

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

Friday 12 June 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.

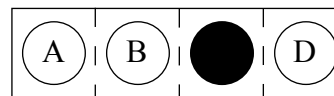
Before the test begins:

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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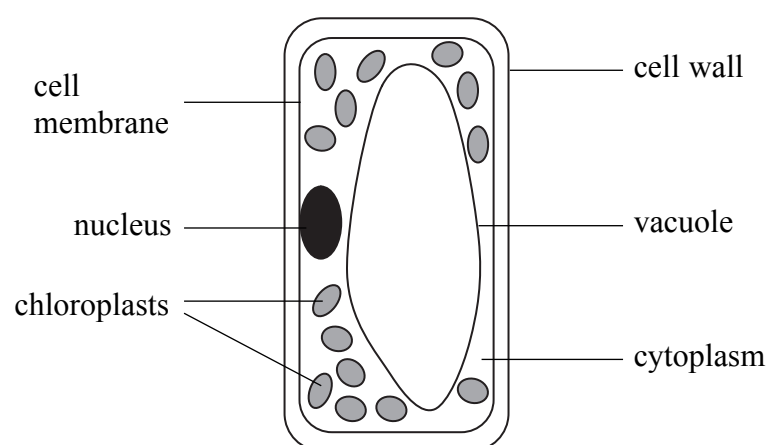
Turn over

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

Working cells

The diagram below shows a cell that is found in the leaf of a plant



1. Which structure on the diagram contains DNA?

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

2. Which is a reactant for photosynthesis?

- A water
- B sugar
- C oxygen
- D protein

3. Which row of the table gives the words to correctly complete the sentences?

Light energy is absorbed by a green chemical called1.....

This energy is used to help make2..... for respiration.

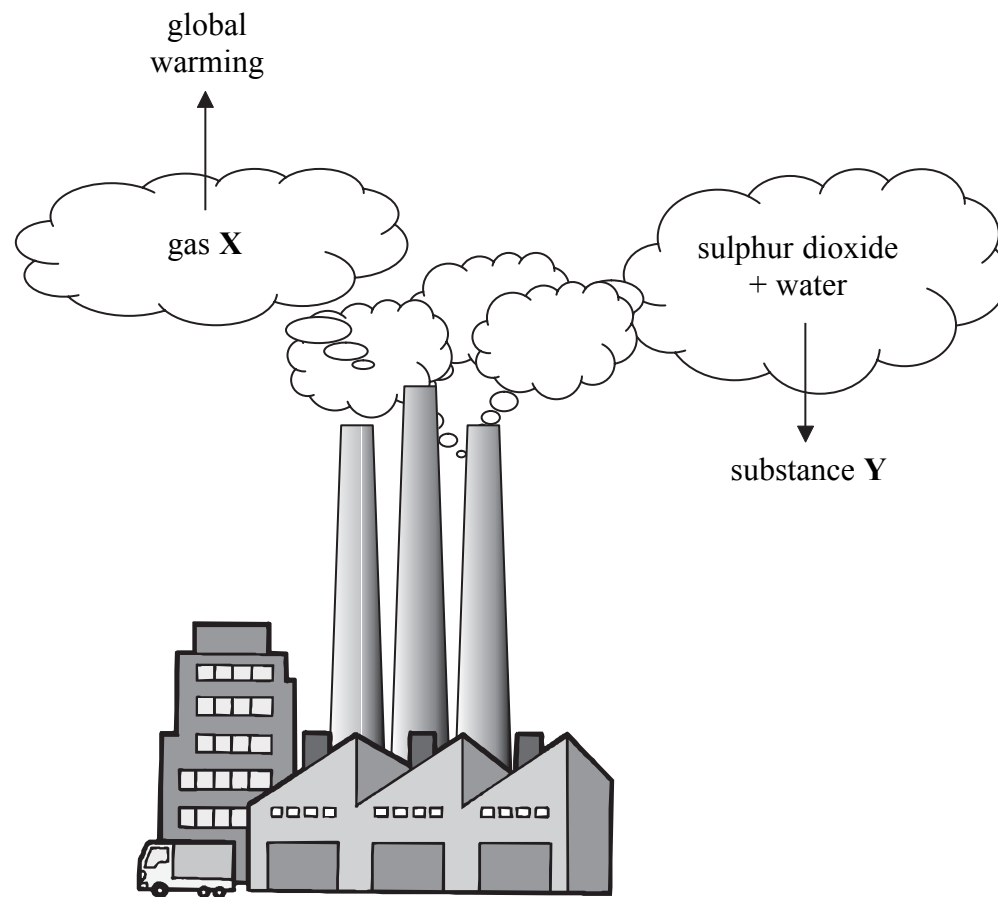
missing word		
	1	2
A	cytoplasm	glucose
B	chlorophyll	carbon dioxide
C	cytoplasm	carbon dioxide
D	chlorophyll	glucose

4. Which of these conditions would cause the largest increase in the rate of photosynthesis?

- A bright sunlight and low temperature
- B dull sunlight and warm temperature
- C bright sunlight and warm temperature
- D dull sunlight and low temperature

Polluting the environment

The diagram below shows some of the substances released into the atmosphere when power stations burn fossil fuels.



5. Name substance Y.
- A nitrogen
 - B carbon monoxide
 - C acid rain
 - D ozone
6. Name gas X.
- A carbon dioxide
 - B methane
 - C nitrogen
 - D chlorofluorocarbons (CFCs)

7. Which process releases energy in the power station that uses fossil fuels?

- A respiration
- B combustion
- C transpiration
- D fermentation

8. Gases produced by power stations using fossil fuels affect

- A land and air only
- B land and water only
- C air and water only
- D land, air and water

Extreme environments

Giant tube worms are among the few creatures that can live deep in the ocean close to very hot volcanic vents. They have no eyes, no mouth and no digestive system.



9. Which row of the table shows the conditions that giant tube worms live in?

	oxygen levels	temperature
A	high	high
B	high	low
C	low	high
D	low	low

10. Bacteria live inside the giant tube worms where they are protected. The bacteria use the chemicals released from the volcanic vents. The tube worms feed on the waste products of the bacteria. This relationship is an example of

- A competition
- B predation
- C interdependence
- D adaptation

11. Only certain plants live in the extreme environment of Antarctica. This is because there is limited supply of

- A** carbon dioxide
- B** nutrients
- C** nitrogen
- D** ozone

12. Bumblebees are able to live in environments with limited oxygen.



Bumblebees have thick coats which keep them warm in cold conditions. These features are an example of

- A** biodiversity
- B** competition
- C** adaptation
- D** conservation

Healthy plants

All plants need nitrates for healthy growth. They need the help of bacteria in the soil that change nitrogen into nitrates.

The plants then absorb the nitrates through their roots.

13. Which bacteria convert nitrogen into nitrates?

- A nitrifying bacteria
- B decomposers
- C denitrifying bacteria
- D nitrogen-fixing bacteria

14. Farmers can add nitrates to the soil to help plants grow. Nitrates to help plants grow are in

- A pesticides
- B weedkillers
- C fertilisers
- D plant hormones

15. Sometimes farmers add too much nitrate to the soil. This excess nitrate can leach into lakes leading to

- A eutrophication
- B ozone depletion
- C global warming
- D acid rain

16. The statements are about genetically modified (GM) plants.

- 1 GM plants can grow faster
- 2 GM plants can provide medicines

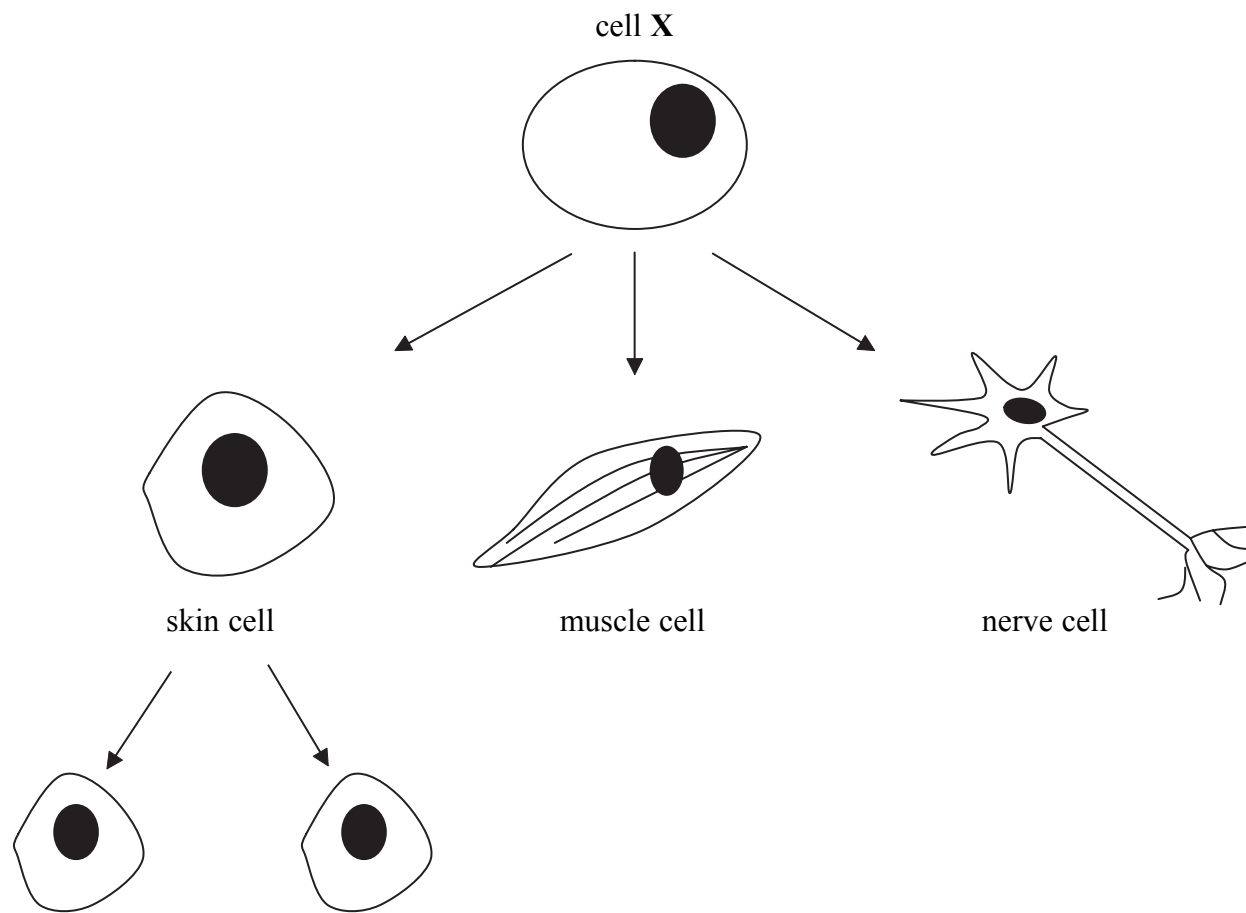
Which of these statements are potential benefits of using GM plants?

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

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.

Working cells

The diagram shows some of the different types of cell that can be produced from cell X.



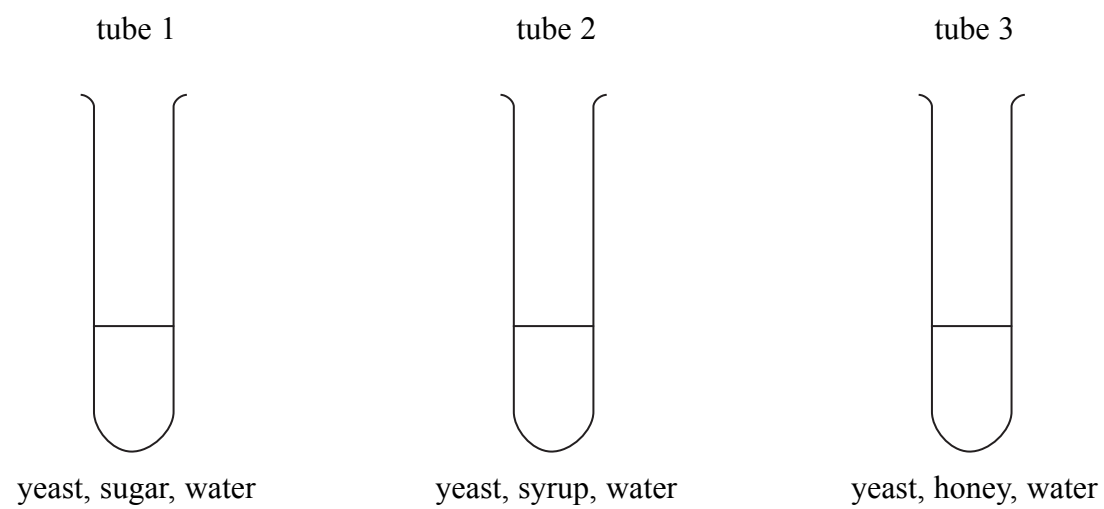
17. Cell X is
- A a skin cell
 - B a stem cell
 - C an egg cell
 - D an embryo

18. The skin cell continues to divide to produce new skin cells.
This process of cell division is known as
- A meiosis
 - B differentiation
 - C mitosis
 - D regeneration
19. Which word equation shows how energy is released in muscle cells?
- A carbon dioxide + glucose \longrightarrow oxygen + water + energy
 - B oxygen + water \longrightarrow carbon dioxide + glucose + energy
 - C carbon dioxide + water \longrightarrow oxygen + glucose + energy
 - D oxygen + glucose \longrightarrow carbon dioxide + water + energy
20. The statements below are about using stem cells to produce organs for transplants.
- stem cells can be obtained from embryos left over from fertility treatment
 - transplanted organs produced from stem cells are more likely to be rejected
 - adult stem cells could be used instead of embryonic stem cells
- How many of the statements are true?
- A none
 - B one
 - C two
 - D three

Aaron's investigation

Aaron was baking bread. He added yeast to warm water and sugar. The yeast broke down the sugar. Carbon dioxide gas was released which made the yeast mixture frothy.

Aaron stated 'I think that yeast can break down pure sugar faster than honey.'
Aaron set up the following investigation:



Aaron measured the height of the froth produced by each of the yeast mixtures every 5 minutes for 30 minutes. His results are shown in the table.

tube		height of froth (cm)						
		0 min	5 min	10 min	15 min	20 min	25 min	30 min
1	sugar	0	1.5	2.0	2.5	3.0	2.9	2.9
2	syrup	0	1.0	1.25	1.3	1.5	1.5	1.3
3	honey	0	1.75	2.5	3.0	3.25	3.3	3.3

21. Aaron's results do not support his statement because after 30 minutes

- A tube 3 produced more froth than tubes 1 or 2
- B tube 1 produced more froth than tubes 2 or 3
- C tube 2 produced less froth than tubes 1 or 3
- D tube 1 produced less froth than tube 2

22. Which row of the table shows what Aaron must consider during the planning of his investigation to ensure that his results are **valid**?

	temperature at which tests are carried out	quantity of reactants	repeating each test
A	yes	no	yes
B	no	yes	no
C	yes	yes	no
D	no	no	yes

23. Aaron believed tube 2 was his control experiment.
A correct control for this experiment should have contained

- A** sugar, honey, yeast and water
- B** yeast and water
- C** sugar, syrup, yeast and water
- D** honey, yeast and water

24. Yeast ferments sugar and produces carbon dioxide gas.
What other substance is produced from this fermentation reaction?

- A** glucose
- B** lactic acid
- C** protein
- D** alcohol

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

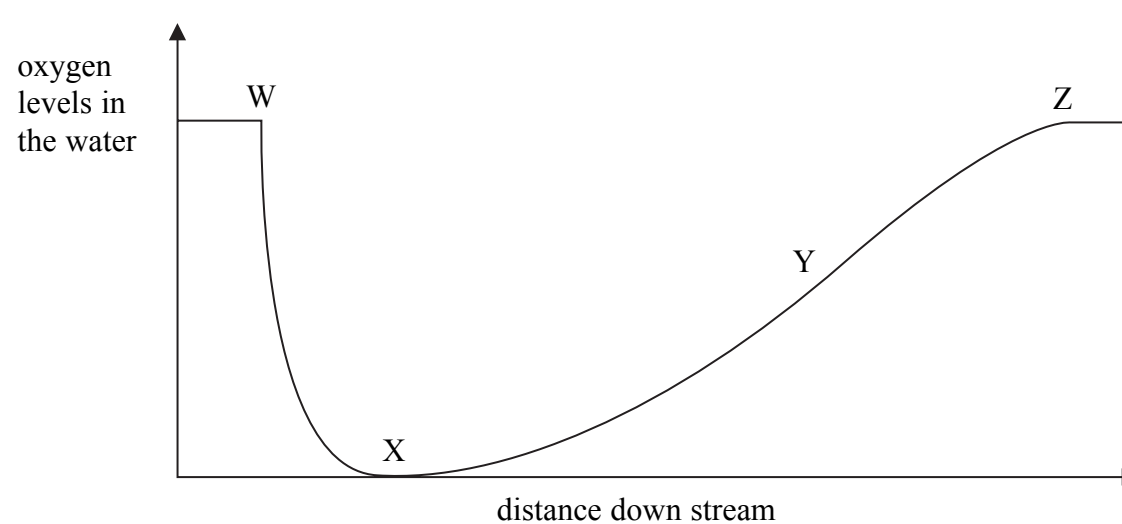
Foundation tier candidates do not answer any more questions after question 24.

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

Contaminated water

Use this information to help you answer questions 25, 26 and 27.

The graph shows the oxygen levels in a slow-moving fresh water stream that has been contaminated by sewage.



25. At what point on the graph did sewage leak into the fresh water stream?

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

26. The reason why the oxygen levels drop rapidly between W and X is because

- A** water plants photosynthesise too quickly
- B** microorganisms carry out aerobic respiration and multiply rapidly
- C** fish take in all of the oxygen
- D** plants produce carbon dioxide which replaces the oxygen

27. The table shows some organisms that are tolerant of pollution levels in water.

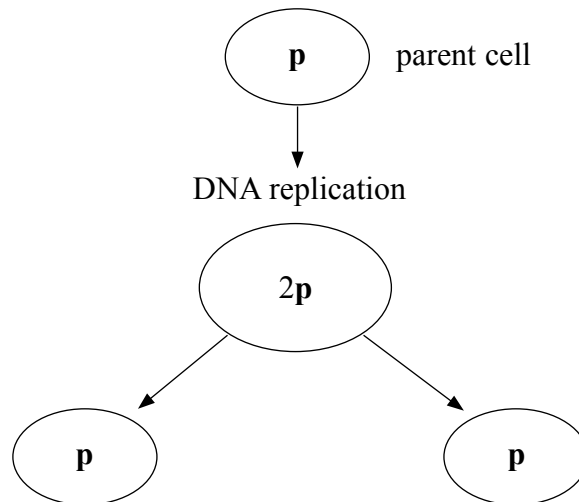
water pollution level		
high	medium	low
sludge worms blood worms rat-tailed maggots	water lice fresh water shrimp	mayfly nymphs dragonfly nymphs caddis fly larvae

At which points on the graph would rat-tailed maggots be found?

- A W to X
 - B X to Y
 - C Y to Z
 - D Z to W
28. The organisms in the table above are known as
- A oxygen indicators
 - B sewage indicators
 - C living indicators
 - D non-living indicators

Producing new cells

29. The diagram shows a cell dividing. The letter **p** on the diagram represents the number of chromosomes.



Which row of the table shows the type of cell division taking place and the type of cells produced by this division?

	type of cell division	type of cells produced
A	mitosis	haploid
B	meiosis	diploid
C	mitosis	diploid
D	meiosis	haploid

30. Meiosis in animals produces

- A** sperm and body cells
- B** egg and body cells
- C** egg and sperm cells
- D** body cells

31. New cells produced by mitosis are

- A** genetically identical to the parent cell and to each other
- B** genetically identical to the parent cell but not to each other
- C** genetically identical to each other but not to the parent cell
- D** genetically identical to neither the parent cell nor each other

32. A newly formed human embryo develops into an individual. To do this the cells of the embryo must
- A divide and elongate
 - B divide and differentiate
 - C divide only
 - D differentiate only

Making insulin

Insulin is a hormone that helps to regulate blood sugar levels. It is made up of two polypeptide chains, called the A and B chains.

33. The A chain of the insulin gene is 30 amino acids long. The B chain of the insulin gene is 21 amino acids long. How many bases make up the insulin gene in total?
- A 63
 - B 90
 - C 102
 - D 153

34. The DNA sequence below shows the first 15 bases of the insulin gene.

TACAAACATTTAGTT

What is the corresponding mRNA sequence for this section of the insulin gene?

- A ATGTTTGTAATCAA
 - B UTGTTTGTUUUTC UU
 - C AUGUUUGUAAAUCA A
 - D UTGTTTGTUUUTC UU
35. Converting the DNA code into the two polypeptide chains that make up an insulin molecule involves the processes of transcription and translation.

Which row of the table shows where these two processes take place?

	transcription	translation
A	nucleus	nucleus
B	on ribosomes	on ribosomes
C	on ribosomes	nucleus
D	nucleus	on ribosomes

36. Bacteria can be used to produce human insulin for people with diabetes.

The statements below give information on how bacteria can be genetically modified to produce insulin.

- bacterial genes are removed from plasmids using enzymes
- bacterial genes are inserted into the human genome using plasmids
- human genes are removed from DNA using enzymes
- human genes are inserted into the bacterial plasmids using enzymes

How many of the statements are correct for the production of insulin?

- A** one
B two
C three
D four

Mineral requirements and the grass park experiment



The grass park experiment is a 20 year study by scientists.
In the experiment, sections of grass are treated with various concentrations of acids.
This is to see if the acidity affects the uptake of particular minerals.

37. Which row of the table shows the mineral ion and the correct benefit it has to the plant?

	mineral ion	benefit to the plant
A	potassium	chlorophyll production
B	magnesium	chlorophyll production
C	potassium	protein synthesis
D	magnesium	protein synthesis

38. Scientists believe that high levels of sulphurous acid may interfere with the uptake of nitrates. This reduction in the uptake of nitrates is likely to cause

- A** the blades of grass to turn purple
- B** the grass to die completely
- C** the grass to show stunted growth
- D** yellow spots on the leaves

39. The grass park experiment has taken place over 20 years to ensure

- A** accuracy in the measurement of the samples
- B** valid results due to many different variables being tested
- C** reliable results as the experiment does not need to be repeated
- D** a large amount of data so a valid comparison of the results is possible

40. Plants uptake minerals through their roots. Which row of the table shows how minerals are transported into the plant and the plant structure through which the minerals flow?

	method of transportation into the plant	structure through which the mineral ions flow
A	transpiration	xylem vessel
B	active transport	xylem vessel
C	transpiration	phloem vessel
D	active transport	phloem vessel

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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