OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE SCIENCE A

A211/01

Unit 1: Modules B1 C1 P1 (Foundation Tier)

11LMP01060

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)

Thursday 13 January 2011
Morning

Duration: 40 minutes

A211101

Candidate forename		Candidate surname	

Centre number						Candidate number				

MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- 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).
- Answer **all** the questions.
- Do **not** write in the bar codes.

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**.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Instructions for how an organism develops are found on the chromosomes in cells.

(a) Use words from the list to complete the sentences about chromosomes.

carbohydrate

cytoplasm

DNA

gene

membrane

nucleus

The chromosomes are in the part of the cell called the …… .

A chromosome is a very long molecule of …… .

A section of a chromosome is called a …… . **[3]**

(b) Tom and John are brothers.

They have a friend called Paul.

Tom and John look more like each other than like Paul.

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

Paul goes to a different school from Tom and John. ☐

Tom and John live in the same house. ☐

Tom and John have more identical alleles. ☐

Paul has been brought up in a different environment. ☐

[1]

(c) Tom, John and Paul are all boys.

Complete the sentences about Tom, John and Paul's sex chromosomes.

Tom, John and Paul all have two sex chromosomes.

From their mothers they inherited the …… chromosome and

from their fathers the …… chromosome. **[2]**

[Total: 6]

2 Huntington's disorder and Cystic fibrosis are both inherited conditions.

They are both caused by faulty alleles.

(a) Complete the table to show the combination of alleles each type of individual could have.

Use these symbols

H = allele that causes Huntington's disorder
h = allele that does not cause Huntington's disorder

B = allele that does not cause Cystic fibrosis
b = allele that causes Cystic fibrosis

	combination of alleles present in…		
disorder	**… an individual without the disorder**	**… an individual with the disorder**	**… a carrier of the disorder**
Huntington's disorder	.....	Hh or	no carriers
Cystic fibrosis	Bb or	.....	.....

[2]

(b) Read the article about gene therapy.

A gene therapy cure for Cystic fibrosis (CF) is closer

At the present time CF cannot be cured.
People with CF cannot make a protein called CFTR.
One hope for curing genetic disorders like CF is gene therapy.
Scientists are trying to use a virus to deliver in to cells a working gene to replace the faulty gene.
This should cure CF.
This idea has been used to treat other disorders but the use of a virus has caused side effects in some patients.

Write down **one** reason for using gene therapy and **one** reason against using gene therapy.

Use information from the article.

for .....

.....

against .....

.....

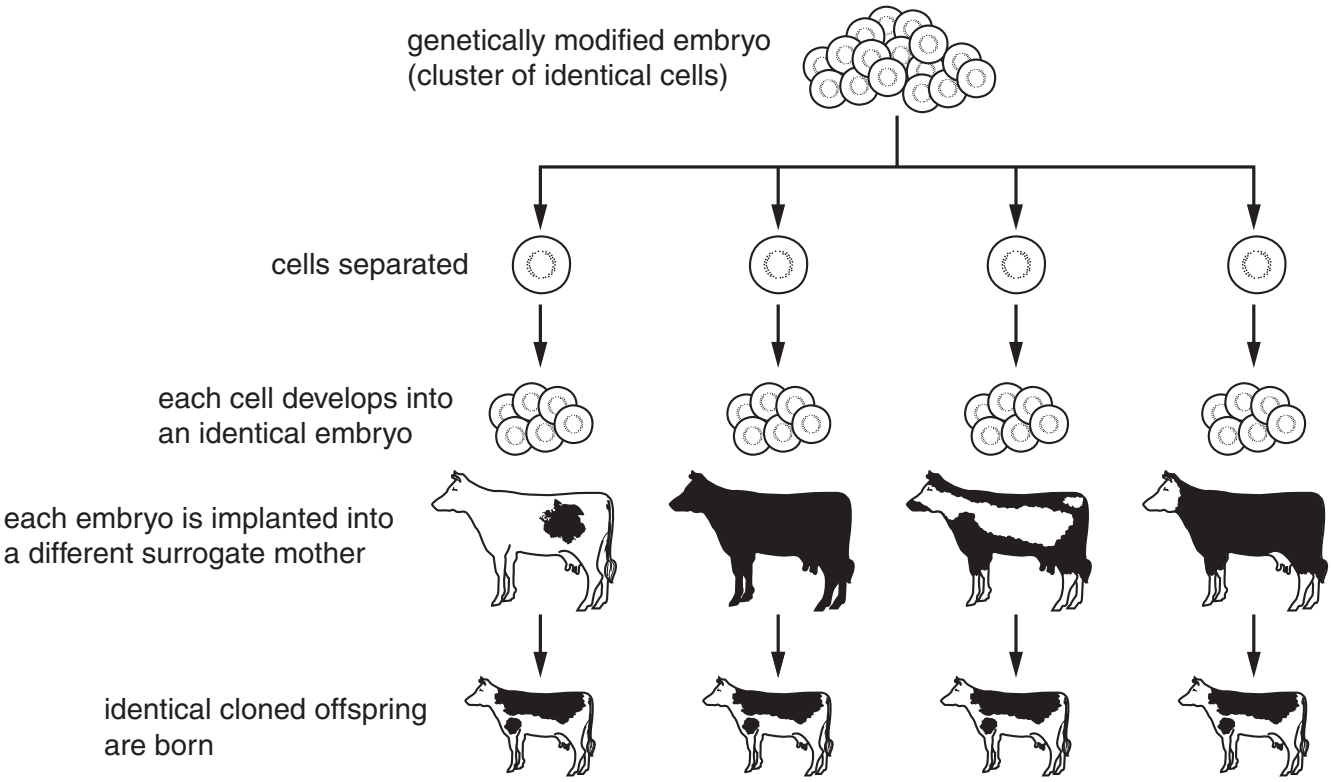
[2]

[Total: 4]

3 **(a)** A cow embryo can be genetically modified so that it contains the gene to make human insulin.

Copies of this embryo can then be made by cloning.

The adult cows will produce human insulin.



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

The **cloned offspring** will be identical to …

… their biological mothers. ☐

… their biological fathers. ☐

… their surrogate mothers. ☐

… each other. ☐

[1]

(ii) Embryo cloning uses **embryonic stem cells**.

Put a tick (✓) in the box next to the **best** description of an embryonic stem cell.

the egg cell from which an embryo develops	☐
a specialised cell in an early embryo	☐
a cell with no sex chromosomes	☐
an unspecialised cell in an early embryo	☐

[1]

(b) Read the news flash from the internet.

Scientists researching fertility problems in men claim to have made human sperm in the laboratory.

The scientists claim that this will allow an infertile man to father a child.

Other scientists do not think that fully developed sperm have been made.

It will be several years before the technique can be used.

The scientists used stem cells from human embryos donated after IVF treatment.

The stem cells were removed when the embryos were a few days old.

The stem cells were stored in liquid nitrogen.

Explain

- who would benefit from this scientific breakthrough
- why some people may be against this kind of research.

.....

.....

.....

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

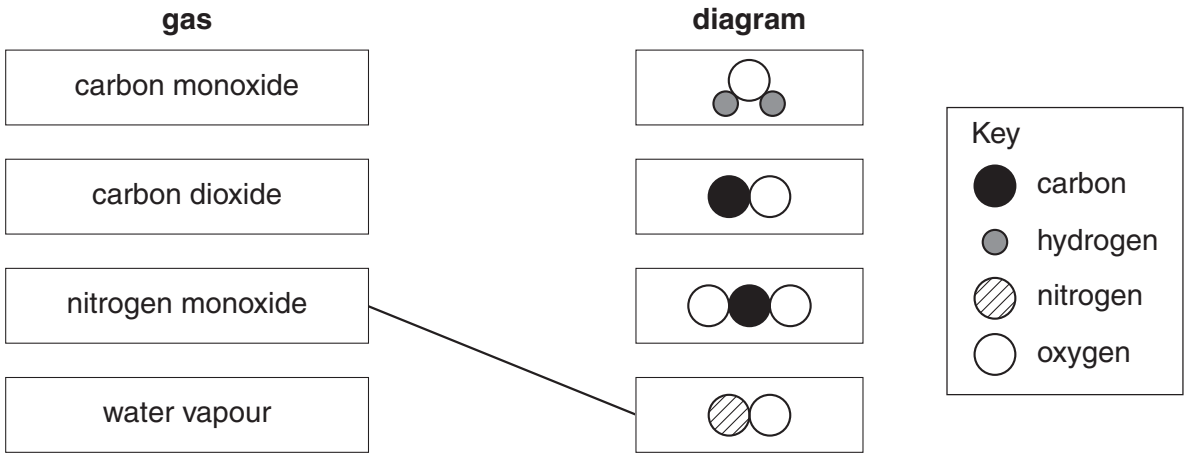
[Total: 4]

4 **(a)** The boxes show the names of some of the gases found in car exhausts.

They also show diagrams of their molecules.

Draw a straight line from each **gas** to its correct **diagram**.

One has been done for you.



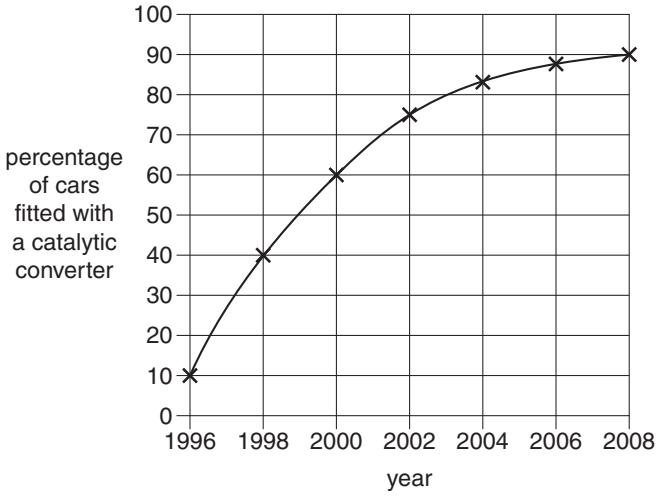
[2]

(b) Catalytic converters are used to remove nitrogen **monoxide** and other pollutants from car engine exhausts.

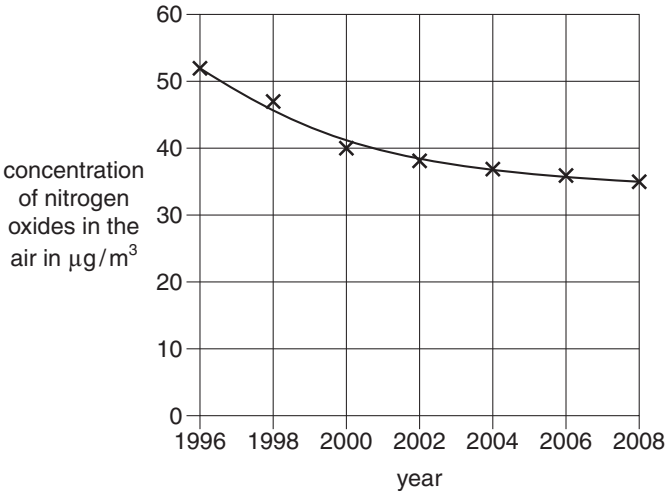
Catalytic converters have been fitted to new cars since 1994.

Look at the graphs.

the percentage of cars fitted with a catalytic converter



average concentration of nitrogen oxides in the air



Use the graphs to answer the following questions.

(i) In what year did 60 % of cars have a catalytic converter?

answer ..... **[1]**

(ii) What was the concentration of nitrogen oxides in the air when 50 % of cars had a catalytic converter?

answer ..... **[1]**

(iii) There is a **correlation** between the two graphs.
What is the **best** description of this correlation?

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

Nitrogen oxides in the air decrease from 52 % to 35 %.	☐
The percentage of cars with a catalytic converter has no effect on nitrogen oxides in the air.	☐
As the percentage of cars with a catalytic converter increases, nitrogen oxides in the air decrease.	☐
As the number of cars on the roads increases, nitrogen oxides in the air decrease.	☐
As the percentage of cars with a catalytic converter increases, nitrogen oxides in the air increase.	☐

[1]

(iv) Today more than 90 % of cars have a catalytic converter but nitrogen oxides have only fallen by about 30 %.
What is the reason for this?

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

Polluting gases are never removed from the air.	☐
Catalytic converters do not remove sulfur dioxide in car exhausts.	☐
Factories, power stations and homes still pollute the air with nitrogen oxides.	☐
Car engines are less efficient now than they were in 1996.	☐

[1]

[Total: 6]

5 A power station burns fuel oil.

Fuel oil is a mixture of hydrocarbons.

(a) Complete the sentences by choosing the **best** words from the list.

argon

carbon dioxide

nitrogen

oxygen

sulfur dioxide

water

When fuels burn they react with …… in the air.

Carbon atoms in the fuel react to make …… .

Hydrogen atoms in the fuel react to make …… . **[2]**

(b) A scientist measures the amount of particulate carbon in the flue gases of the power station.

She takes five samples on Monday.

She takes another five samples at the same time on Tuesday.

Here are her results.

	particulate carbon in μg/m^3					
sample	**1**	**2**	**3**	**4**	**5**	**mean**
Monday	55	59	63	101	67	**61**
Tuesday	132	132	134	131	136	

(i) Look at the results for Monday.

The scientist did not use the result for **sample 4** when calculating the mean.

Explain why she did not use this result.

.....

.....

.....

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

(ii) What is the best estimate of the true value for the level of particulate carbon in the flue gases on **Tuesday**?

Put a (ring) around the correct answer.

131 **132** **133** **134** **135**

[1]

(iii) What is the range of values for Tuesday shown by the table of results?

Put a (ring) around the correct answer.

55 to 101 **55 to 136** **131 to 136** **132 to 134**

[1]

(c) Fuel oil also contains sulfur atoms.

Sulfur atoms burn to make sulfur dioxide.

Sulfur dioxide harms the environment.

How does sulfur dioxide harm the environment?

Include in your answer

- what happens when sulfur dioxide is released into the atmosphere
- how this harms the environment.

.....

.....

.....

.....

.....

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

[Total: 8]

6 Alfred Wegener suggested the idea of continental drift in 1912.

(a) Which of the following facts support Wegener's theory?

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

All continents have mountains.	☐
Continents are separated by oceans.	☐
Some African fossils are identical to some South American fossils.	☐
Rock layers on some continents match those found on other continents.	☐
Some continents may have been joined by land bridges.	☐

[2]

(b) In 1912 other geologists did not accept Wegener's theory.

Write down the reasons why these geologists did not accept Wegener's theory.

.....

.....

.....

.....

..... **[3]**

[Total: 5]

7 **(a)** Read this article about the Kepler mission.

Kepler space probe looks for new Earths

In March 2009 the Kepler space probe was launched. It follows the Earth's orbit around the Sun, but it is a long way behind the Earth.

It will search for Earth-like planets around distant stars.

It is expected that Kepler will be able to detect the small changes in brightness when a planet moves in front of its star. This is very difficult to observe from the Earth's surface.

Scientists have looked for life in other places in our Solar System.

Apart from the Earth, on how many planets and moons of our Solar System have scientists found life?

Put a (ring) around the correct number.

0 **1** **2** **4**

[1]

(b) Another space probe was launched in 2009 to find out about the beginning of the Universe. The probe may also help scientists to predict how the Universe will end.

Discuss what scientists understand about the changing Universe.

In your answer you should mention

- what scientists think was the beginning of the Universe
- why the end of the Universe is difficult to predict.

.....

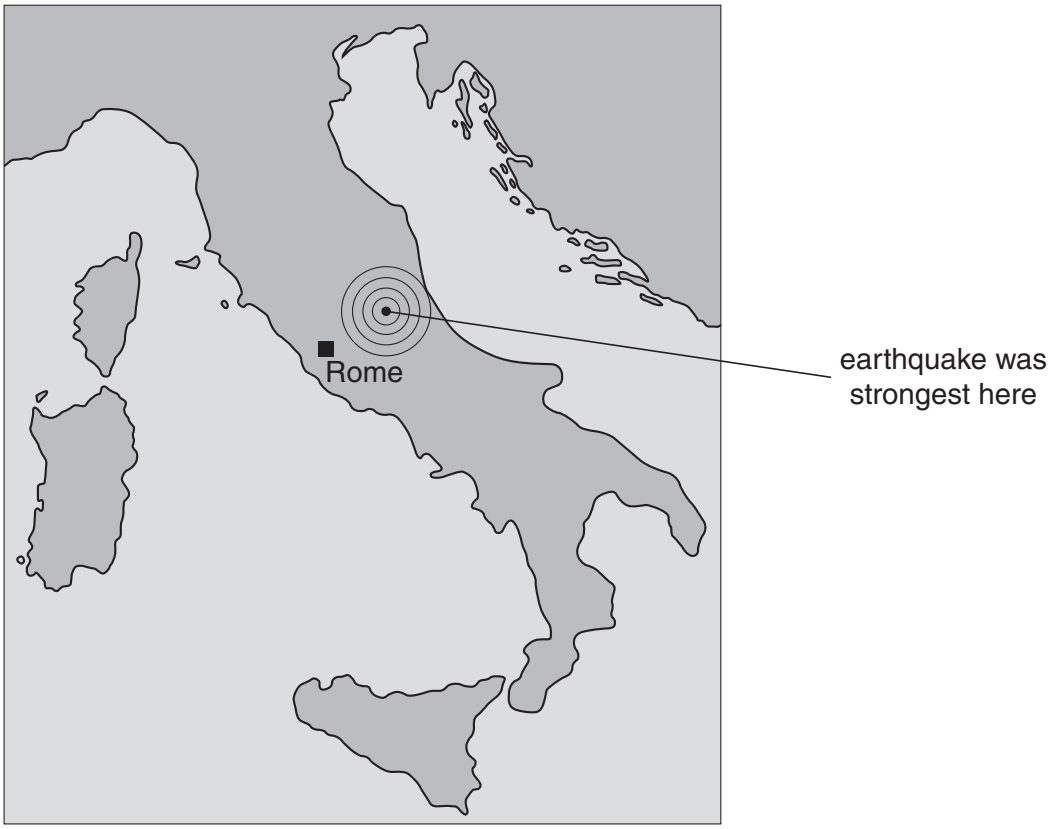
.....

.....

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

[Total: 3]

8 A serious earthquake struck central Italy in April 2009.



(a) Italy often has earthquakes.

Which of the following best explains this?

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

It is surrounded by sea. ☐

It is in southern Europe. ☐

Italy has many large cities. ☐

It is close to where two tectonic plates meet. ☐

[1]

(b) In some places earthquakes are common.

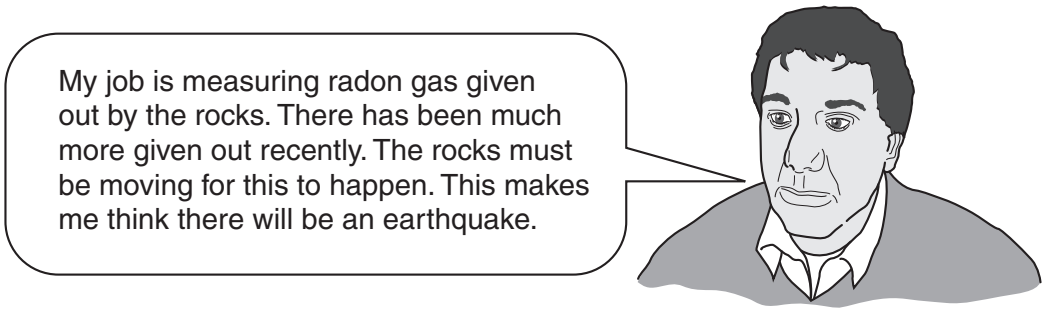
Which of the following are often found in these places?

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

deserts	☐
lakes	☐
mountains	☐
rivers	☐
volcanoes	☐

[2]

(c) A laboratory technician had predicted that there would be an earthquake.



(i) What is the **data** that he used to make his prediction?

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

(ii) What is the **explanation** for the prediction?

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

(d) Many scientists think that the technician's prediction was correct just by chance.

Which of the following best explains their opinions?

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

Earthquakes do not affect the rocks.	☐
Earthquakes happen every day in this part of Italy.	☐
Radon gas cannot escape from rocks in the ground.	☐
Radon levels often change when there is no earthquake.	☐

[1]

[Total: 6]

END OF QUESTION PAPER

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