



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

TWENTY FIRST CENTURY SCIENCE (EXTENDED)

0608/02

Paper 2 Multiple Choice

October/November 2013

1 hour

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

* 8 6 2 7 1 7 5 6 2 6 *

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.
DO NOT WRITE IN ANY BARCODES.

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.

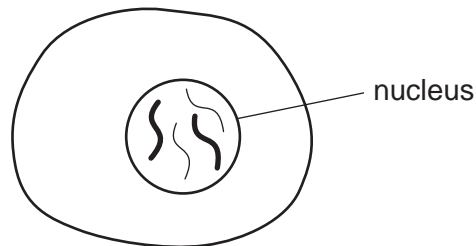
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.

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



- 1 What happens during **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.

- 2 The diagram shows an animal cell.



The nucleus in the cell contains chromosomes.

Which statement best explains the role of chromosomes in the cell?

- A A chromosome contains genes which each code for a particular protein.
 - B Chromosomes in the nucleus of a cell are found in pairs.
 - C Each chromosome is a sequence of genes which are all used in every cell.
 - D The genes on a chromosome code for the carbohydrates which a cell needs.
- 3 Cystic fibrosis is an inherited disease caused by a recessive allele. The allele for cystic fibrosis is represented by *c*. The dominant healthy allele is represented by *C*.

The table shows the alleles possessed by the parents of a child.

		mother	
		<i>c</i>	<i>c</i>
father	<i>C</i>		
	<i>c</i>		

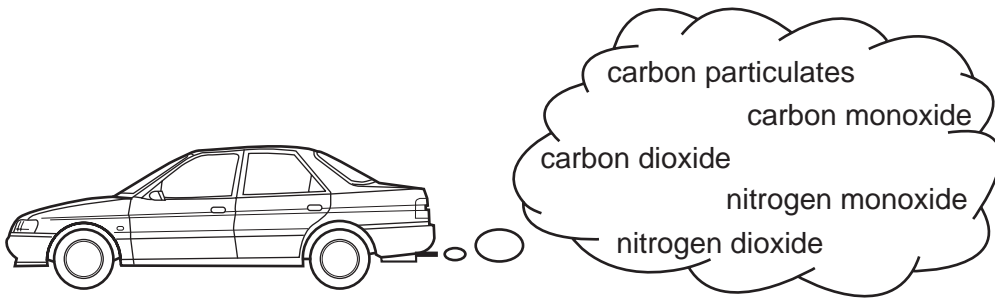
What is the risk of their child being a **carrier** of cystic fibrosis?

- A 25%
- B 50%
- C 75%
- D 100%

- 4 Cystic fibrosis often results in death at a young age because several organs are weakened.

What is the best explanation of how the organs are affected?

- A The faulty allele causes organs to be blocked with thick mucus.
 - B The faulty allele causes the fibres in muscles to be weakened.
 - C The faulty allele leads to a weakening of the bones.
 - D The faulty allele produces red blood cells which do not carry oxygen.
- 5 The diagram shows some pollutants produced in a car engine.



Which pollutants are produced by incomplete combustion?

- A carbon dioxide and nitrogen monoxide
 - B carbon monoxide and nitrogen dioxide
 - C carbon particulates and carbon monoxide
 - D carbon particulates, carbon monoxide and carbon dioxide
- 6 How are carbon particulates removed from the air?
- A They are used by plants for photosynthesis.
 - B They dissolve in the sea.
 - C They form a solid deposit on surfaces.
 - D They react with rainwater and oxygen to form acid rain.

The following information should be used for questions 7 and 8.

Liz uses an electronic sensor to test the percentage of carbon monoxide in the exhaust gases of a car.

She repeats the test five times.

The table shows the results.

test	percentage of carbon monoxide in %
1	0.12
2	0.03
3	0.04
4	0.03
5	0.02

7 Liz treats test 1 as an outlier.

Why does she do this?

- A The first test was just a rough trial.
- B The result does not agree with the best estimate.
- C The test result is higher than the mean of the other results.
- D The test result lies well outside of the range of the other results.

8 Liz uses her results to calculate the best estimate of the percentage of carbon monoxide in the car exhaust.

What is the value of the best estimate?

- A 0.02% B 0.03% C 0.04% D 0.048%

9 Sarah has tried to write some equations for burning fuels.

Unfortunately, Sarah has made some mistakes.

Which equation is correct?

- A $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- B $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
- C $\text{C}_4\text{H}_{10} + 2\text{CO}_2 \rightarrow 2\text{O}_2 + 5\text{H}_2\text{O}$
- D $\text{C}_8\text{H}_{18} + 12\text{O}_2 \rightarrow 8\text{CO}_2 + 18\text{H}_2\text{O}$

10 South America and South Africa are separated by a large ocean.

Fossils of *Mesosaurus*, an ancient reptile, have been found in South America and in South Africa.

Scientists think that this is evidence that

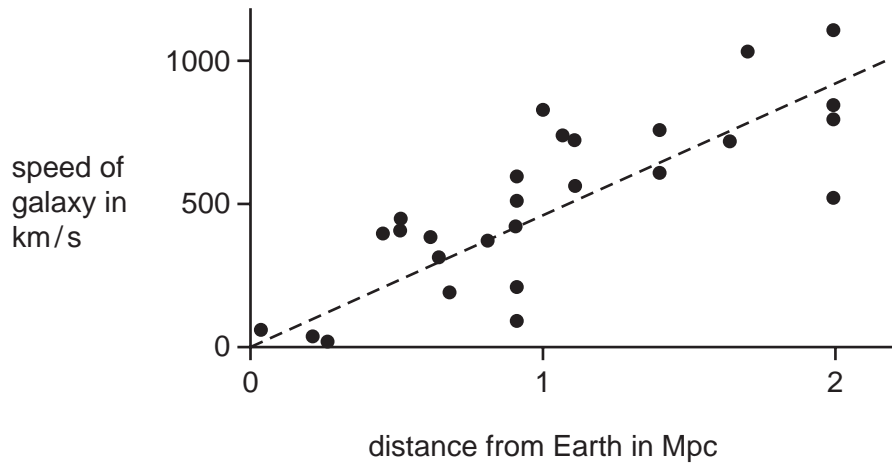
- A life evolved differently in South America and South Africa.
- B *Mesosaurus* was able to swim large distances.
- C South America and South Africa were once part of the same land mass.
- D all the fossils in South America and South Africa must be the same.

11 Which objects in the solar system travel the greatest distance from the Sun?

- A asteroids
- B comets
- C moons
- D planets

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

The graph shows the results of Edwin Hubble's research into galaxies in 1929.



12 What is the best **explanation** for Hubble's results?

- A Gravity is acting on the galaxies.
- B Hubble discovered the relationship.
- C Space is expanding.
- D There are too many galaxies in the universe.

13 Which idea does the data in Hubble's graph best support?

- A Galaxies are made of stars.
- B Stars have a life cycle.
- C The universe is orbiting our galaxy.
- D The universe started with a 'big bang'.

14 The body has natural barriers to prevent the entry of microorganisms.

Which does **not** prevent the entry of microorganisms into the body?

- A skin
- B sweat
- C tears
- D white blood cells

15 What causes influenza?

- A a bacterium
- B a fungus
- C a toxin
- D a virus

16 Doctors always recommend that patients finish the course of antibiotics that they are prescribed.

What is the reason for this?

- A It helps prevent resistant bacteria increasing in numbers.
- B It makes sure that all toxins are destroyed.
- C Some bacteria might produce antibodies to destroy the antibiotics.
- D Some bacteria might become immune to the antibiotic.

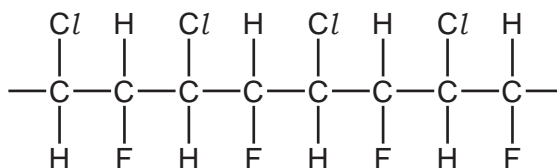
17 Blood is carried away from the heart in arteries and back to the heart in veins.

The pressure of the blood in arteries is much higher than in veins.

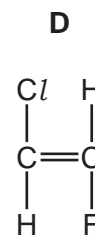
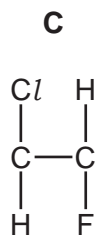
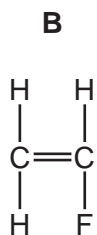
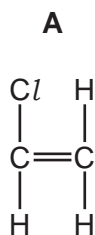
Which features of veins are correct?

- A thick walls and no valves
- B thick walls and valves
- C thin walls and no valves
- D thin walls and valves

18 Scientists have made a new polymer.



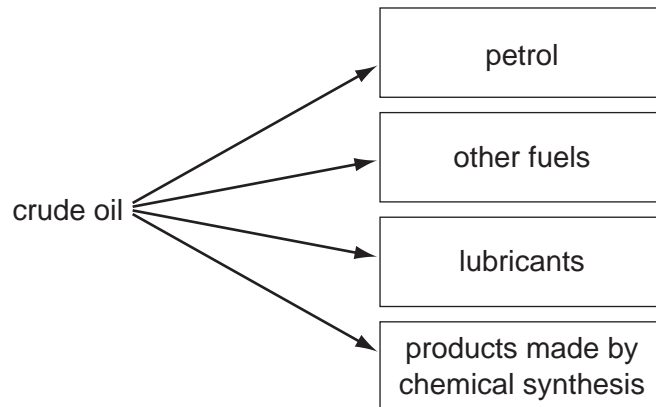
Which monomer was used to make the polymer?



19 Which polymer modification would **not** increase the tensile strength?

- A increasing the crystallinity
- B making polymer chains longer
- C adding plasticisers
- D adding cross links

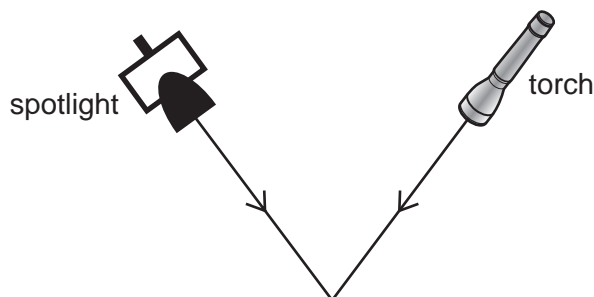
20 The diagram shows some products of crude oil.



Which of these products uses the smallest percentage of crude oil?

- A petrol for cars
- B other fuels
- C lubricants
- D products made by chemical synthesis

21 A torch and a spotlight both produce visible light.



They shine from the same distance onto a point.

The spotlight delivers more energy to the point than the torch.

Which row shows the factors that affect the amount of energy delivered to the point?

	number of photons	energy of each photon	speed of the light
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	x

22 When you watch a movie, light travels from the movie screen to your eye.

Which row best describes the processes happening to the light?

	movie screen	air	eye
A	absorbs	emits	reflects
B	absorbs	reflects	transmits
C	emits	transmits	absorbs
D	transmits	absorbs	reflects

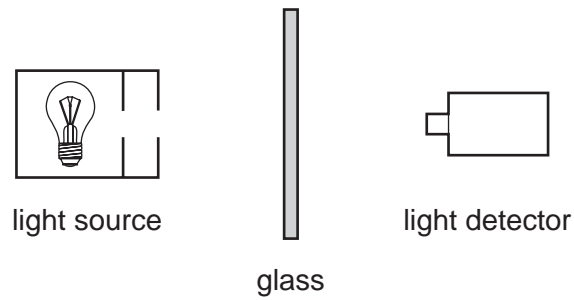
23 The Maldives are a series of low lying islands in the Indian Ocean.

The government of the Maldives is one of the most active in promoting measures to limit global warming.

Which statement best explains why?

- A** Global warming is due to the increase in carbon dioxide in the atmosphere.
- B** Global warming is likely to cause sea levels to rise.
- C** Global warming is likely to cause the temperature in all parts of the world to increase.
- D** Global warming is likely to increase the number of earthquakes.

24 The diagram shows an experiment.



In the experiment, the intensity of the light reaching the detector is found to decrease as the thickness of the glass is increased.

Which statement best explains this?

- A** The glass absorbs some photons of light.
- B** The glass decreases the energy of the photons.
- C** The glass slows the photons down.
- D** The glass transmits photons of light.

25 Scientists do not always agree with each other.

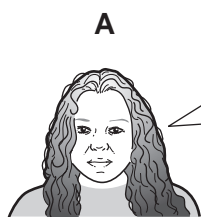
Which three statements are plausible reasons why scientists don't always agree with each other?

- 1 They are using different sets of data.
- 2 They are using the same data but reach different conclusions.
- 3 Insufficient data has been collected.
- 4 New experiments confirmed the data produced by earlier experiments.

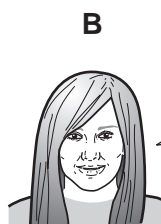
- A** 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

26 Different people have different views about the origin of life on Earth and evolution.

Which person is using imagination and creativity in an explanation?



I wonder if life began on Earth or came from outer space.



Life on Earth began about 3500 million years ago.



Different layers of rock contain different fossils.



The fossil record is evidence for animals evolving slowly over time.

27 Scientists cannot agree on whether life began on Earth or in outer space.

Which statement best explains why?

- A** No evidence of life has been found on other planets.
- B** Some people believe that God created all living things.
- C** Life on Earth began a very long time ago.
- D** The first living things may have developed from molecules that could copy themselves.

28 Which best describes nervous impulses?

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

29 The nervous system contains sensor and effector cells.

Which statement about sensor and effector cells is correct?

- A** Both sensor and effector cells detect a stimulus.
- B** Both sensor and effector cells respond to a stimulus.
- C** Sensor cells detect a stimulus and effector cells respond to a stimulus.
- D** Sensor cells respond to a stimulus and effector cells detect a stimulus.

- 30 Scientists studying human evolution make predictions. Other scientists later make observations that may or may not agree with the original predictions.

Which statement about human evolution describes an observation that **agrees** with a prediction?

- A** A scientist thought that *Homo habilis* evolved from *Australopithecus afarensis* but only fossils of a common ancestor have been found.
- B** Fossils have been found that link *Homo habilis* with *Homo erectus* just as early scientists thought.
- C** Fossils show that *Homo habilis* became extinct around 1.5 million years ago, which is later than scientists originally thought.
- D** *Homo sapiens* is now found in Europe, Africa, Asia and America, but was originally found only in Africa.

- 31 Which pair of rows shows the correct information about starch and protein?

	polymer	elements in polymer	small molecule formed when polymer breaks down
A	starch	carbon, hydrogen, and oxygen	cellulose
	protein	carbon, hydrogen, oxygen and nitrogen	glucose
B	starch	carbon, hydrogen, and oxygen	glucose
	protein	carbon, hydrogen, oxygen and nitrogen	amino acids
C	starch	carbon, hydrogen, oxygen and nitrogen	cellulose
	protein	carbon, hydrogen, oxygen and nitrogen	amino acids
D	starch	carbon, hydrogen, oxygen and nitrogen	glucose
	protein	carbon, hydrogen and oxygen	amino acids

- 32 Which list contains parts of the body that are all made from mainly protein?

- A** fat, teeth, nerves
- B** muscles, tears, bones
- C** tendons, skin, blood haemoglobin
- D** vitamins, water, hair

33 Eve and Clare both have jobs that involve making cakes.

They talk about the ingredients they use.



Eve

I bake cakes to sell in my own local shop. I use all natural, fresh ingredients.

I bake cakes to sell in supermarkets. I add antioxidants and preservatives to my cakes.



Clare

Why do Eve and Clare need to use different ingredients?

- A By law, food sold in supermarkets must contain artificial additives.
- B Cakes sold locally do not need to be transported or stored for long periods.
- C Supermarket cakes need to contain more additives because they always contain more sugar and fat.
- D Supermarkets do not use natural ingredients in their foods.

34 Why are antioxidants and preservatives added to foods?

	reason for adding antioxidant	reason for adding preservatives
A	to stop fats and oils in the food from reacting with oxygen	to stop the growth of harmful microbes in the food
B	to stop oil and water in the food from separating	to keep the nutrient content in food from deteriorating
C	to stop fats and oils in the food from reacting with oxygen	to keep vitamin levels high in the food
D	to stop sugar in the food from reacting with oxygen in the air	to stop the growth of harmful microbes in the food

35 The nitrogen cycle recycles nitrogen through the atmosphere.

Which stage is **not** included in the nitrogen cycle?

- A Animals eat plants and other animals.
- B Fossil fuels are burned.
- C Decomposers break down dead animals.
- D Lightning causes chemical reactions.

36 Which statement correctly describes an atom?

- A A nucleus of electrons and ions surrounded by protons.
- B A nucleus of neutrons and ions surrounded by electrons.
- C A nucleus of protons and electrons surrounded by ions.
- D A nucleus of protons and neutrons surrounded by electrons.

37 The table shows what materials stop some types of ionising radiation that are produced by radioactive materials.

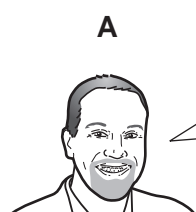
type of ionising radiation	stopped by		
	paper	aluminium	lead
X	x	✓	✓
Y	x	x	✓
Z	✓	✓	✓

What are the correct names of the radiations X, Y and Z?

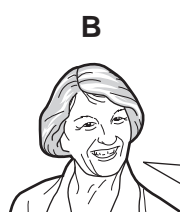
	X	Y	Z
A	beta	gamma	alpha
B	beta	alpha	X-ray
C	gamma	beta	alpha
D	X-ray	gamma	beta

38 Four people who work with radioactive materials are discussing safety.

Who is talking about the ALARA principle?



I don't mind working with radioactive materials. The pay is good.



I organise the duties of all the workers. I make sure that the dose everyone gets is as low as we can manage and still do our jobs.



Workers should not go to work unless the company can guarantee a zero dose.



I like working here. The conditions are excellent. We get regular health checks.

39 The table contains information about some atoms.

atom	number of electrons	number of neutrons	number of protons
W	6	6	6
X	5	6	5
Y	8	9	8
Z	6	8	6

Which atoms are the same element?

- A** W and X **B** W and Z **C** W, X and Y **D** Y and Z

40 In a nuclear reactor neutrons are produced by a1..... inside the2..... , and neutrons are absorbed by the3..... .'

Which words correctly completes gaps 1, 2 and 3?

	1	2	3
A	chain reaction	coolant	control rod
B	chain reaction	fuel rod	control rod
C	coolant	fuel rod	chain reaction
D	fuel rod	coolant	chain reaction

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