

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

Wednesday 18 November 2009 – 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.

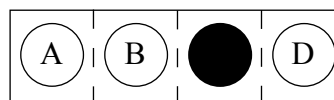
### **Before the test begins:**

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.

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*Turn over*

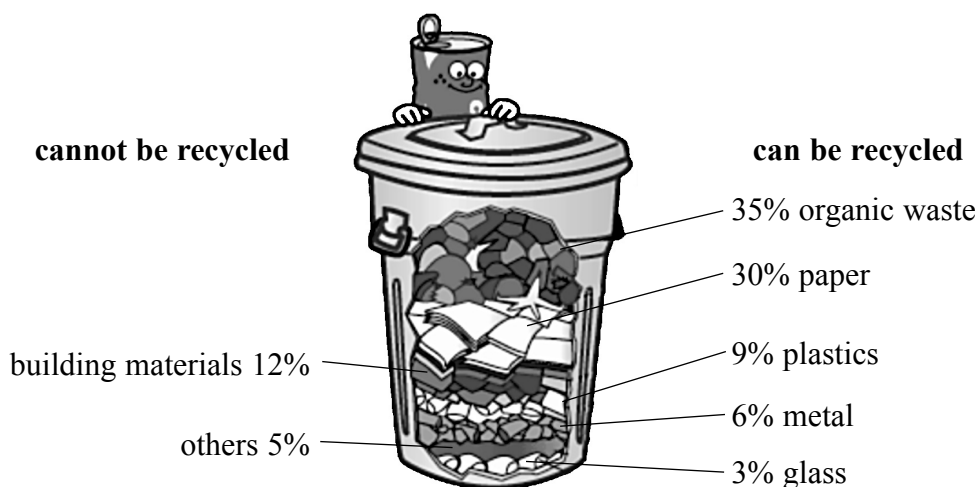
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Questions 1 to 16 must be answered by Foundation tier candidates only.  
Higher tier candidates start at question 17.

### Recycling



1. What percentage of the contents of this bin cannot be recycled?  
**A** 5%  
**B** 12%  
**C** 17%  
**D** 83%
2. Bacteria break down organic waste such as grass cuttings to form compost. This process is called  
**A** conservation  
**B** decomposition  
**C** photosynthesis  
**D** combustion
3. When glass and plastics are recycled the demand for natural resources is  
**A** increased  
**B** decreased  
**C** unaffected  
**D** completely removed
4. Paper can be burned rather than recycling it. One environmental problem associated with burning paper is that  
**A** nitrogen levels in soil increase  
**B** sulphur dioxide levels in water increase  
**C** carbon dioxide levels in air increase  
**D** oxygen levels in air increase

## Exercise is good for you

A doctor advised Krishna to increase his amount of exercise. Krishna measured his heart rate while on a rowing machine. The results are shown in the table.

<b>time (seconds)</b>	0	10	20	30	40	50	60	70	80	90	100
<b>heart rate (b.p.m.)</b>	72	74	76	77	84	88	90	99	165	105	119

5. Which result is most likely to be anomalous?
- A heart rate at 0 seconds
  - B heart rate at 30 seconds
  - C heart rate at 80 seconds
  - D heart rate at 100 seconds
6. Krishna used a heart rate monitor rather than taking his pulse because the heart rate monitor
- A gave inaccurate results
  - B repeated the results for him
  - C was a more accurate way of measuring
  - D increased his heart rate gradually
7. When you exercise, your
- A heart rate slows
  - B breathing rate slows
  - C muscle cells need more carbon dioxide
  - D muscle cells need more oxygen
8. Energy is needed for exercise. Most of this energy is released from
- A glucose
  - B oxygen
  - C lactic acid
  - D carbon dioxide

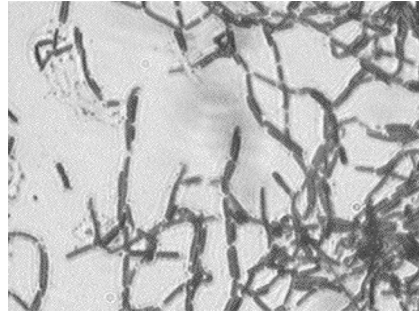
## Breakthrough in stem cell research

**Surgeons in Spain have carried out the world's first whole organ transplant using a windpipe grown from the patient's own stem cells.**

9. Stem cells can grow into different organs because stem cells
- A can differentiate into any type of cell
  - B are genetically identical
  - C always grow to produce a windpipe
  - D are rejected by the donor
10. There are **fewer** ethical concerns with the transplant of this organ because
- A the transplant took place in Spain
  - B the transplant was rejected
  - C stem cells from embryos were used
  - D the patient's own stem cells were used
11. The DNA in the nucleus of a stem cell is
- A a single strand with single bases
  - B a double helix with paired bases
  - C a single strand with paired bases
  - D a double helix with single bases
12. How many different types of base are in a DNA molecule?
- A 2
  - B 3
  - C 4
  - D 5

## Bacterial cells

The image shows bacterial cells seen through a light microscope.



13. Scientists use microscopes to see bacterial cells.  
These images seen with the microscope are
- A more detailed and more clear
  - B more detailed but less clear
  - C less detailed but more clear
  - D less detailed and less clear
14. A bacterial cell has some similar structures to an animal cell.  
These structures are
- A a cell wall and cytoplasm
  - B a cell membrane and chloroplasts
  - C a cell wall and chloroplasts
  - D a cell membrane and cytoplasm
15. Bacterial cells carry genetic information on a DNA ring.  
Mammals have DNA which form
- A a single helix
  - B genes
  - C amino acids
  - D chlorophyll
16. Bacterial cells produce carbon dioxide during
- A combustion
  - B photosynthesis
  - C ventilation
  - D respiration

**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.**

**Birds and climate change**

Scientists are researching how climate change is affecting bird populations.

17. The bird populations in this research are

- A living indicators
- B non-living indicators
- C human indicators
- D affecting climate change

18. Pollutants in air and water have caused problems for birds.  
Which row of the table is correct for air and water pollutants?

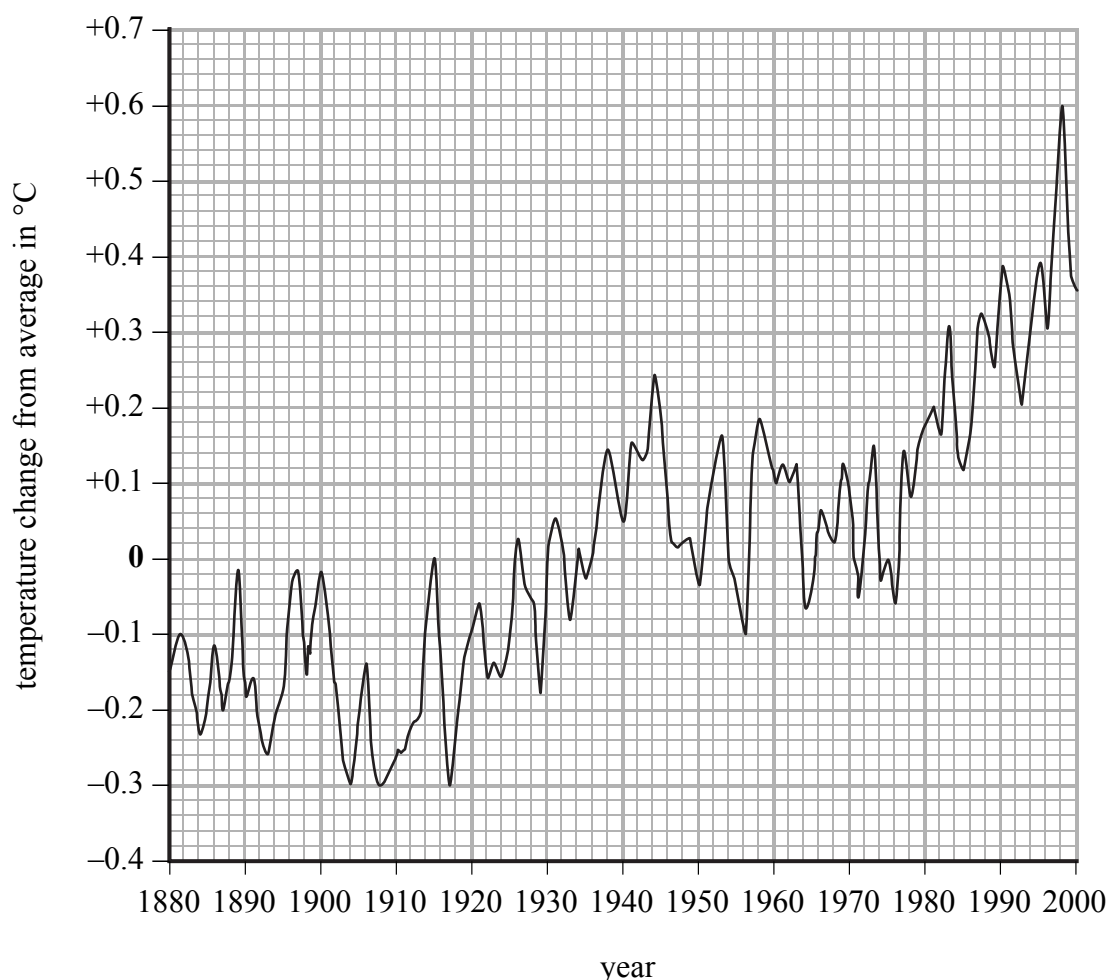
	<b>air pollutant</b>	<b>water pollutant</b>
<b>A</b>	sulphur dioxide	nitrates
<b>B</b>	sulphur dioxide	carbon monoxide
<b>C</b>	nitrates	carbon dioxide
<b>D</b>	nitrates	sewage

Use this graph to answer questions 19 and 20.

The graph shows how global temperatures have risen or fallen in relation to the average global temperature.

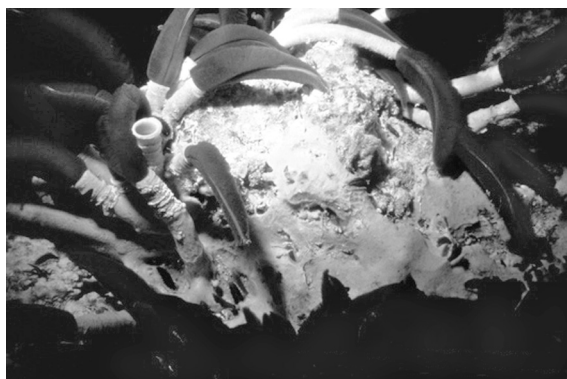
This average temperature is shown as zero on the graph.

global temperature changes (1880–2000)



19. Which statement is true about this graph?
- A The lowest temperature was  $-0.3\text{ }^{\circ}\text{C}$  in between 1905 and 1918
  - B The highest temperature was  $+0.6\text{ }^{\circ}\text{C}$  in 1996
  - C The maximum temperature difference across all years was  $0.5\text{ }^{\circ}\text{C}$
  - D The temperature in 2000 was  $0.5\text{ }^{\circ}\text{C}$  warmer than in 1880
20. Many scientists believe that the trend in increasing global temperatures is a result of the
- A human population decreasing and less carbon dioxide being produced
  - B human population increasing and less carbon dioxide being produced
  - C human population decreasing and more carbon dioxide being produced
  - D human population increasing and more carbon dioxide being produced

## Tube worms and hydrothermal vents



C Van Dover/Science Photo Library

Tube worms can grow to 2 m in length and live near hydrothermal vents. They have no eyes, no mouth, no stomach and live off chemosynthetic bacteria. These bacteria break down hydrogen sulphide and provide nutrition for the tube worms.

21. The characteristics of tube worms enable them to live in hydrothermal vents. These characteristics are examples of

- A competition
- B conservation
- C adaptation
- D regeneration

22. Vent shrimps feed on tube worms and each other. Which row of the table is correct for tube worms?

	tube worms		
	are predators of vent shrimps	are dependent on chemosynthetic bacteria	compete with vent shrimps for food
A	yes	yes	yes
B	no	yes	no
C	yes	no	yes
D	no	no	no

23. Conditions in hydrothermal vents are

- A high pressure and high light intensity
- B low pressure and high light intensity
- C low pressure and very low light intensity
- D high pressure and very low light intensity

24. An American scientist placed a sample of food near a hydrothermal vent and a year later it was in almost the same condition.  
The most likely reason for the food decomposing very slowly is
- A lack of hydrogen sulphide
  - B lack of chemosynthetic bacteria
  - C lack of oxygen
  - D lack of predators

**TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS**

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**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.**

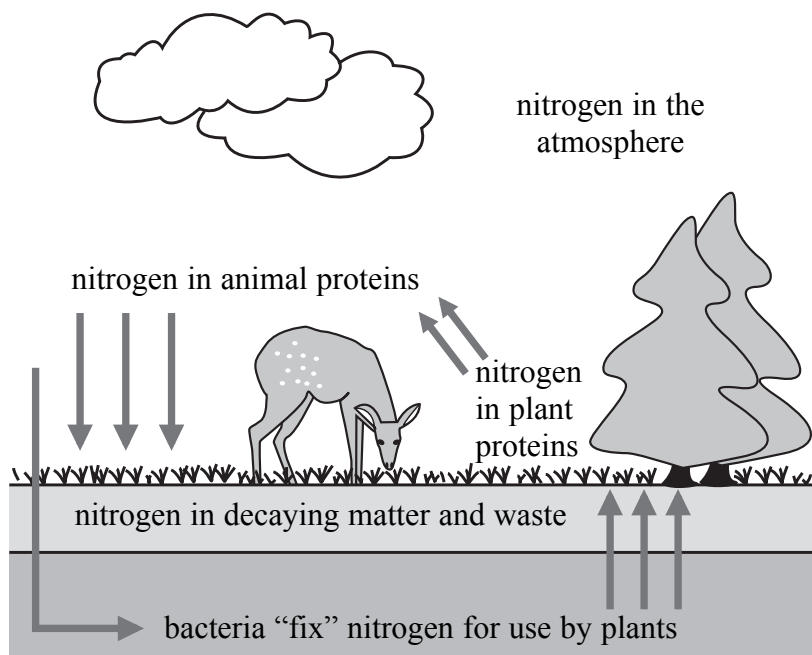
### **Entomologists buzzing about vanishing bee populations**

Entomologists are studying the reasons behind the enormous drop in the bee populations in Britain. They call this drop in bee populations ‘colony collapse disorder’.  
If they cannot find a solution, then there may be an 80% drop in fruit and vegetable crops.

25. This ‘colony collapse disorder’ may be due to global warming.  
A result of this ‘colony collapse disorder’ would be
- A an increase in the predation of bees by flowers
  - B a decrease in the competition between bees for resources
  - C an increase in biodiversity in the environment
  - D a decrease in global warming
26. Many fruit farmers bring bees in to pollinate their flowers to enable seed or fruit production.  
Farmers do this in order to
- A decrease the number of insects
  - B reduce the need for crop rotation
  - C maximise crop yields
  - D reduce the need for chemical fertilisers
27. Bees pollinate crop flowers and collect nectar from the flowers.  
This relationship is an example of
- A adaptation
  - B competition
  - C interdependence
  - D predation
28. Farmers can use chemicals to help plants to form fruit.  
These chemicals are
- A enzymes called auxins
  - B hormones called auxins
  - C hormones called steroids
  - D enzymes called steroids

## The nitrogen cycle

Use this diagram to answer questions 29 and 30.



29. What is the name of the organisms that help break down decaying matter?
- A denitrifying bacteria
  - B decomposer bacteria
  - C nitrifying bacteria
  - D nitrogen fixing bacteria
30. Which row of the table is correct for the removal of nitrogen from the atmosphere?

	nitrogen can be removed from the atmosphere by		
	lightning	nitrifying bacteria	nitrogen fixing bacteria
<b>A</b>	yes	no	yes
<b>B</b>	no	yes	no
<b>C</b>	no	yes	yes
<b>D</b>	yes	no	no

31. Plants need nitrogen in the form of nitrates for healthy growth. Which other compounds must be absorbed for the healthy growth of plants in sunlight?
- A oxygen and glucose
  - B glucose and carbon dioxide
  - C carbon dioxide and water
  - D water and glucose

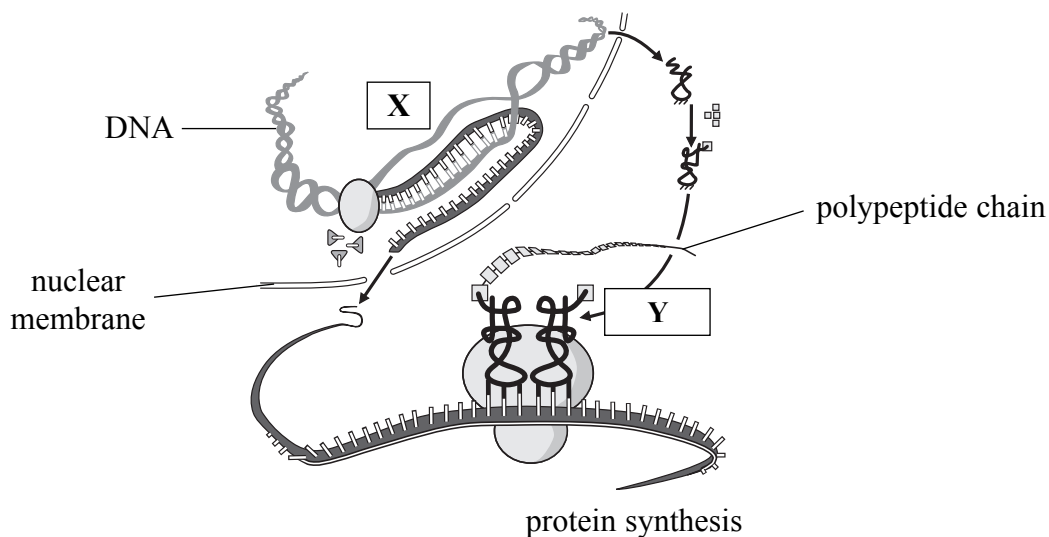
32. Nitrate fertilisers are added to plants to promote healthy growth.  
What is an environmental problem caused by the overuse of nitrate fertilisers?
- A global warming
  - B deforestation
  - C eutrophication
  - D conservation

**Newly discovered protein could remove the threat of anthrax**

Anthrax can be used in biological warfare.  
A new protein called PlyPH can get inside an anthrax bacterium and cause it to burst.  
PlyPH can be manufactured by inserting the gene which codes for it into a different bacterium.

33. This manufacturing process is an example of
- A selective breeding
  - B genetic modification
  - C regeneration
  - D artificial selection

34. The diagram shows the organelles involved in making a new protein.



What processes are happening at X and Y?

	X	Y
A	translation	transcription
B	replication	translation
C	transcription	replication
D	transcription	translation

35. At the ribosome
- A mRNA codes for amino acids using a triplet code
  - B tRNA codes for amino acids using a triplet code
  - C mRNA codes for amino acids using a binary code
  - D tRNA codes for amino acids using a binary code

36. Polypeptides are formed by
- A linking proteins
  - B linking amino acids
  - C breaking mRNA into triplet codes
  - D breaking codons into anticodons

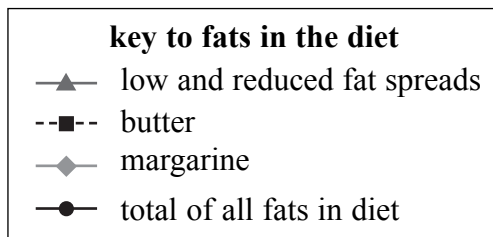
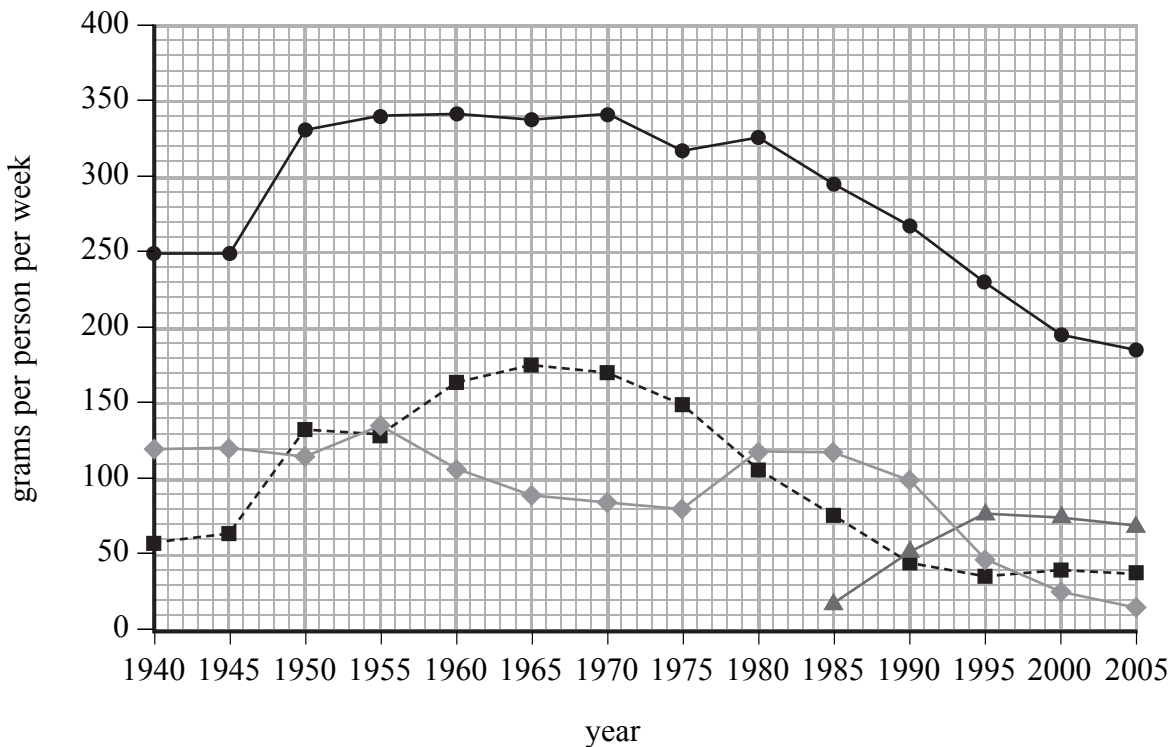
## Eating trends in Britain

The government has monitored the intake of certain foods by people in Britain over the past 70 years.

37. The current health advice is to reduce the intake of high energy foods and to take more exercise.

What is the most likely reason for this current advice being given?

- A a balanced diet combined with plenty of exercise is not beneficial to health
- B a high fat diet combined with plenty of exercise is beneficial to health
- C a high fat diet combined with no exercise will cause weight gain
- D a balanced diet with no exercise will cause weight loss



38. The data on the graph indicates that

- A there was a decrease in the intake of each fat between 1940 and 2005
- B the intake of butter was at its lowest in 1940 and highest in 1970
- C the amount of total fats consumed has steadily decreased since 1940
- D from 1956 to 1978 butter was the most popular type of fat eaten

39. When you exercise, muscles get most energy from

- A anaerobic respiration using glucose and oxygen
- B anaerobic respiration producing glucose
- C aerobic respiration using glucose and oxygen
- D aerobic respiration producing oxygen

40. These are three statements about the effect of vigorous exercise on respiration.

- 1 Anaerobic respiration can cause a build up of lactic acid if there is enough oxygen
- 2 Lactic acid can be converted to carbon dioxide and water if there is enough oxygen
- 3 The build up of lactic acid in the muscles can cause cramp which needs extra carbon dioxide to relieve it

Which are **not** true?

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

**TOTAL FOR HIGHER TIER PAPER: 24 MARKS**

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