



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

TWENTY FIRST CENTURY SCIENCE (EXTENDED)

0608/02

Paper 2 Multiple Choice

October/November 2010

1 hour

Additional Materials: Multiple Choice Answer Sheet
 Soft clean eraser
 Soft pencil (type B or HB is recommended)



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

You may use a calculator.

This document consists of **14** printed pages and **2** blank pages.



The following information should be used to answer questions 1 and 2.

A scientist looked at tree snails on different mountains in Hawaii. He noticed that the snails that lived on different mountains had different coloured shells.

He made four statements about the snails.

- 1 Snails are often born with different coloured shells.
- 2 The snails are 'fighting' for resources.
- 3 Many of the snails are eaten by birds.
- 4 Natural selection produced different results on different mountains.

1 Which word can be used to describe the snail's behaviour in statement 2?

- A biodiversity
- B competition
- C evolution
- D variation

2 Each of the four statements contains data or is an explanation.

Which statement contains an explanation for the different coloured snails on different mountains?

- A 1 B 2 C 3 D 4

3 Which is the best definition of asexual reproduction?

- A Genetically identical offspring are made from one parent.
- B One parent produces two types of sex cell which join.
- C One parent splits to form two offspring that have different genes.
- D Two parents make sex cells that join to make an embryo.

4 Jane is sitting reading a book.

The door bell rings.

She gets up to answer it.

What are the **effectors** in Jane's response to the door bell?

- A her ears
- B her eyes
- C her glands
- D her muscles

- 5 *Staphylococcus* is often destroyed on the skin by natural chemicals made by the body.

In which liquid are these chemicals found?

- A blood
 B saliva
 C stomach acid
 D sweat
- 6 Which product is **not** made from the chemicals in crude oil?
- A fuels
 B lubricants
 C natural fibres
 D poly(ethene)
- 7 The diagram shows the arrangement of atoms in some molecules.



Which compound is **not** shown in the diagram?

- A CO B CO₂ C H₂O D SO₂
- 8 The diagram shows the atoms in a molecule found in living things.



key

- carbon
 ○ hydrogen
 ○ oxygen
 ● nitrogen

What is the name of this type of molecule?

- A amino acid
 B carbohydrate
 C hydrocarbon
 D polymer

The following information should be used to answer questions 9 and 10.

Eve has a fridge magnet that shows the healthy amounts of sugar, fat and salt in food.

Check the LABELS!		
	What's a little? (per 100 g)	What's a lot? (per 100 g)
sugar	2 g	10 g
fat	3 g	20 g
salt	0.3 g	1.5 g

She looks at the label on a packet of Krunchy Crisps.

	per 100 g
energy	2190 kJ
sugar	2.5 g
fat	33.0 g
salt	1.9 g

Use the fridge magnet and label to decide if the crisps are high or low in sugar, fat or salt.

- 9 Which statement is correct?
- A The crisps are high in fat and salt but not sugar.
 - B The crisps are high in sugar, fat and salt.
 - C The crisps are low in salt.
 - D The crisps are very low in sugar.
- 10 Eve knows that she cannot assess the risk of eating Krunchy Crisps, to her health, using only this information.

Which statement shows why she **cannot** assess the risk?

- A Other brands of crisps have different amounts of sugar, fat and salt.
- B She does not know the outcome of eating too much sugar, fat and salt.
- C She might be eating other foods that are high in sugar, fat and salt.
- D There are other factors in Eve's life to consider.

11 Eve reads an article that says eating too much fat can increase the risk of getting heart disease.

She knows that her grandmother eats lots of fatty foods but has a very healthy heart. Which statement explains this?

- A Eve's grandmother eats lots of fat and sugar too.
- B Eve's grandmother may get heart disease in the future.
- C Smoking is also a cause of heart disease.
- D The article is making a correlation between groups of people.

The following information should be used to answer questions 12 and 13.

Kelly and Tunde are discussing the plan to build a nuclear power station near where they live.

I don't want the power station. It might replace 2 or 3 coal power stations or 500 wind turbines but it would put tourists off from visiting our excellent beach.



Kelly

I think we should have the power station, as we need more electricity. But I think the nuclear waste is a problem that we need to spend more money on to make it safe, because nuclear power is the most reliable.



Tunde

12 Who made a comment about power output?

- A Kelly
- B Tunde
- C both Kelly and Tunde
- D neither Kelly nor Tunde

13 Who made a comment about economic cost?

- A Kelly
- B Tunde
- C both Kelly and Tunde
- D neither Kelly nor Tunde

14 Which statement about microwaves is **not** correct?

- A Microwaves can cause water molecules to vibrate.
- B Microwaves produce ions in living cells.
- C The energy in microwaves is carried as photons.
- D The intensity of microwaves decreases as the distance from the source increases.

15 A scientist thinks that mountains must be forming all the time.

She uses some of the statements below in her explanation.

- 1 Mountains are part of the Earth's crust.
- 2 Erosion causes mountains to be worn down.
- 3 The Earth is older than the oldest rocks.
- 4 If no new mountains are formed, the world would be flat.
- 5 Mountains exist today.
- 6 Mountains are only formed on drifting continents.

Which statements make up an explanation for mountains forming all the time?

- A 1, 3 and 6 B 2, 4 and 5 C 3, 4 and 6 D 4, 5 and 6

16 Radiations from radioactive sources have different powers of penetration.

What is the order of penetration for alpha, beta and gamma radiation?

	most	→	least
A	alpha	beta	gamma
B	alpha	gamma	beta
C	beta	gamma	alpha
D	gamma	beta	alpha

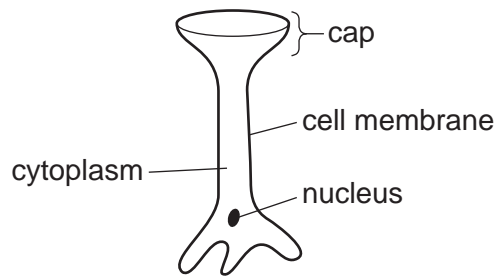
17 It is now possible to artificially produce a clone of an animal.

Which process is used to do this?

- A An egg is fertilised by a body cell.
- B A nucleus is transferred into an empty egg cell.
- C Genes are moved from an egg to a body cell.
- D The cells of an embryo are separated to make identical twins.

18 *Acetabularia* is a single celled organism that lives in the sea.

It has an unusual shape.



Which part of *Acetabularia* contains the genetic material?

- A cap
 - B cell membrane
 - C cytoplasm
 - D nucleus
- 19 The genetic material is made up of long molecules of a certain chemical.

What is the name of this chemical?

- A DNA
 - B fat
 - C protein
 - D sugar
- 20 'Double-blind tests' are sometimes used in human trials to test medical treatment.

Which statement is true for 'double-blind tests'?

- A Neither the doctor nor the patient are influenced by knowing who has taken the real drug.
- B The doctor knows who has the real drug, making analysis of the results easier.
- C The placebo reduces the costs by containing a low dose of the drug.
- D They always produce positive results.

21 Many people think that placebos should not be used in some human drug trials.

Why is this?

- A It is unfair to give an ill person a treatment that will not help them.
- B They make it harder to work out the actual effect of the real drug.
- C They make the trial last much longer.
- D They may make the person more susceptible to disease.

Read this information about a vaccine trial.

Use the information to answer questions **22**, **23** and **24**.

- A new vaccine was tested on HIV-negative men and women.
- All the volunteers were given advice to help them avoid HIV.
- Half the volunteers were randomly picked to receive the vaccine, while the other half received dummy injections.
- Until the trial ended, nobody knew who had been given the genuine vaccine and who had not.
- 51 of the 8197 people given the vaccine and 74 of the 8198 who received dummy shots became infected.

22 What is the new vaccine most likely to contain?

- A a dose of weakened or dead virus
- B antibiotics
- C a small dose of live microorganisms
- D white blood cells

23 Why has it been so difficult to develop a vaccine against HIV?

- A Antibodies are not effective against viruses.
- B HIV is a virus and is not destroyed by antibiotics.
- C It is impossible to test to see if a person has the virus.
- D The virus has a high mutation rate.

24 Until the trial ended, nobody knew who had the real vaccine and who had dummy injections.

What is this type of trial called?

- A a blind trial
- B a controlled trial
- C a double-blind trial
- D a fair trial

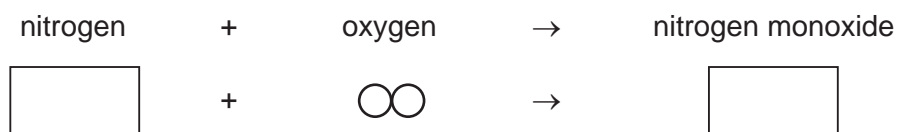
25 Four people are discussing nitrogen dioxide pollution in the area where they live.

Which person is suggesting a correlation between a factor and an outcome?

- A 'It is very difficult to measure the concentration of nitrogen dioxide accurately.'
- B 'Nitrogen dioxide is made in thunderstorms.'
- C 'Nitrogen dioxide levels are higher when people are driving to and from work.'
- D 'Nitrogen dioxide reacts with water to make acid rain.'

26 Cars and power stations both produce nitrogen monoxide, NO.

The diagram shows part of this reaction.



Which diagrams are needed to make the reaction balanced?

	nitrogen	nitrogen monoxide
A	●	●●○
B	●●	●○
C	● ●	●○ ●○
D	●●	●○ ●○

27 The diagram shows part of a polymer chain.



Which statement about the polymer is **not** correct?

- A The polymer is a hydrocarbon.
- B The polymer is made from a monomer with formula $\text{CH}_3=\text{CH}_3$.
- C The polymer is made from chemicals from crude oil.
- D The polymer is not cross linked.

28 Synthetic rubber is made from crude oil.

The rubber can be used to make car tyres and surfaces for children's playgrounds.

Why is the Life Cycle Assessment different for rubber used in car tyres compared to rubber used in playground surfaces?

- A Car tyres wear out more quickly than playground surfaces.
- B More people drive cars than use playgrounds.
- C Playgrounds do not belong to individual consumers.
- D Synthetic rubber is non-biodegradable.

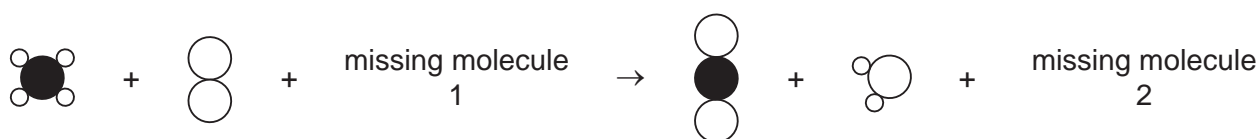
29 In developed countries, the number of farmers using manure as a fertiliser is increasing.

In developing countries, the number of farmers using synthetic fertilisers is increasing.

Which statement gives a reason for this?

- A Developing countries have food shortages but developed countries have plenty of food available.
- B Farmers in developed countries are more interested in profits.
- C Farmers in developed countries have more information about organic farming methods.
- D Farmers in developing countries have more land available for farming.

- 30 The diagram shows what happens when a molecule of methane burns to make carbon dioxide and water.



Which row shows the correct missing molecules?

	missing molecule 1	missing molecule 2
A		
B		
C		
D		

- 31 PVC is a polymer that can be used to make window frames. PVC can be modified for use as a wrapping for food.

The table shows the properties of the two types of PVC.

	strength	flexibility
PVC for window frames	high	not flexible
PVC for food wrapping	low	very flexible

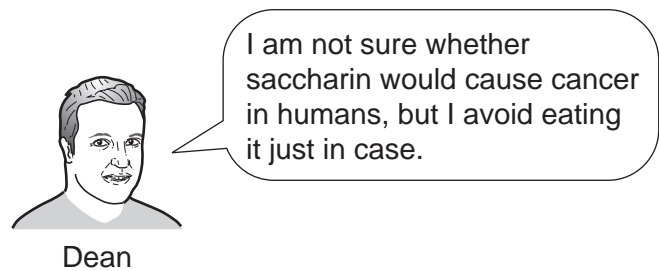
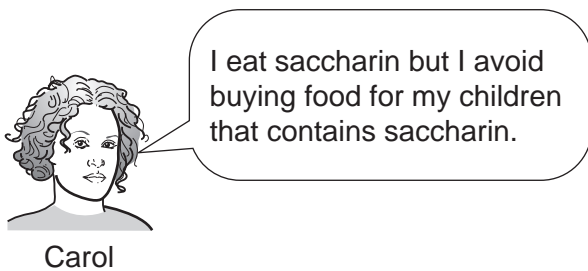
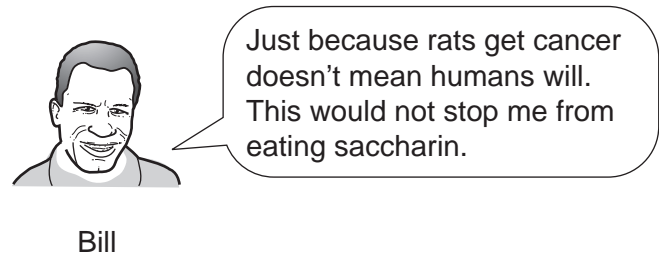
Which statement explains why the properties of the two types of PVC are different?

- A** PVC for food wrapping contains plasticisers and has shorter chain lengths.
- B** PVC for food wrapping has a higher crystallinity.
- C** PVC for making window frames has been heat treated.
- D** The two types of PVC have different Life Cycle Assessments.

32 Saccharin is used as an artificial sweetener in foods.

It has been proved that very large doses of saccharin causes cancer in rats.

Some people are discussing whether or not they would eat food containing saccharin.



Which person's view is based on the precautionary principle?

- A Amy
- B Bill
- C Carol
- D Dean

33 Sometimes it is very difficult to make accurate observations.

Which observation is the **most** difficult to make?

- A diameter of the Earth
- B distances to far galaxies
- C distance to the Moon
- D time for the Earth to orbit the Sun

34 A radio wave signal gets weaker the further away it is from the transmitter.

Which statement correctly explains the decrease in intensity of the radio beam?

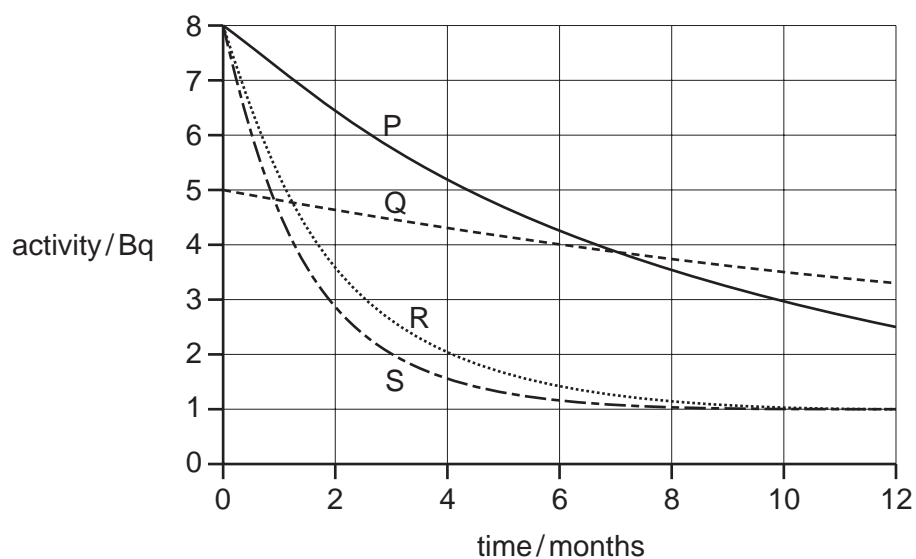
- A Photons cannot travel very far as they have relatively low energy.
- B Photons lose energy as they travel away from the transmitter.
- C Photons slow down as they travel away from the transmitter.
- D Photons spread apart as they travel away from the transmitter.

35 What is the nucleus of an atom made up of?

- A electrons and ions
- B neutrons and ions
- C protons and electrons
- D protons and neutrons

The following graph should be used to answer questions 36 and 37.

The graph shows how the activity of some radioactive sources changes over time.



36 Which radioactive source has the shortest half-life?

- A P
- B Q
- C R
- D S

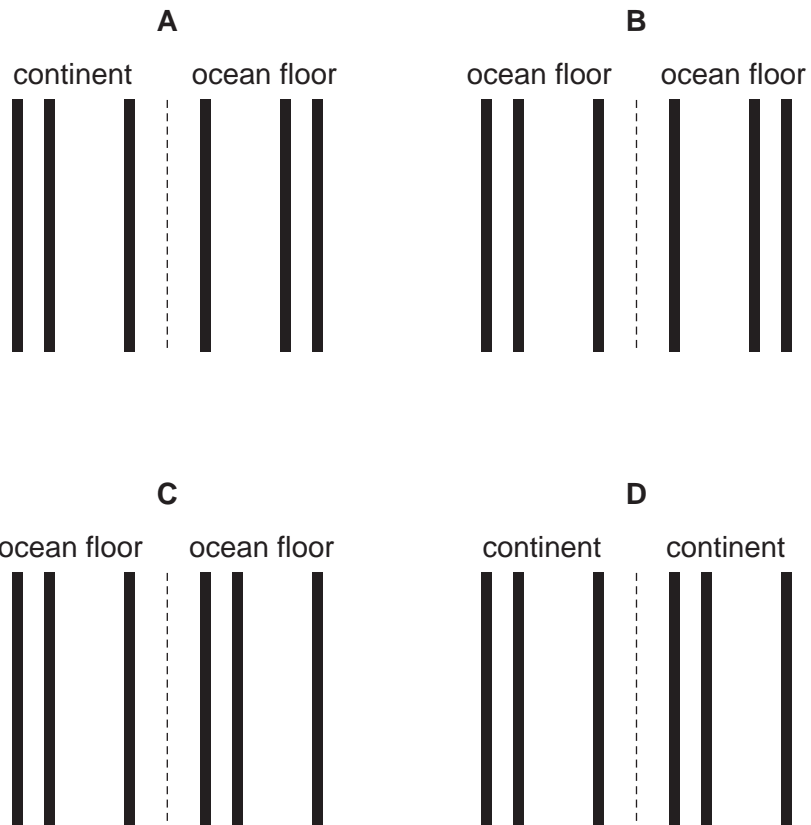
37 What is the background radiation?

- A 1 Bq
- B 4 Bq
- C 5 Bq
- D 8 Bq

38 What is the approximate speed at which continents move apart?

- A 1 mm/yr B 10 cm/yr C 1 m/yr D 10 m/yr

39 Which diagram correctly shows the magnetic patterns that support Wegener's theory of continental drift? (The dotted line is a plate boundary)



40 Which gas produces reversible chemical changes in the atmosphere when it absorbs ultraviolet radiation?

- A carbon dioxide
 B nitrogen
 C oxygen
 D ozone

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