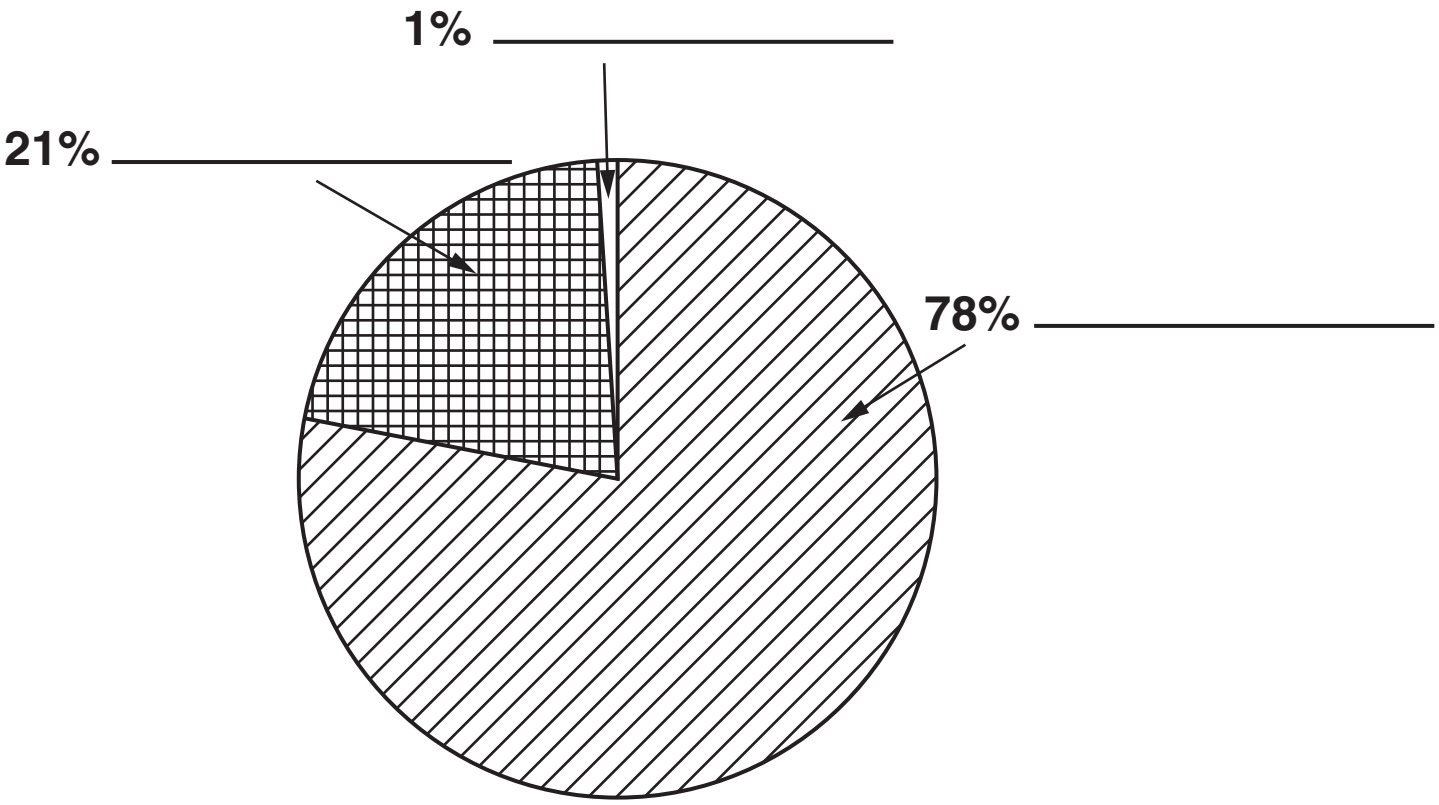
ARGON

CARBON DIOXIDE

CHLORINE

NITROGEN

OXYGEN



[2]

(b) Burning fuels pollutes the air.

(i) Most fuels are compounds of hydrogen and carbon.

What is the name for compounds containing only hydrogen and carbon?

Put a (ring) around the correct answer.

DIESEL

HYDROCARBONS

HYDROGEN OXIDES

HYDROXIDES

PETROL

[1]

(ii) **Particulate carbon, carbon dioxide, carbon monoxide and nitrogen oxides are pollutants made when fuels burn.**

Draw a <u>SINGLE</u> straight line from <u>EACH POLLUTANT</u> to <u>HOW IT IS MADE</u>.

<u>POLLUTANT</u>	**<u>HOW IT IS MADE</u>**
particulate carbon	
	complete combustion of the fuel
carbon dioxide	
	incomplete combustion of the fuel
carbon monoxide	
	reaction of gases from the air at high temperature
nitrogen oxides	

[2]

(iii) Sulfur dioxide is a pollutant from coal-burning power stations.

How is sulfur dioxide made in a coal-burning power station?

You should write down where the sulfur atoms come from and explain how they are changed into sulfur dioxide.

_____

_____

_____

_____ **[2]**

[Total: 7]

5 Read this newspaper article.

CLEAR SKIES FOR BEIJING OLYMPICS

China wanted to reduce air pollution in Beijing for the Olympic Games.

Two million cars (half the total number) were banned from the roads. 100 factories and some coal-burning power stations were shut down.

Beijing's massive experiment with controlling pollution gave scientists an opportunity to investigate pollution.

After the factory closures and traffic restrictions began, air pollution levels fell.

Weather conditions made a difference too. Every time it rained, pollution was reduced.

(a) (i) Use the article to decide how air pollution was reduced for the Beijing Olympics.

Put a tick (✓) in the box next to the <u>CORRECT</u> explanation.

No cars were allowed on the roads. ☐

No electricity was generated in China. ☐

Some factories and power stations were shut down. ☐

People drove cars rather than travelled by bus. ☐

[1]

(ii) Scientists collected data on air quality in Beijing before and after the start of the Olympic Games.

Why did scientists collect these air quality data?

Put ticks (✓) in the boxes next to the TWO best scientific reasons.

So they could …

… prove that athletes and spectators were not harmed by poor air quality. ☐

… use data to make explanations. ☐

… detect changes in air pollution. ☐

… find out how many people ride bicycles. ☐

… show air pollution is caused only by traffic. ☐

[2]

(iii) After rainfall there is less air pollution.

Explain what happens to the pollutants when it rains.

_____

_____

_____

_____ **[2]**

(b) The chart on page 21 opposite shows measurements of particulates in the air for the 15 days before the Olympic Games started and the 15 days of the Games themselves.

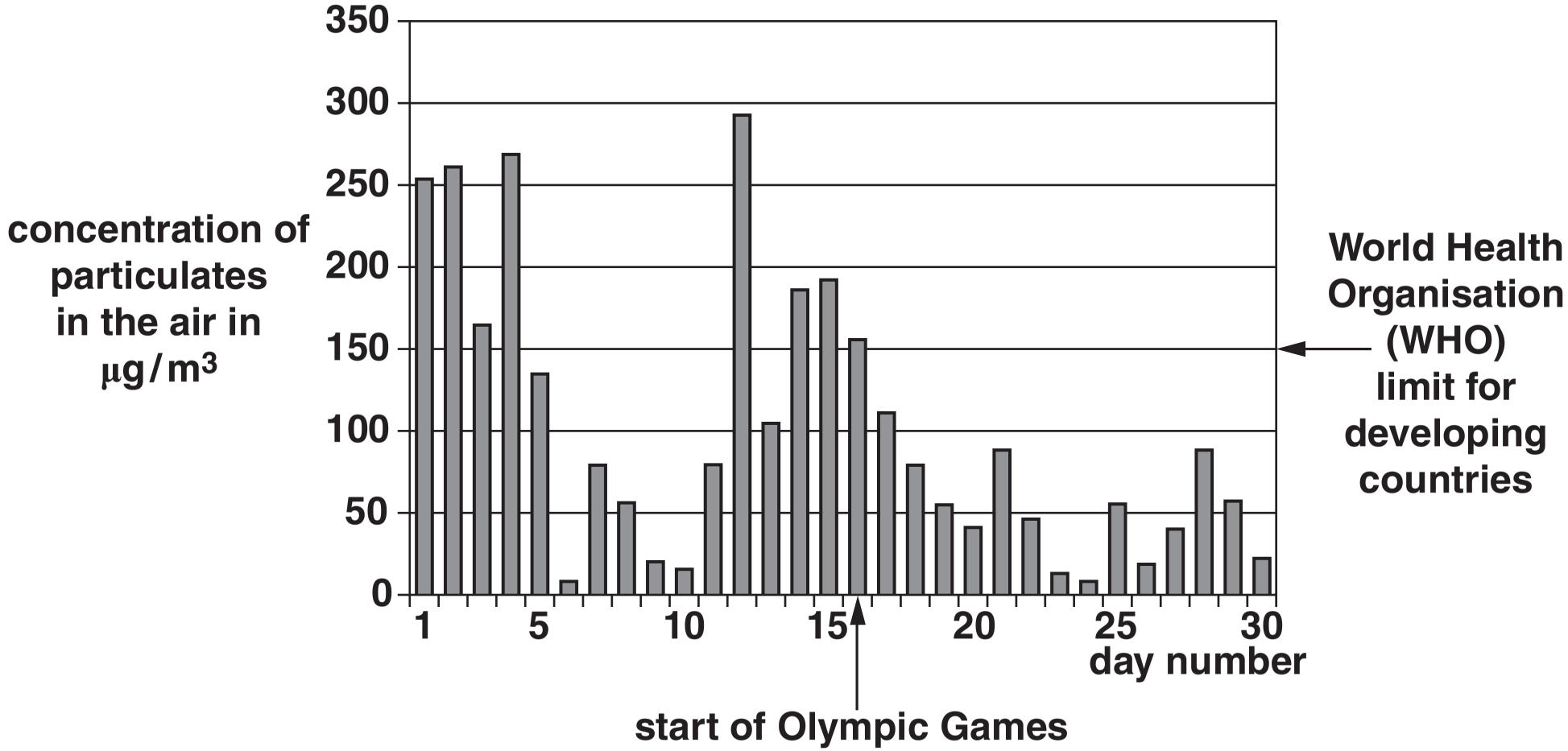
Below are four statements about the data. Each statement is either true or false.

Put a tick (✓) in the correct box to show whether each statement is TRUE or FALSE.

	TRUE	FALSE
The WHO limit for developing countries is 150 μg/m^3.	☐	☐
Concentrations of particulates in the air were always lower than the WHO limit.	☐	☐
Concentrations of particulates were greater than 250 μg/m^3 on 4 days.	☐	☐
The lowest level of pollution was in the first five days of testing.	☐	☐

[2]

[Total: 7]


concentration of particulates in the air in µg/m3
350
300
250
200
150
100
50
0
1
5
10
15
20
25
30
day number
World Health Organisation (WHO) limit for developing countries
start of Olympic Games

6 There was a massive explosion in northern Russia in 1908. A very large area of forest was destroyed.

It is now thought that this was caused by a comet or asteroid.

Not many people live in that remote area, but this is what one witness remembered.

> **I saw fire appear high and wide above the forest to the north. I felt a strong blast of wind and I was blown over. There was a sudden loud noise as if rocks were falling or guns were firing.**

(a) Which of the following statements is the best scientific explanation of his observations?

Put a tick (✓) in the box next to the <u>BEST</u> explanation.

A comet or asteroid crashed into the ground. ☐

A comet or asteroid exploded high in the air. ☐

A comet or asteroid passed near the Earth. ☐

A comet or asteroid hit the Moon. ☐

[1]

(b) Which of the following statements about asteroids are true?

Put ticks (✓) in the boxes next to the TWO correct statements.

Asteroids orbit the Earth.	☐
Asteroids orbit the Sun.	☐
Asteroids are much smaller than a planet.	☐
Asteroids come from other planets.	☐
Asteroids come from the Moon.	☐

[2]

(c) Small asteroids often hit the Earth, but cause little damage.

(i) Explain how the impact of a <u>LARGE</u> asteroid could affect the whole world.

_____

_____

_____

_____ **[2]**

(ii) Although the <u>CONSEQUENCES</u> of a large asteroid colliding with the Earth would be very serious, the actual <u>RISK</u> of people dying due to a large asteroid strike is not great.

Explain why.

_____

_____ **[1]**

[Total: 6]

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Question 7 begins on page 26

PLEASE DO NOT WRITE ON THIS PAGE

7 Ptolemy was an astronomer who lived nearly 2000 years ago.

His ideas about the Sun, the Moon and the planets were believed for many hundreds of years.

PTOLEMY

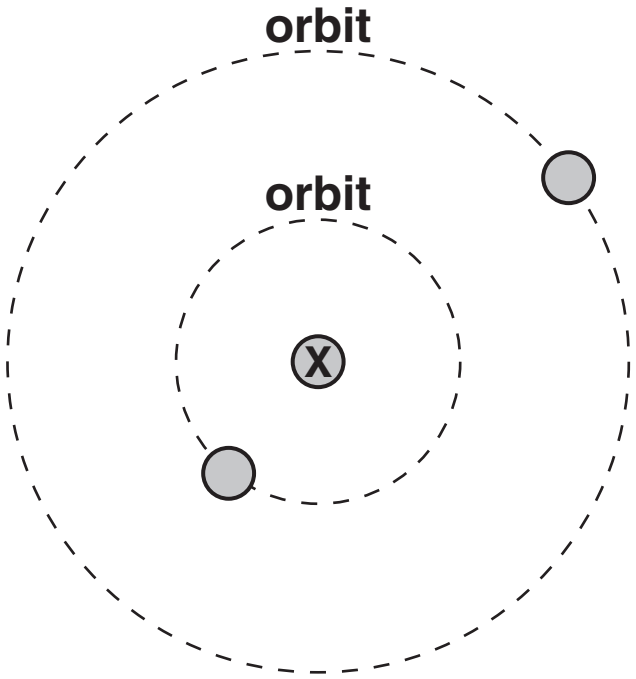
Everything in our Solar System – the Sun, the Moon and the planets – all move in orbits around the Earth.

In 1530, Nicolaus Copernicus had different ideas.

COPERNICUS

Ptolemy's ideas are wrong. The Earth and the other planets all move in orbits around the Sun.

(a) The diagram below shows the Sun, the Earth and the planet Saturn. This diagram can fit both Ptolemy's ideas and Copernicus' ideas.



Use words from this list to complete the sentences.

SATURN

THE EARTH

THE MOON

THE SUN

(i) Copernicus would say that X was

_____ . **[1]**

(ii) Ptolemy would say that X was

_____ . **[1]**

(b) It took over 100 years for Copernicus' ideas to be accepted.

Astronomers in 1530 preferred Ptolemy's ideas to Copernicus' ideas.

Put a tick (✓) in the box next to the statement that best explains why.

Ptolemy's ideas had always worked well. ☐

Ptolemy's ideas were too old-fashioned. ☐

All the astronomers were friends of Ptolemy. ☐

Copernicus was very good at persuading people that he was right. ☐

[1]

[Total: 3]

8 A strong earthquake hit the Central American country of Costa Rica in January 2009.

(a) Which of the following statements explains why earthquakes are common in Costa Rica?

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

Costa Rica is a poor country. ☐

Costa Rica is a small country. ☐

Costa Rica is at the edge of a tectonic plate. ☐

Hurricanes are very common near Costa Rica. ☐

[1]

(b) Which TWO of the following would you expect to find in a place like Costa Rica that often has earthquakes?

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

cities	☐
deserts	☐
forests	☐
mountains	☐
volcanoes	☐

[2]

(c) Which of the following could the government of a country like Costa Rica do to reduce deaths and injuries from future earthquakes?

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

Build taller buildings.	☐
Educate people so they know what to do during an earthquake.	☐
Move everyone to another country.	☐
Prepare emergency plans ready for earthquakes.	☐
Build wider roads.	☐

[2]

[Total: 5]

END OF QUESTION PAPER