

Surname	Initial(s)
Signature	

Paper Reference(s)

5015 5027

Edexcel GCSE

Additional Science (5015)

Biology (5027)

B2 – Topics 1 to 4

Foundation and Higher Tier

Thursday 4 March 2010 – Morning

Time: 20 minutes

Materials required for examination

Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers

Nil

Instructions to Candidates

Use an HB pencil. Do not open this booklet until you are told to do so.
Mark your answers on the separate answer sheet.

Foundation tier candidates: answer questions 1 – 24.

Higher tier candidates: answer questions 17 – 40.

All candidates are to answer questions 17 – 24.

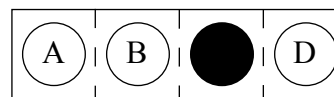
Before the test begins:

Check that the answer sheet is for the correct test and that it contains your candidate details.

How to answer the test:

For each question, choose the right answer, A, B, C or D
and mark it in HB pencil on the answer sheet.

For example, the answer C would be marked as shown.



Mark only **one** answer for each question. If you change your mind about an answer, rub out the first mark **thoroughly**, then mark your new answer.

Do any necessary calculations and rough work in this booklet. You may use a calculator if you wish.

You must not take this booklet or the answer sheet out of the examination room.

Printer's Log. No.

N36473A



W850/R1536/57570 6/4/5/2/4/

This publication may be reproduced only in accordance with Edexcel Limited copyright policy. ©2010 Edexcel Limited.

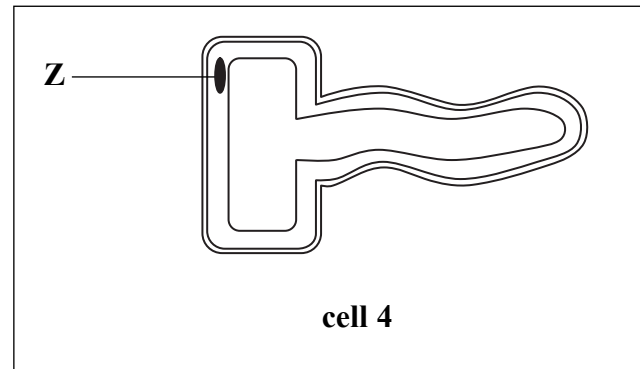
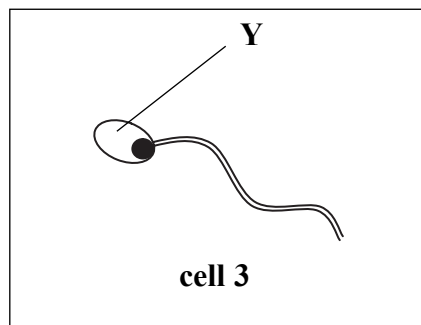
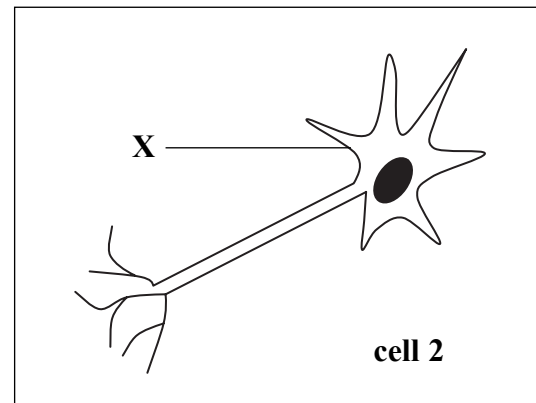
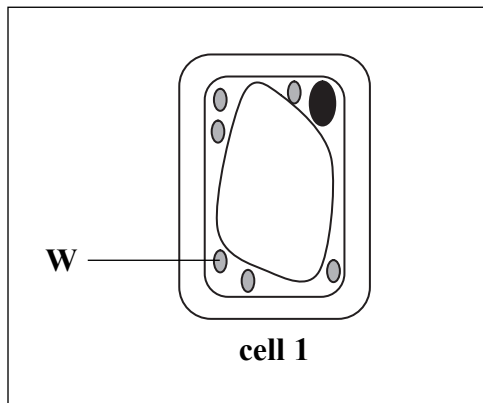
Turn over

edexcel 
advancing learning, changing lives

Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.

Cells

Use the diagrams below to answer questions 1 to 4.



1. Which are animal cells?
A cell 1 and cell 2
B cell 2 and cell 3
C cell 3 and cell 4
D cell 4 and cell 1

2. In which part of the cell is glucose made?
A W
B X
C Y
D Z

3. Part Z contains

- A cellulose
- B chlorophyll
- C chromosomes
- D hormones

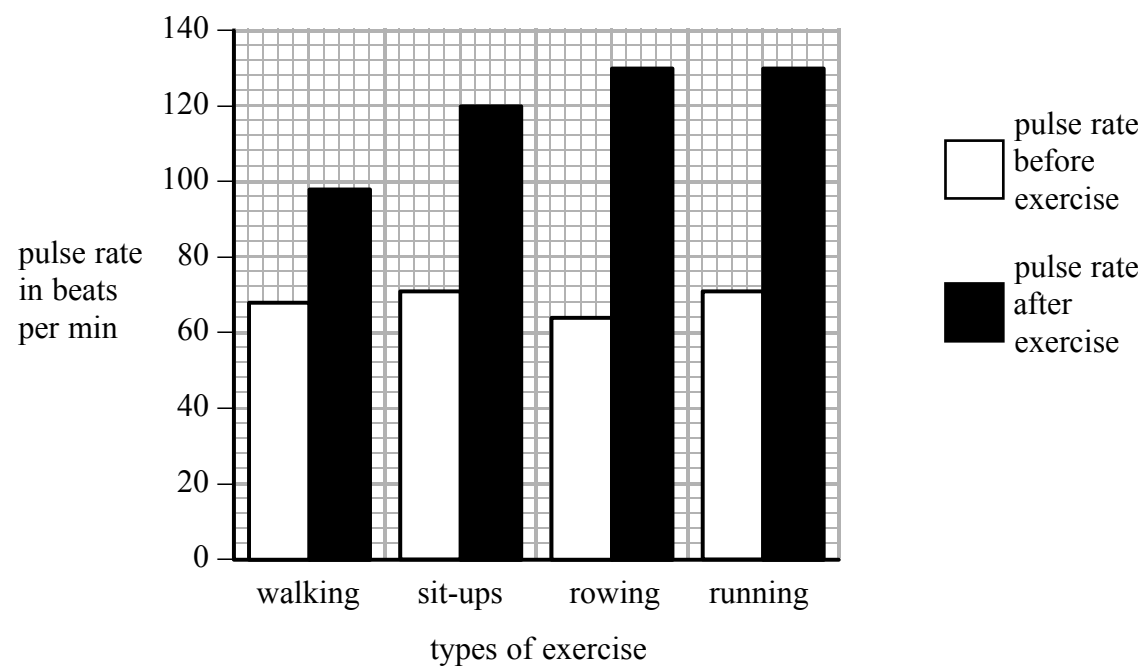
4. All of the cells shown contain cytoplasm.
The cytoplasm in each of these cells

- A controls what enters and exits the cell
- B controls the activities of the cell
- C is made of cellulose
- D is where most chemical reactions take place

Keeping fit

Mary carried out an investigation on how different type of exercise affect pulse rate.

The graph shows Mary's pulse rate before each exercise and at one minute after each exercise.



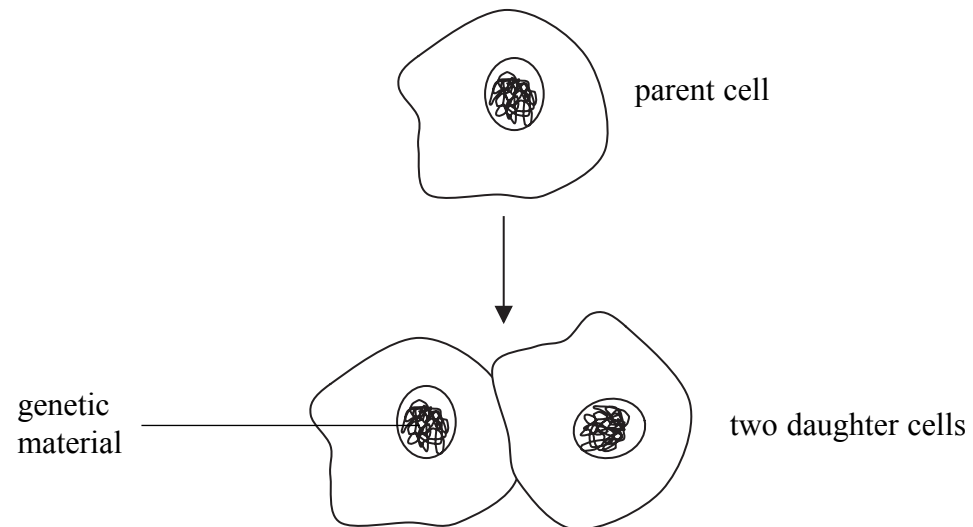
5. Which of the exercises made Mary's pulse rate increase the most?

- A walking
- B sit-ups
- C rowing
- D running

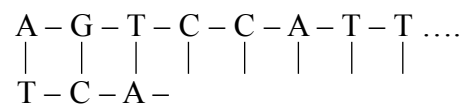
6. Mary's pulse rate increased with all exercises because her
- A blood uses more oxygen
 - B muscles needed more oxygen
 - C breathing rate decreased
 - D muscles needed more carbon dioxide
7. The most accurate way for Mary's pulse rate to be measured is to
- A ask a friend to use their fingers to take her pulse
 - B use a breathing rate monitor
 - C take her own pulse using her fingers
 - D use a heart rate monitor
8. Some people who participate in sport have taken steroids.
The reason for this is because steroids
- A prevent facial hair growth in women
 - B increase athletic performance
 - C increase reaction time
 - D stop lactic acid being made in muscles

Reproduction

The diagram shows a single cell reproducing asexually.



9. The genetic material of the parent cell contained 22 chromosomes before it divided. How many chromosomes will be in each daughter cell?
- A 11
B 22
C 33
D 44
10. The genetic material of each cell is double-stranded DNA. Part of this DNA is shown below. Some of the bases are missing.



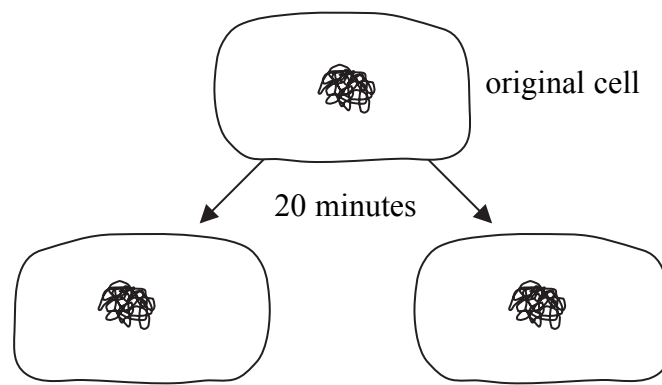
Which sequence shows the missing bases?

- A A-A-T-G-G
B G-G-T-C-C
C G-G-T-A-A
D C-C-A-T-T

11. Bacteria can be used to make useful substances such as hormones.
Plasmids are used to transfer human genes into bacteria.
Plasmids are made of

A enzymes
B DNA
C insulin
D waste products

12. Bacterial cells multiply very rapidly and produce a large amount of hormone in a short time.
Each bacterial cell can divide into two cells every 20 minutes.



Starting with the original cell, how many bacterial cells will there be after one hour?

A 3
B 8
C 12
D 16

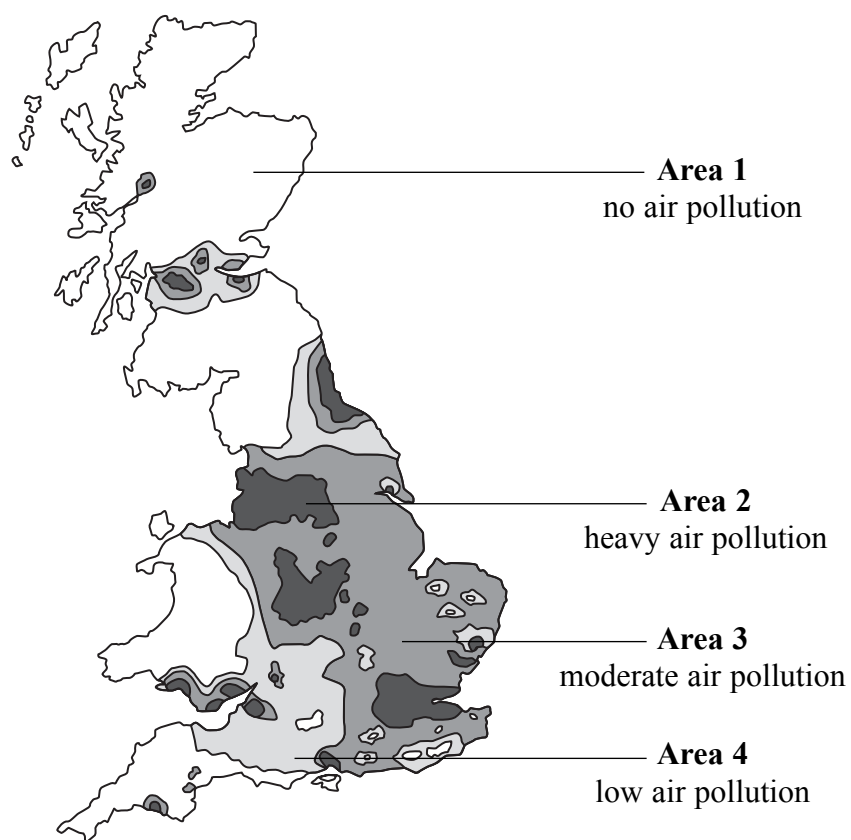
BLANK PAGE

Investigating pollution

Use the map and the table to answer questions 13 and 14.

Lichens are organisms made up of green algae and fungi. The green algae produce food by photosynthesis.

A lichen survey was carried out in Britain to indicate the amount of sulphur dioxide in the air. A map showing the results of the lichen survey is shown below.



The table shows different types of lichen and the amounts of sulphur dioxide they are able to tolerate.

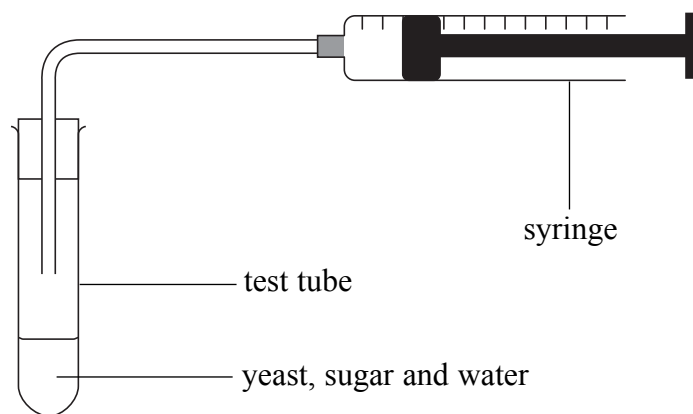
type of lichen	amount of sulphur dioxide in the air ($\mu\text{g}/\text{m}^3$)
no lichens	more than 170
some crusty lichens	not more than 160
orange leafy lichen	about 125
grey-green leafy lichen	about 70
shrubby lichen	between 10 and 35

13. Which type of lichen is most likely to be found in area 2?
- A shrubby
 - B grey-green leafy
 - C orange leafy
 - D crusty
14. A study was carried out on lichens in London.
In 1985, only crusty lichens were found.
By 2005, grey-green leafy lichens were also found.
By how many $\mu\text{g}/\text{m}^3$ had the sulphur dioxide fallen during this time in London?
- A 230
 - B 160
 - C 90
 - D 55
15. Algae share the food they make by photosynthesis with the fungi.
The fungi provide water and minerals for the algae.
This type of relationship is known as
- A competition
 - B interdependence
 - C predation
 - D conservation
16. Lichens can be used as living indicators to
- A monitor levels of pollution
 - B reduce levels of pollution
 - C detect the presence of lichens
 - D increase biodiversity

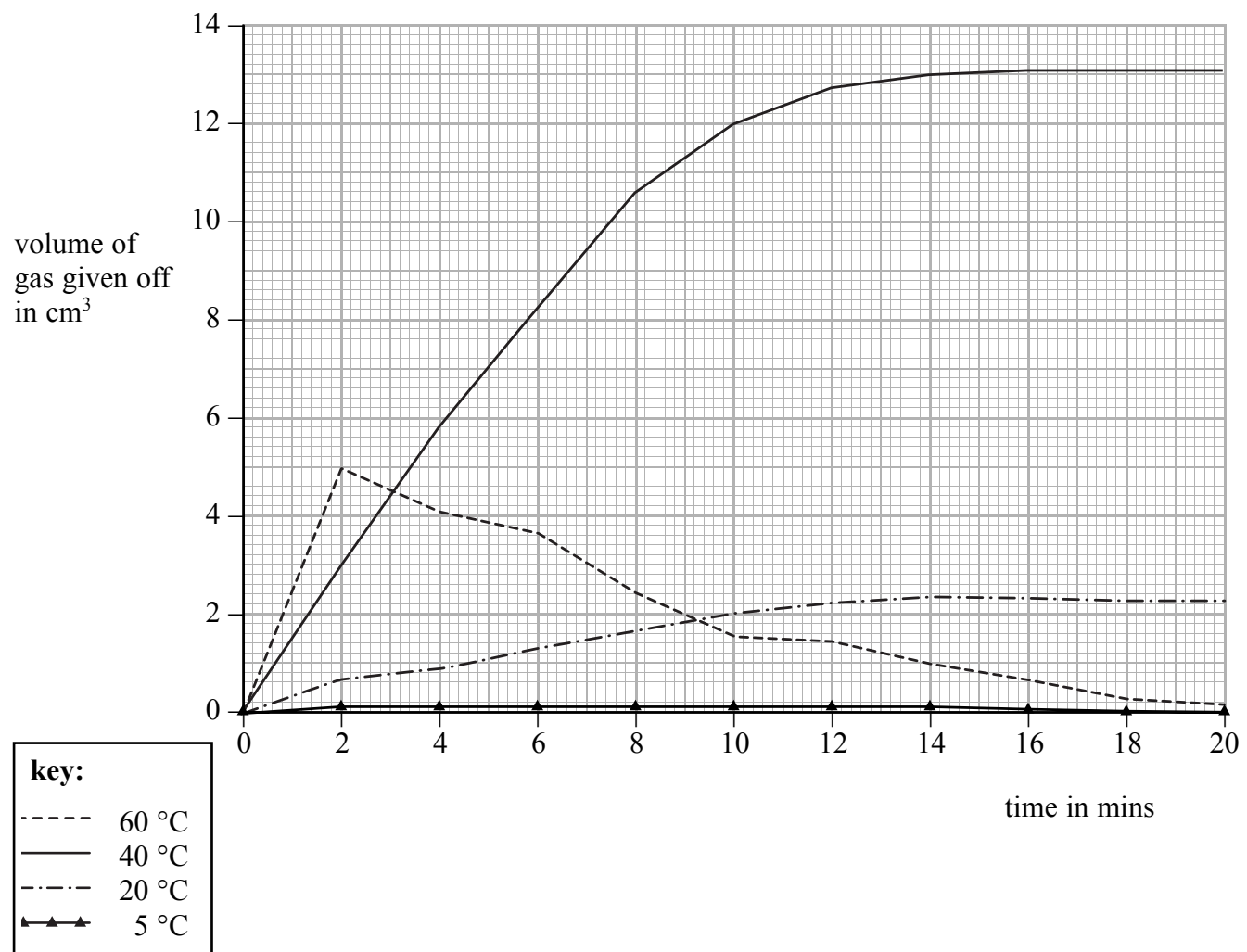
Higher tier candidates start at question 17 and answer questions 17 to 40.
 Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier

Microorganisms and food

Stacey was investigating the effect of four temperatures on yeast cells.
 The diagram below shows how she set up her investigation.



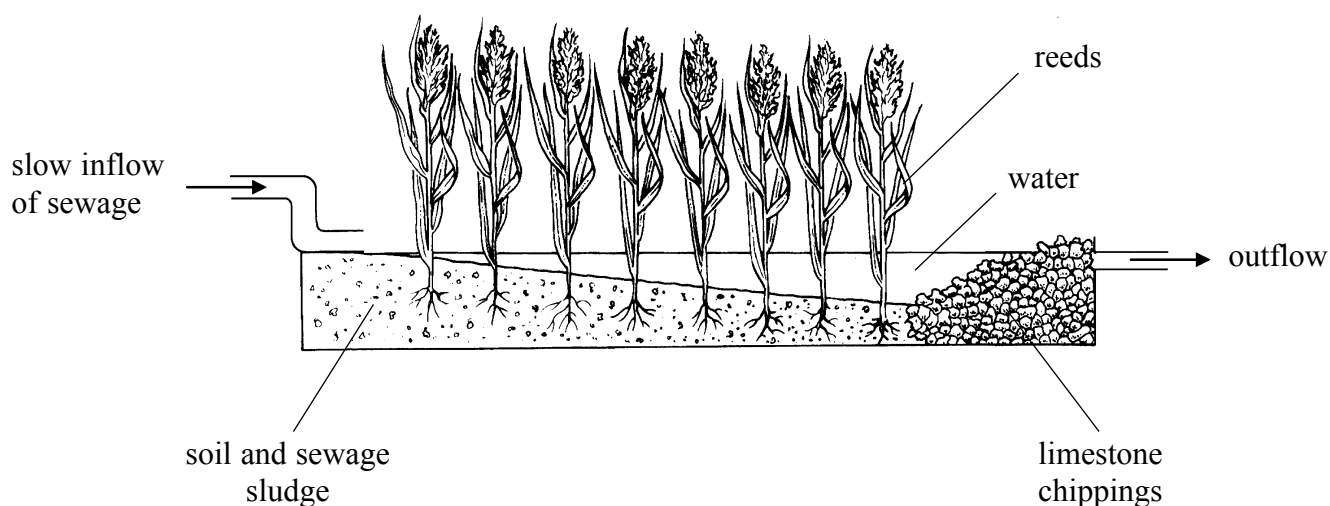
She measured the volume of gas given off at each temperature every 2 minutes for 20 minutes.
 Her results are shown in the graph.



17. At 2 minutes how much more gas did the yeast at 60 °C produce compared to the yeast at 40 °C?
- A 2 cm³
 - B 3 cm³
 - C 5 cm³
 - D 8 cm³
18. A likely reason for the line levelling off after 14 minutes at 40 °C is that
- A the yeast had used up most of the sugar
 - B the yeast had used up most of the gas
 - C the yeast were reproducing rapidly
 - D all of the yeast had died
19. The gas produced by the yeast during this fermentation reaction is
- A carbon monoxide
 - B oxygen
 - C nitrogen
 - D carbon dioxide
20. Stacey concluded that yeast breaks down sugar most quickly at 40 °C. This is **not** a valid conclusion because she
- A did not repeat the experiment 3 times
 - B used a syringe to measure the volume of gas given off
 - C carried out her experiment at only 4 temperatures
 - D carried out her test for only 20 minutes

Cleaning water

Water containing sewage can be treated using reed beds.
A diagram of how this is carried out is shown below.



The reeds absorb oxygen from the air and pass it through their roots into the water.
The bacteria in this water use the oxygen and break down the sewage.

21. Sewage contains a chemical called urea.
Urea is broken down to produce nitrates which are useful to the reeds.
Reeds use nitrates for
- A photosynthesis
 - B respiration
 - C transpiration
 - D growth
22. The reeds also release oxygen into the air.
The reeds produce oxygen by the process of
- A respiration
 - B photosynthesis
 - C decomposition
 - D eutrophication
23. The reeds grow in a dense layer.
This can prevent other water plants from growing between them.
The most likely reason for this is because the reeds prevent other plants from receiving
- A water
 - B oxygen
 - C sunlight
 - D minerals

24. As bacteria break down the sewage, nutrients are released.
These bacteria are

- A decomposers
- B denitrifying
- C nitrogen making
- D nitrogen fixing

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

Foundation tier candidates do not answer any more questions after question 24.

**Questions 25 to 40 must be answered by Higher tier candidates only.
Foundation tier candidates do not answer questions 25 to 40.**

Saving planet Earth

Since the start of the industrial revolution in the 18th century, vast amounts of the Earth's natural resources have been exploited.

This exploitation has seriously damaged the natural processes that occur on Earth.

25. How many of the statements are processes that will help to reduce environmental pollution?

- treating drinking water before consumption
- eating more locally produced food rather than imported food
- recycling waste materials such as plastics

- A** none
- B** one
- C** two
- D** three

26. Chlorofluorocarbons (CFCs) were used in aerosols and refrigerators.
CFCs cause

- A** skin cancer
- B** ozone depletion
- C** eutrophication
- D** acid rain

27. Which is an example of sustainable development?

- A** excessive use of fertilisers in order to increase crop yields
- B** a continued increase in the human population
- C** clearing forests for farming
- D** planting fast growing trees that are used to build new homes

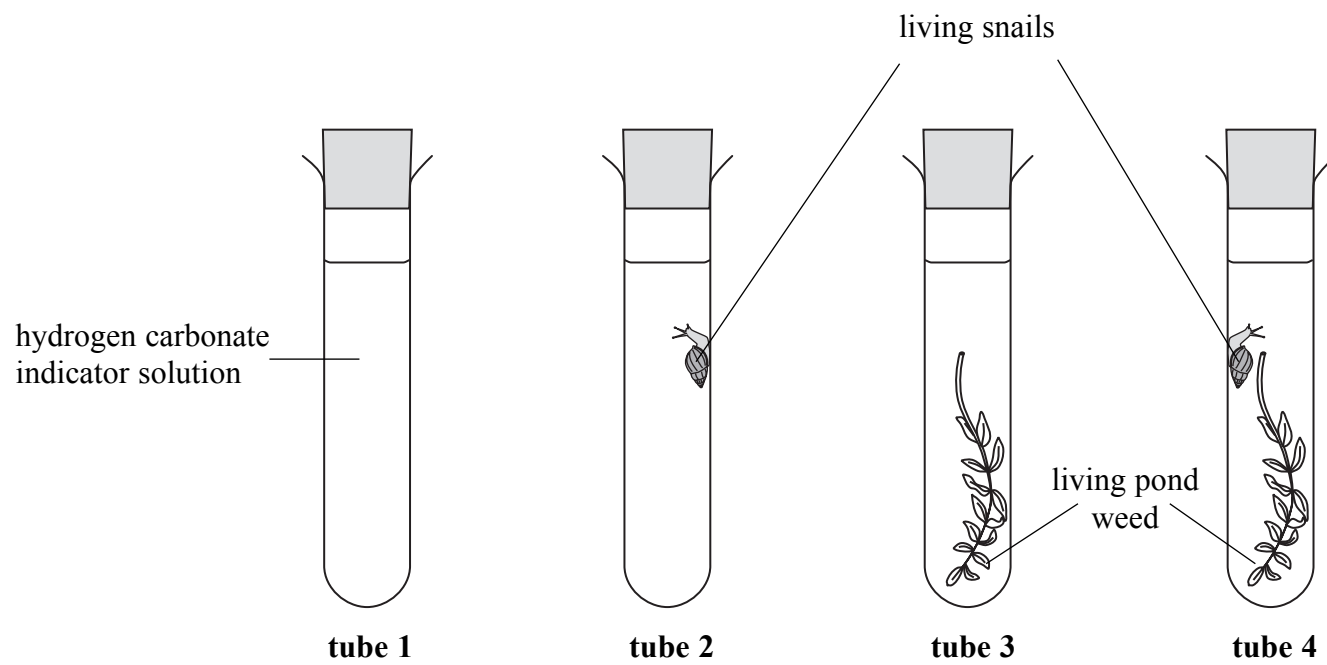
28. The burning of fossil fuels has increased significantly since the industrial revolution.

Which row of the table shows how the burning of fossil fuels is most likely to affect the environment?

	global biodiversity	global temperature
A	increase	increase
B	increase	decrease
C	decrease	decrease
D	decrease	increase

Exchanging gases

George was investigating gas exchange in pond plants and animals. He set up four test tubes in normal day light.



George used hydrogen carbonate indicator to show the concentration of carbon dioxide present in tubes 1 to 4.

The table shows the colour of the indicator in different concentrations of carbon dioxide.

concentration of carbon dioxide	colour of hydrogen carbonate indicator
low	purple
normal	orange-red
high	yellow

29. The hydrogen carbonate indicator in tube 2 turned yellow because
- A photosynthesis uses oxygen and increases the amount of carbon dioxide
 - B photosynthesis produces oxygen and reduces the amount of carbon dioxide
 - C respiration uses oxygen and increases the amount of carbon dioxide
 - D respiration produces oxygen and reduces the amount of carbon dioxide
30. The hydrogen carbonate indicator is most likely to remain orange-red in tubes
- A 1 and 3
 - B 1 and 4
 - C 2 and 3
 - D 3 and 4

- 31.** In humans gas exchange takes place in the lungs.
Inhalation moves air into the lungs.
Which row of the table shows the processes that occur during inhalation?

	volume inside chest cavity	movement of ribs
A	increases	down and in
B	decreases	up and out
C	increases	up and out
D	decreases	down and in

- 32.** The statements are about gas exchange and the carbon cycle.
- 1 Decomposers release carbon dioxide into the soil which plants absorb through their roots
 - 2 Plants and animals release carbon dioxide into the atmosphere during respiration

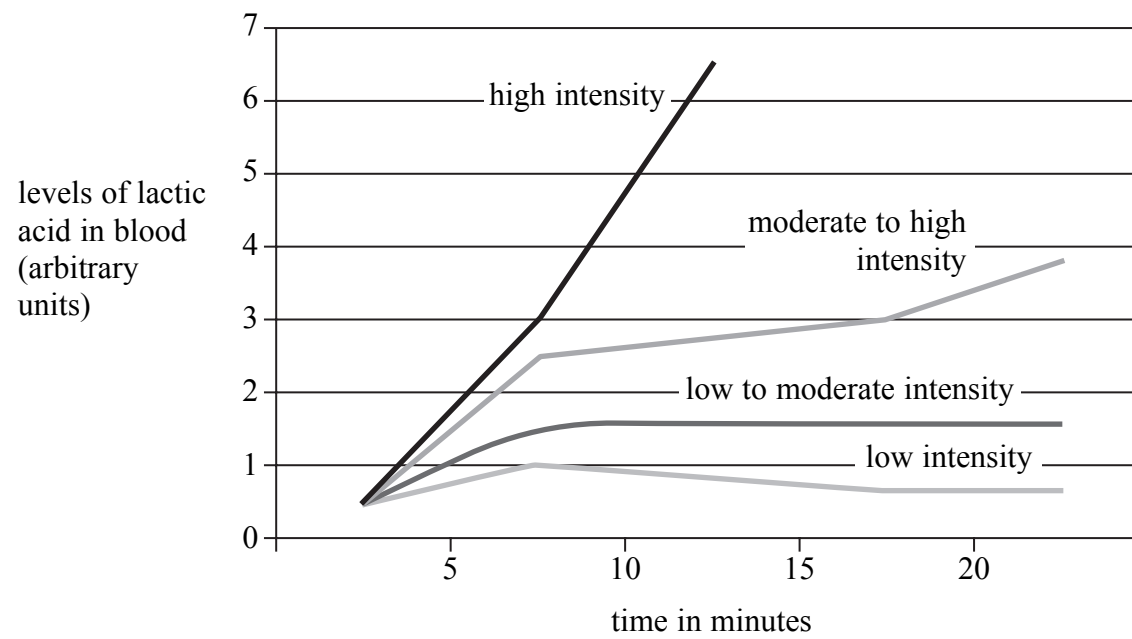
Which statements are true?

- A** none
B 1 only
C 2 only
D 1 and 2

Performance training

One type of sports training helps your muscles to work for longer before lactic acid levels in the body affect your performance.

The graph shows the levels of lactic acid in the blood with different exercise intensities.



33. During which exercise will muscles be carrying out mostly aerobic respiration?
- A high intensity
 - B moderate to high intensity
 - C low to moderate intensity
 - D low intensity
34. High intensity exercise has to stop at 12 minutes. The reason for this is because there is a lack of
- A carbon dioxide to change the lactic acid to oxygen
 - B carbon dioxide to change the lactic acid to glucose and water
 - C oxygen to change the lactic acid to glucose and carbon dioxide
 - D oxygen to change the lactic acid to carbon dioxide and water

35. Which row of the table shows the factors that affect the rate of diffusion of gases in the lungs?

	concentration of carbon dioxide in lungs	concentration of oxygen in blood	decrease in rate of respiration in muscles
A	no	no	yes
B	yes	yes	yes
C	yes	yes	no
D	yes	no	yes

36. During periods of high intensity exercise an oxygen debt accumulates in the body. This debt is a result of not receiving enough oxygen to
- A** make lactic acid
 - B** supply the increase in energy demand
 - C** drive anaerobic respiration
 - D** remove lactic acid from aerobic respiration

Cell division

37. Cell division is important for the growth and reproduction of species. There are two types of cell division. These are called mitosis and meiosis.

Which row of the table correctly shows the events that occur in **meiosis** only?

	occurs in reproductive organs	replaces damaged body cells	results in haploid nucleus
A	✓	✓	✓
B	✗	✓	✓
C	✓	✗	✗
D	✓	✗	✓

38. The ovaries contain cells that produce ova. The number of chromosomes in these cells that produce ova is
- A** the same as in ova
 - B** half the number in ova
 - C** double the number in ova
 - D** half the number in a body cell

39. Cloning is a technique that is used to produce identical organisms. Producing animal clones relies upon the transfer of a

- A** haploid nucleus from an ova to a body cell
- B** diploid nucleus from an ova to a body cell
- C** haploid nucleus from a body cell to an ova
- D** diploid nucleus from a body cell to an ova

40. The statements are about processes that occur in animal cells during protein synthesis.

- DNA is transcribed into mRNA in the cytoplasm only
- ribosomes translate mRNA into amino acids
- ribosomes transcribe the triplet code on mRNA to tRNA

How many are true?

- A** none
- B** one
- C** two
- D** three

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END