



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**TWENTY FIRST CENTURY SCIENCE (EXTENDED)**

**0608/02**

Paper 2 Multiple Choice

**May/June 2012**

**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 **15** printed pages and **1** blank page.



The following information should be used for questions 1 and 2.

It is now possible for a person to have their DNA tested.

The tests can tell a person how likely they are to develop certain genetic conditions.

People were asked who they think should be allowed to know the results of genetic tests.

The diagram shows the results of the two questions asked.



- 1 Which conclusion can be made from these results?
- A Most people do not mind their insurance companies knowing the results.
  - B People are happier with their insurance company knowing their results than their employer.
  - C Most people do not have strong views on the topic.
  - D Everybody thinks that the results should be completely secret.
- 2 Which statement might best explain these results?
- A People think they are more likely to get promoted at work if they test positive for a genetic condition.
  - B People are most worried about losing their jobs if they test positive.
  - C People are most worried that they may not be able to get insurance.
  - D People do not think that this is a very important issue.

The following information should be used for questions 3 and 4.

Scientists are planning to inject stem cells into the eyes of blind patients to try and replace the sensitive cells that are damaged.

Four people have different views on this idea.



Penny

I know that it would be good to cure these blind people but we cannot justify killing embryos to get the stem cells.



Shireen

I think that these operations are too expensive. The money can be better spent elsewhere.



Don

I don't like the idea of killing embryos but, if it helps blind people see, it must be worthwhile.



















Carol

I think that this technique needs more testing. The doctors may just be wasting their time.

- 3 Which people are worried about whether it is morally right to use this technique?
- A Penny and Don
  - B Penny and Carol
  - C Penny, Don and Shireen
  - D Shireen and Carol
- 4 Which person thinks that certain actions are never justified because they are unnatural or wrong?
- A Carol
  - B Don
  - C Penny
  - D Shireen

- 5 Which statement about cell specialisation is true?
- A All cells are specialised.
  - B Only stem cells are specialised.
  - C Cells specialise during the early development of an organism.
  - D Cells specialise in the final stages of the development of an organism.
- 6 Carbon monoxide has the formula CO.  
Carbon dioxide has the formula CO<sub>2</sub>.  
Water has the formula H<sub>2</sub>O.  
Nitrogen dioxide has the formula NO<sub>2</sub>.

Which row is correct?

	carbon monoxide	carbon dioxide	water	nitrogen dioxide
A				
B				
C				
D				

- 7 Carbon dioxide is put into the atmosphere by burning fossil fuels.

Carbon dioxide is also removed from the atmosphere.

How is carbon dioxide removed from the atmosphere?

- A It is an unstable gas and it breaks down in sunlight.
- B It is used in photosynthesis and it dissolves in sea water.
- C It is used in respiration by both animals and plants.
- D It is broken down by bacteria and it reacts with oxygen.

- 8 Two molecules of oxygen and one molecule of methane, a hydrocarbon, react with each other. Methane burns in air.

The diagram shows the molecules that react.



Which diagram shows the correct molecules after the reaction?

- A
- B
- C
- D

- 9 Which steps would result in lowering an individual's contribution to carbon dioxide levels in the atmosphere?

1. cycling to work rather than taking their car
2. fitting a catalytic converter to their car
3. insulating the hot water tank in their house
4. leaving their television on standby at night

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

- 10 The Earth is about 4.5 thousand million years old.

Approximately how old are the Earth's oldest rocks?

- A 4 thousand million years
- B 4.5 thousand million years
- C 5 thousand million years
- D 9 thousand million years

- 11 Uranium is the heaviest naturally occurring element found in the Earth's crust.

What is the most likely explanation for the existence of uranium?

- A It was produced by nuclear fission in stars pre-dating our Sun.
- B It was produced by nuclear fission in the Earth's core.
- C It was produced by nuclear fusion in stars pre-dating our Sun.
- D It was produced by nuclear fusion in the Earth's core.

- 12 The table shows the speeds at which four distant galaxies are moving away from the Earth and the brightness of those galaxies.

The speeds were found from measurements of the radiation given out by those galaxies.

From which galaxy was the radiation given out earliest?

	speed (km/s)	brightness
A	11 000	100
B	14 000	60
C	28 000	15
D	32 000	12

- 13 Wegener's theory of continental drift was based on comparisons between different continents.

Which comparison did Wegener use as evidence for his theory?

- A comparing records on stone tablets in different continents
- B comparing rivers in different continents
- C comparing rock types in different continents
- D comparing the climate in different continents

- 14 Sea-floor spreading is causing the Atlantic Ocean to become wider.

How much wider does the ocean become each year?

- A 0.1 – 0.9 cm    B 1 – 20 cm    C 21 – 100 cm    D more than 1 m

The following information should be used for questions 15 and 16.

Some people think that everyone should be vaccinated against a disease even if they would not to be.

Different people have different views about this issue.



Anita

We cannot force everyone to be vaccinated against disease.



Ranjit

Whatever the benefit, we should not force people to be vaccinated. They have a right to choose for themselves.



Paul

I think everybody should be vaccinated because it would save millions of lives.



Sunita

People may not like being vaccinated but catching the disease is much more harmful than any side-effects of the vaccine.

**15** Which person is saying that the right thing to do gives the best outcome for the majority of people?

















- A** Anita
- B** Paul
- C** Ranjit
- D** Sunita

**16** Which person is talking about a risk and a benefit of the vaccine?

- A** Anita
- B** Paul
- C** Ranjit
- D** Sunita

- 17 New vaccines against influenza need to be developed each year.

Which row of diagrams of the influenza virus best explains this fact?

	2008	2009	20010	2011
<b>A</b>				
<b>B</b>				
<b>C</b>				
<b>D</b>				

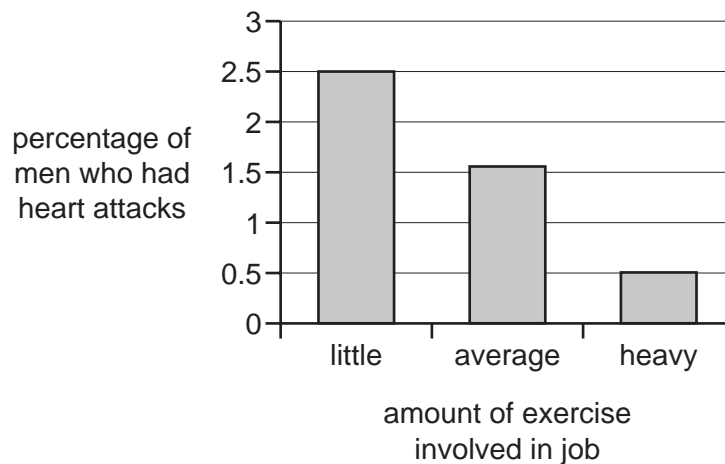
- 18 People only show the symptoms of some diseases the first time they are infected.

Which statement explains why?

- A** Our bodies can make antibodies much quicker the second time around.
- B** Microorganisms are not able to enter the body the second time around.
- C** The microorganism that causes the disease has become extinct.
- D** The reproduction rate of microorganisms is too slow the second time around.
- 19 Which two of the following, when taken together, explain the causes of the symptoms of a disease?
- 1 damage done to cells
  - 2 the production of antibodies
  - 3 toxins produced by the bacteria
  - 4 the production of white blood cells
- A** 1 and 2      **B** 1 and 3      **C** 2 and 4      **D** 3 and 4

- 20 In the 1950s a scientist called Morris studied men whose jobs involved different amounts of exercise.

He looked at the percentage of the men who had heart attacks.



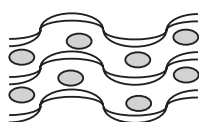
What is a reasonable conclusion from Morris' data?

- A Doing a job that involves little exercise reduces the fatty deposits in the arteries supplying the heart muscle.
  - B Doing a job that involves little exercise causes heart attacks.
  - C Men doing jobs which involve heavy exercise are less likely to have heart attacks.
  - D There does not seem to be any correlation between the job a person does and the chance that they will have a heart attack.
- 21 Some waste polymers are buried in landfill sites. Some waste polymers are incinerated.

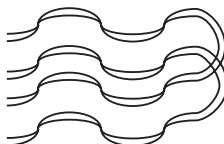
Which statement gives an advantage of incinerating waste polymers rather than burying them in landfill sites?

- A Energy from burning polymers can be used to make electricity.
- B Incinerating polymers gives off carbon dioxide.
- C Incinerating polymers is carried out at a very high temperature.
- D Polymers in landfill sites do not give off any harmful gases.

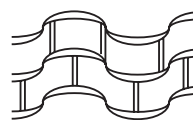
22 The diagrams show the structures of three polymers used to wrap food.



polymer 1



polymer 2



polymer 3

Which statement about the polymers is true?

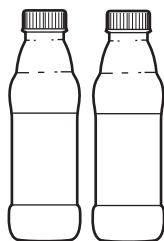
- A Polymer 1 is less flexible than polymer 2.
- B Polymer 2 is stiffer than polymer 3.
- C Polymer 3 has a lower melting point than polymer 2.
- D Polymer 3 is stronger than polymer 1.

23 Some of the molecules in crude oil are used to make polymers.

Which statement about polymers made from crude oil is true?

- A Molecules in polymers are larger than the molecules from crude oil that are used to make them.
- B Most of the molecules in crude oil are used to make polymers.
- C The molecules in both crude oil and the polymers contain mainly carbon, hydrogen and oxygen.
- D The molecules in crude oil are all the same length.

- 24 A company uses the same type of polymer to make bottles for drinks and padding for



drinks bottles



padded jackets

The Life Cycle Assessment for the **polymer** is different when it is used to make different things.

What is the best explanation for this?

- A Different people buy the drinks and the padded jackets.
  - B Drinks bottles are cheaper to buy than padded jackets.
  - C Padded jackets are used for a long time, drinks bottles are thrown away quickly.
  - D The jackets are made from other materials as well as the polymer.
- 25 Which sentence concerning electromagnetic radiation is fully correct?
- A The ozone layer in the atmosphere absorbs mainly microwave radiation.
  - B The metal door screen on a microwave oven absorbs mainly ultraviolet radiation.
  - C Sun-screen on the skin absorbs mainly ultraviolet radiation.
  - D Carbon dioxide in the Earth's atmosphere absorbs mainly microwave radiation.
- 26 Some scientists have calculated that the health risk from a chest X-ray delivering a radiation dose of 30 mSv is equivalent to that of smoking eight cigarettes.

Another medical treatment uses barium. The treatment delivers a radiation dose of 540 mSv.

How many cigarettes is this treatment the equivalent of smoking?

- A 18
  - B 68
  - C 144
  - D 2052
- 27 Which of these gases is **not** a greenhouse gas?

- A carbon dioxide
- B methane
- C nitrogen
- D water vapour

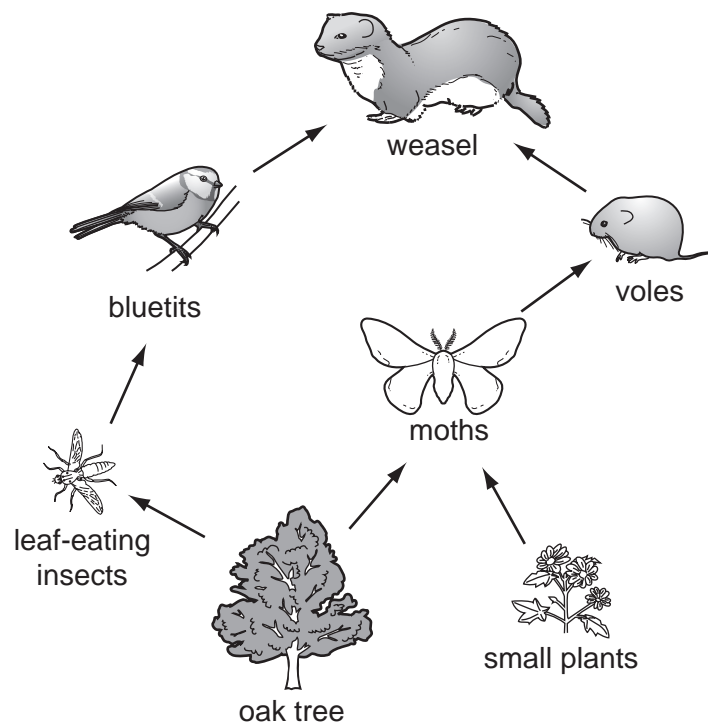
- 28 The planet Venus is closer than the Earth to the Sun. Venus' average temperature is 480 °C, compared to the Earth's of about 15 °C.

One reason for this is the radiation arriving from the Sun.

Why does more energy arrive at Venus?

- A More photons arrive at Venus than at the Earth.
- B Intensity of electromagnetic radiation increases with distance from the Sun.
- C Photons lose energy as they travel away from the Sun.
- D Venus is covered in clouds all the time, which reflect light.

- 29 The diagram shows a food web.



A farmer sprays his field with insecticide.

It reduces the population of moths.

What immediate effect will this have on the numbers of small plants?

- A decrease and then increase
- B decrease
- C increase
- D no effect

30 Natural selection involves the following processes.

1. survival
2. competition
3. variation
4. reproduction

What is the correct order of these processes in natural selection?

- A** 1, 2, 4, 3
- B** 2, 3, 4, 1
- C** 3, 1, 2, 4
- D** 3, 2, 1, 4

31 What best describes hormonal communication?

- A** chemical, fast, long-lived
- B** chemical, slow, long-lived
- C** electrical, fast, short-lived
- D** electrical, slow, short-lived

32 Which statement about the nervous system is true?

- A** Neurones are connected by effector cells to sensor cells.
- B** Neurones are connected by sensor cells to effector cells.
- C** Sensor cells are connected by neurones to effector cells.
- D** Sensor cells are not connected to effector cells.

33 Which row shows a correct sequence of changes involved in excretion?

<b>A</b>	excess amino acids are broken down in the kidneys	the liver removes urea from the blood	urine is excreted
<b>B</b>	the liver breaks down urea to form amino acids	the kidneys remove amino acids from the blood	urine is excreted
<b>C</b>	the kidneys remove amino acids from the blood	the liver converts amino acids to urea	urine is excreted
<b>D</b>	excess amino acids are broken down in the liver	the kidneys remove urea from the blood	urine is excreted

**34** Which is a harmful chemical produced by mould that can contaminate crops during storage?

- A** aflatoxin in nuts and cereals
- B** antioxidants in mushrooms
- C** gluten in wheat
- D** hydrocyanic acid toxin in uncooked cassava

**35** Which substance contains nitrogen?

- A** protein
- B** cellulose
- C** starch
- D** sugar

**36** Some natural processes in the nitrogen cycle provide nitrogen for plants.

Which statement correctly describes a stage in the nitrogen cycle?

- A** Nitrogen reacts to make nitrogen compounds during lightning storms.
- B** Nitrogen reacts with hydrogen in the soil.
- C** Plant leaves convert nitrogen gas to nitrates.
- D** Plants use nitrogen in the form of ammonia.

**37** Liz is 35 years old. She works mostly at a desk.

Her son Joe is 13 years old. He plays sport every day.

Which statement about the diets of Liz and Joe is true?

- A** Joe needs more fibre than Liz.
- B** Joe needs more protein and a higher energy intake than Liz.
- C** Liz needs more salt and sugar than Joe.
- D** Liz needs to drink more water than Joe.

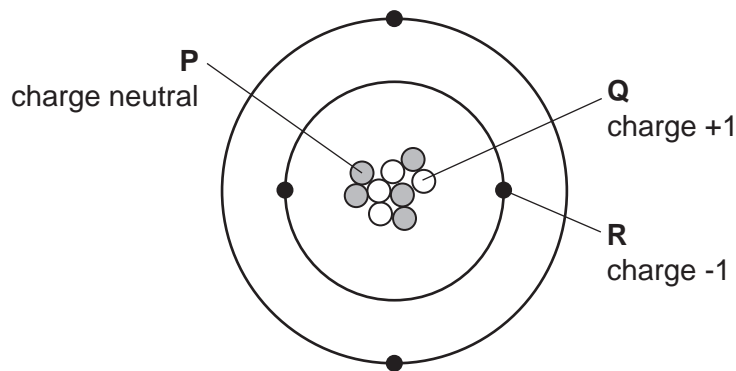
38 A power station produces radioactive waste.

This hot waste is cooled under water until it becomes less active and can be sent for long storage.

What type of waste has to be cooled under water until it is less active?

- A non-radioactive waste
- B low level radioactive waste
- C intermediate level radioactive waste
- D high level radioactive waste

39 The diagram shows the three main types of particle found in atoms.



Which row shows the correct labels for the electron and the proton?

	electron	proton
A	P	Q
B	Q	P
C	R	Q
D	P	R

40 Nuclear fission of a uranium nucleus produces neutrons.

What else is formed?

- A one smaller nucleus
- B one larger nucleus and one smaller nucleus
- C two smaller nuclei of similar size
- D many smaller nuclei

