

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 3 March 2011 – 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.

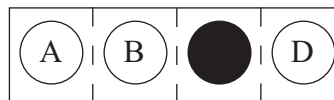
Before the test begins:

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.

P38652A



P 3 8 6 5 2 A

Turn over

W850/R1536/57570 1/1/1/1/1

This publication may be reproduced only in accordance with Edexcel Limited copyright policy. ©2011 Edexcel Limited.

edexcel 
advancing learning, changing lives

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

Living in the Arctic

Polar bears have thick fur, small ears and wide, flat feet.
These features help the polar bear to survive in cold Arctic temperatures.



1. What name is given to the features that help the polar bear to survive in the Arctic?

A indicators
B adaptations
C genetic modifications
D organelles

2. Polar bears hunt seals for food.
Animals that feed in this way are called

A predators
B prey
C herbivores
D competitors

3. In 2007, the Arctic ice cap shrank by more than one million square kilometres.
The most likely cause of this is

A acid rain
B conservation
C reforestation
D global warming

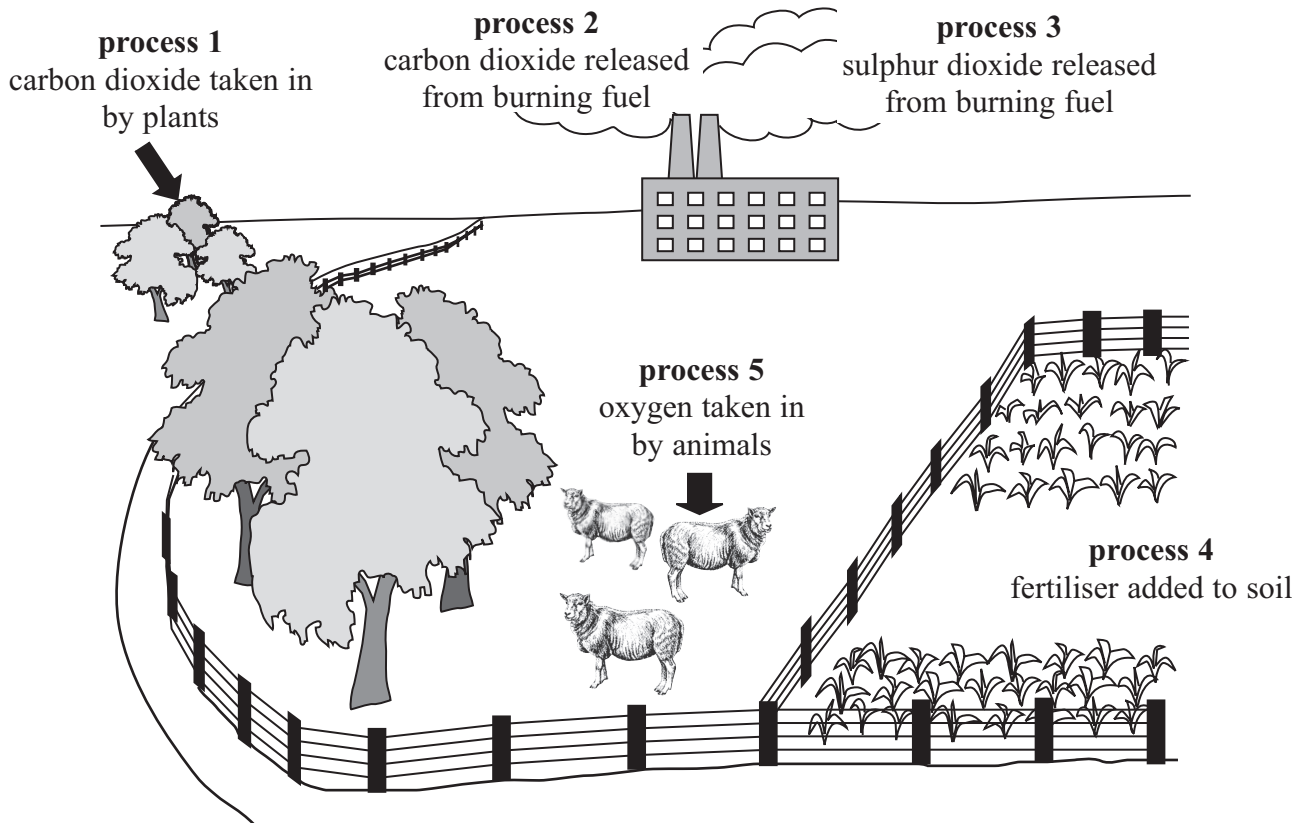
4. The ice cap is still shrinking.
This is likely to cause

A the number of polar bears to increase
B the number of polar bears to decrease
C no change in the number of polar bears
D the polar bears to reproduce

A small community

Use the information in the diagram to answer questions 5 to 7.

The diagram shows five processes that occur in part of a small community.

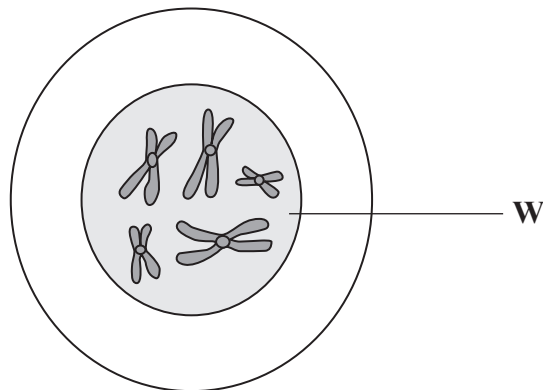


5. Which process might cause acid rain?
- A process 1
 - B process 3
 - C process 4
 - D process 5
6. Which process reduces the amount of greenhouse gas in the air?
- A process 1
 - B process 2
 - C process 3
 - D process 5
7. Which process could lead to eutrophication?
- A process 1
 - B process 2
 - C process 4
 - D process 5

8. The types of lichen that grow on trees near to the power station can be used to indicate air quality.
Lichens that are used in this way are known as
- A universal indicators
 - B carbon indicators
 - C living indicators
 - D non-living indicators

Cells and genes

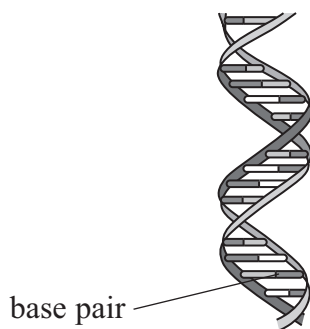
9. The diagram shows an animal cell.



Name part **W**.

- A cell membrane
 - B cytoplasm
 - C nucleus
 - D gene
10. The cell membrane
- A controls the activities of the cell
 - B allows substances to enter and exit the cell
 - C absorbs sunlight for photosynthesis
 - D is where all chemical reactions take place

11. The diagram shows part of a DNA molecule.
The bases shown on the diagram occur in pairs.



Which row of the table shows how bases are paired in DNA?

	A pairs with	C pairs with
A	T	A
B	C	G
C	T	G
D	G	T

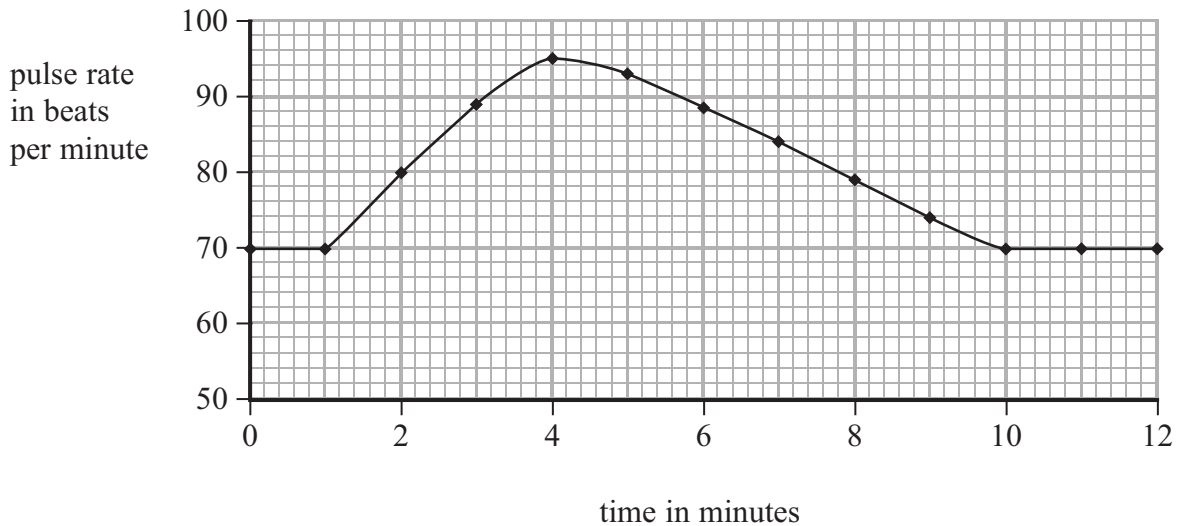
12. Genes contain instructions for cells to make

- A amino acids
- B proteins
- C glucose
- D energy

Keeping fit

Use the graph to answer questions 13 and 14.

Matthew used a pulse rate monitor to measure his pulse rate before, during and after exercise. The graph shows his results.



13. Matthew exercised at a constant rate.
For how many minutes did Matthew exercise?
- A 1
 - B 3
 - C 9
 - D 10
14. During his exercise, Matthew's pulse rate increased by a maximum of
- A 15 beats per minute
 - B 25 beats per minute
 - C 70 beats per minute
 - D 95 beats per minute
15. Matthew's muscles respire aerobically.
To respire aerobically, Matthew's muscles need
- A glucose and carbon dioxide
 - B water and carbon dioxide
 - C oxygen and lactic acid
 - D glucose and oxygen

16. Some athletes have taken steroid hormones to improve their performance. Which row of the table shows the side effects of steroid hormones in women?

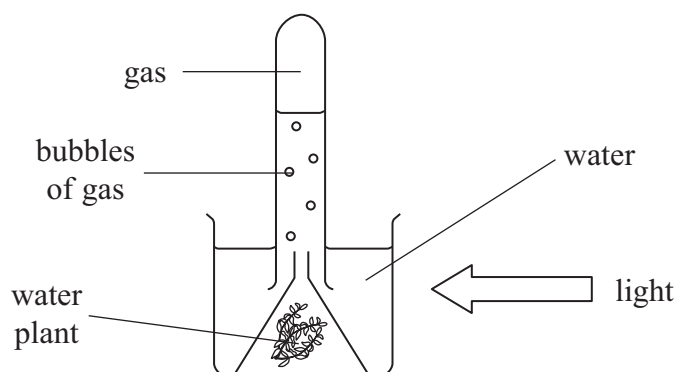
	deepening of voice	growth of facial hair
A	no	yes
B	yes	yes
C	no	no
D	yes	no

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.

Investigating photosynthesis

Use the information to answer questions 17, 18 and 19.

Sally was investigating how light intensity affects the rate of photosynthesis. She placed a lamp at different distances from a water plant and recorded the number of gas bubbles released by the plant.



Sally's results are shown in the table.

distance of lamp from water plant (cm)	number of gas bubbles released by water plant per minute
50	6
40	10
30	14
20	17
10	18

17. Which is a correct conclusion for this experiment?
As the distance from the lamp to the water plant
- A increases, the rate of photosynthesis increases
 - B decreases, the rate of photosynthesis increases
 - C decreases, the rate of photosynthesis decreases
 - D increases, the rate of photosynthesis stays the same
18. The gas bubbles released by the water plant contain mainly
- A carbon dioxide
 - B nitrogen
 - C oxygen
 - D methane

19. For photosynthesis, the water plant absorbs

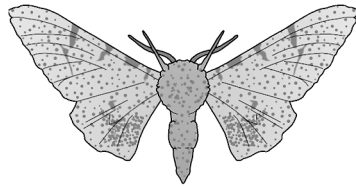
- A nitrates from the air
- B hormones from the water
- C oxygen from the air
- D carbon dioxide from the water

20. The main site for photosynthesis is the

- A vacuole
- B chloroplast
- C cytoplasm
- D nucleus

Monitoring pollution

21. In 1955, a scientist released some light and some dark moths in Dorset, which had low levels of pollution and in Birmingham, which had high levels of pollution. Both types of moth are eaten by birds and rest on trees. In Birmingham, the trees were darkened by the pollution.



light coloured
moth



dark coloured
moth

Later, the moths were recaptured and counted. The results of the experiment are shown in the table.

area		light moths	dark moths
Dorset (low pollution)	number of moths released	496	473
	number of moths recaptured	62	30
	percentage of moths recaptured	12.5	6.3
Birmingham (high pollution)	number of moths released	437	447
	number of moths recaptured	18	123
	percentage of moths recaptured	4.1	27.5

The data shows that

- A** the greater the number of any moths released, the greater the number recaptured
- B** a greater percentage of moths were recaptured in Dorset compared to Birmingham
- C** a greater number of dark moths were recaptured in Birmingham than in Dorset
- D** a greater percentage of light moths were recaptured overall than dark moths

22. The trees near Birmingham are no longer darkened by pollution. This has resulted in an increase in the number of light coloured moths. The main reason for this increase is that the
- A light coloured moths no longer have any predators
 - B light coloured moths are more likely to be seen by predators
 - C light coloured moths are less likely to be seen by predators
 - D light coloured moths are now more likely to find food
23. Cities such as Birmingham have laws which prevent people from destroying trees. Protecting trees in this way is known as
- A conservation
 - B replacement planting
 - C coppicing
 - D reforestation
24. Pollution can be caused by burning fossil fuels. Which row of the table shows how the burning of fossil fuels is most likely to affect the environment?

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

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

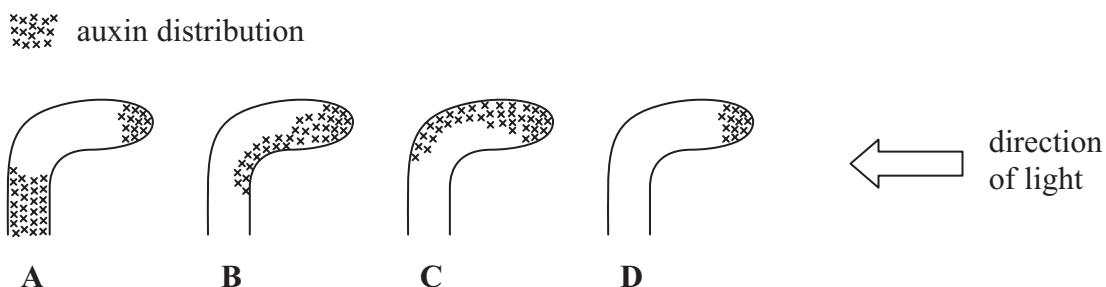
Foundation tier candidates do not answer any more questions after question 24.

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

Growth

25. Plant hormones are widely used in the commercial production of plants.
Auxins are hormones found in the growing shoots of plants.

Which diagram shows how auxins are distributed in plant shoots in response to light?



26. Auxins cause plant cells to

- A divide only
- B elongate only
- C elongate and divide only
- D elongate, divide and differentiate

27. A lack of chlorophyll causes leaves to turn yellow.
Which mineral is most likely to be deficient in a plant with yellow leaves due to low levels of chlorophyll?

- A nitrates
- B magnesium
- C potassium
- D phosphates

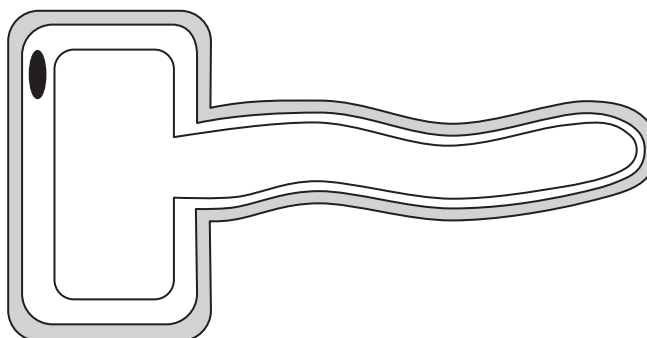
28. Stem cells are important for growth and development.
Which of these statements are true for embryonic stem cells?

- 1 they have no Hayflick limit
- 2 they can differentiate into any cell type
- 3 they divide by meiosis only

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

Root hair cells

The diagram shows a root hair cell from a plant.
Root hair cells absorb water and minerals from the soil.



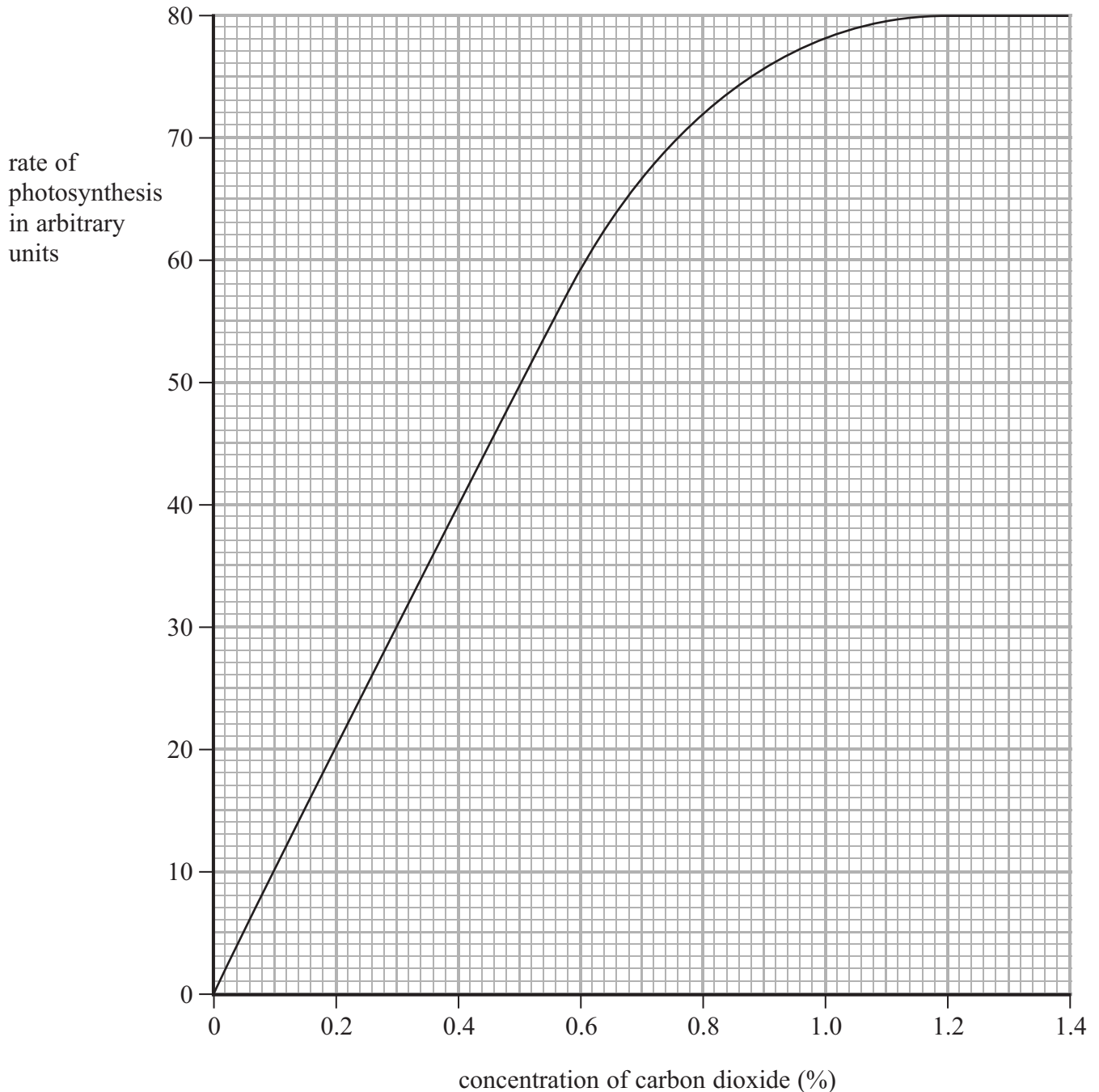
29. The root hair cell absorbs mineral ions from the soil against the concentration gradient by
- A active transport
 - B diffusion
 - C respiration
 - D transpiration
30. Root hair cells absorb water by osmosis.
Osmosis is the movement of water
- A down a concentration gradient of water through a fully permeable membrane
 - B against a concentration gradient of water through a fully permeable membrane
 - C down a concentration gradient of water through a partially permeable membrane
 - D against a concentration gradient of water through a partially permeable membrane
31. Which row of the table shows the vessels that transport water to the leaves and the vessels that distribute sugars to different parts of the plant?

	water transported to leaves by	sugar distributed to different parts of the plant by
A	xylem vessels	xylem vessels
B	xylem vessels	phloem vessels
C	phloem vessels	xylem vessels
D	phloem vessels	phloem vessels

Investigating photosynthesis

Use the graph to answer questions 32 and 33.

The graph shows the effect of increasing the amount of carbon dioxide on rate of photosynthesis.



32. The graph shows that the rate of photosynthesis

- A remains constant as carbon dioxide concentration increases between 0.2% and 1.2%
- B increases most rapidly between 0.2% and 0.6% carbon dioxide
- C increases most rapidly between 0.6% and 1.0% carbon dioxide
- D decreases between 1.1% and 1.3% carbon dioxide

33. What is the most likely reason for the shape of the graph between 1.1% and 1.3% carbon dioxide concentration?
- A carbon dioxide has become a limiting factor
 - B light has become a limiting factor
 - C the pondweed was placed in darkness and could not photosynthesise
 - D the pondweed was respiring faster than it was photosynthesising

34. Plants can be grown in greenhouses to maximise their rate of photosynthesis. Which of these statements about growing plants in greenhouses are true?
- 1 carbon dioxide concentration inside greenhouses can be controlled to increase crop yield
 - 2 temperature inside greenhouses can be controlled to increase crop yield
- A none
 - B 1 only
 - C 2 only
 - D both 1 and 2

35. Fertilisers containing ammonium salts can be added to soil to help plants grow. Ammonium salts are changed to nitrates by soil bacteria. Which soil bacteria change ammonium salts to nitrates?
- A nitrogen-fixing bacteria
 - B nitrifying bacteria
 - C denitrifying bacteria
 - D decomposer bacteria

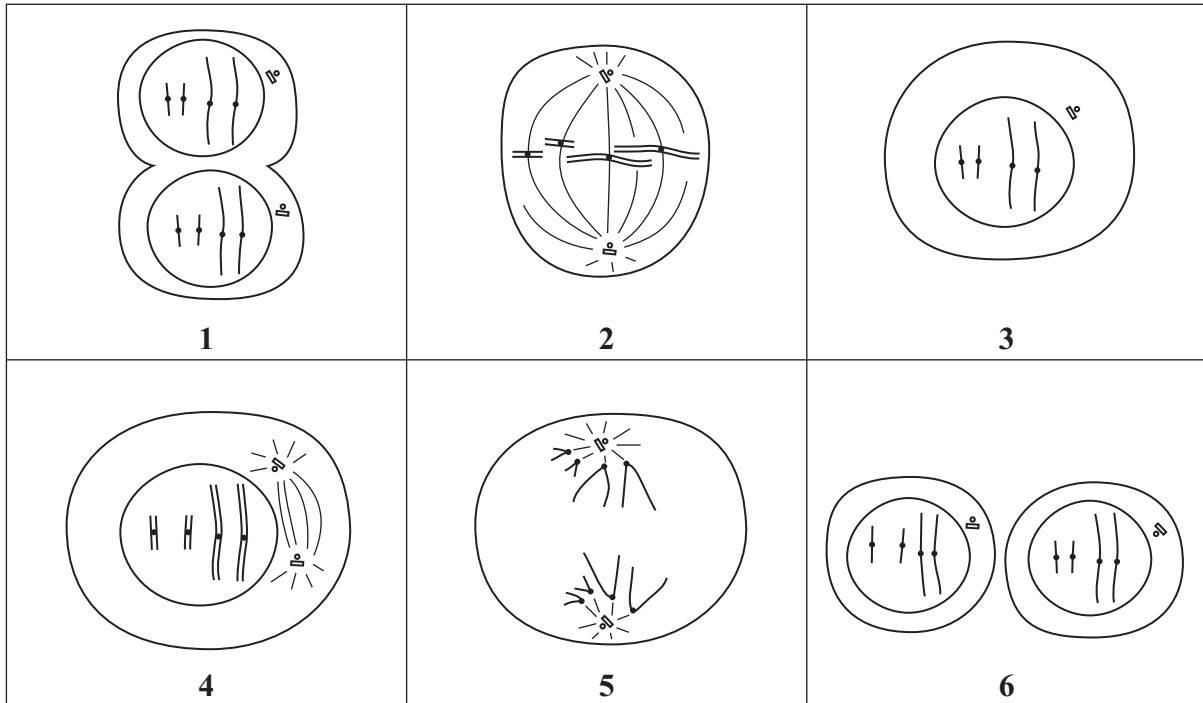
36. Which row of the table is correct for the removal of nitrogen from the atmosphere?

nitrogen can be removed from the atmosphere by			
	lightning	nitrifying bacteria	denitrifying bacteria
A	yes	no	yes
B	no	yes	no
C	no	yes	yes
D	yes	no	no

Cell division

Use the diagrams to answer questions 37 and 38.

The diagrams show the stages involved in mitosis in an animal cell.
The stages are not in the correct order.



37. What is the correct order of stages for mitosis?

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

38. What is the evidence that the animal cell is dividing by mitosis?

- A a haploid cell divides to form two diploid cells
- B a diploid cell divides to form two haploid cells
- C a haploid cell divides to form two haploid cells
- D a diploid cell divides to form two diploid cells

39. Cells must produce proteins before they can divide.
Which row of the table is correct for protein synthesis?

	molecule transcribed from	molecule translated from	DNA is duplicated
A	mRNA	tRNA	yes
B	DNA	mRNA	no
C	tRNA	DNA	yes
D	DNA	tRNA	no

40. Proteins for use in humans can be produced by bacteria.
Which of these statements about the production of proteins by bacteria are true?

- 1 plasmids are used to transfer amino acids into bacterial cells
- 2 the DNA molecule is taken to the ribosome to form protein

- A** 1 only
B 2 only
C both 1 and 2
D neither 1 nor 2

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END

BLANK PAGE

BLANK PAGE

BLANK PAGE