

Specimen Paper Answers
Paper 1: Multiple Choice
Cambridge O Level Biology
5090

For examination from 2023



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Contents

Contents	3
Introduction	4
Assessment at a glance.....	5
Specimen answers	6

Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge O Level Biology 5090, and to show examples of very good answers.

In this booklet, we have provided answers for all questions with examiner comments. These exercises require candidates to answer multiple choice questions and candidates are awarded maximum of 40 marks for this paper and the mark scheme provides the answers required to gain the marks.

Each question and answer is followed by an examiner comment on how each answer should be determined. Additionally, the examiner has set out a number of common mistakes that occur when candidates answer the questions. In this way, it is possible to understand what candidates have done to gain their marks and how they could avoid errors.

The mark schemes for the Specimen Papers are available to download from the School Support Hub at www.cambridgeinternational.org/support

2023 Specimen Paper 1 Mark Scheme

Past exam resources and other teaching and learning resources are available on the School Support Hub www.cambridgeinternational.org/support

Assessment at a glance

The syllabus for Cambridge O Level Biology 5090 is available at www.cambridgeinternational.org

All candidates take three papers. Candidates will be eligible for grades A* to E.

Paper 1: Multiple Choice	Paper 2: Theory
1 hour	1 hour 45 minutes
40 Marks	80 Marks
30%	50%
40 four-option multiple-choice questions	Short-answer and structured questions
Externally assessed	Externally assessed

And

Practical assessment

Paper 3: Practical Test	Paper 4: Alternative to Practical
1 hour 30 minutes	1 hour
40 Marks	40 Marks
20%	20%
Questions will be based on the experimental skills in Section 4	Questions will be based on the experimental skills in Section 4
Externally assessed	Externally assessed

Or

Specimen answers

Question 1

1 Which structures are found in animal cells **and** in plant cells?

- 1 mitochondria
- 2 cell wall
- 3 ribosomes
- 4 sap vacuole

A 1 and 3 B 1 and 4 C 2 and 3 D 2 and 4

Candidate answer: A

Mark awarded = 1

Examiner comment

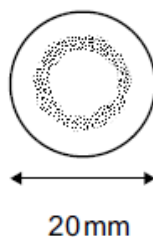
Animal cells do not have cell walls so only options A and B can be correct. Stronger candidates know that all cells make proteins and these proteins are made by ribosomes. Therefore, option A must be correct.

Common mistakes

Some candidates do not realise that respiration occurs in all plant and animal cells and therefore both types of cell must have mitochondria.

Question 2

2 A student draws a red blood cell. The drawing is 20 mm in diameter.



This red blood cell is actually 0.008 mm in diameter.

What is the magnification of the cell shown in the drawing?

- A ×40
- B ×250
- C ×2500
- D ×40 000

Candidate answer: C

Mark awarded = 1

Examiner comment

Magnification = image size / actual size

therefore magnification = 20 mm / 0.008 mm = $\times 2500$

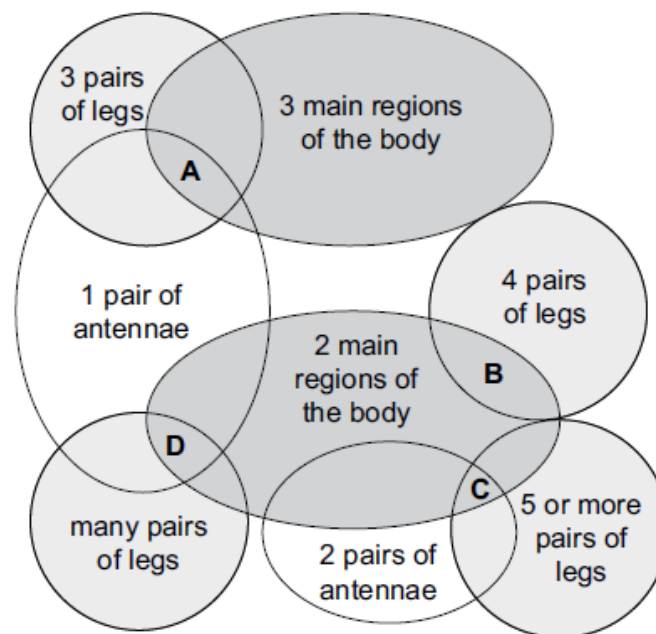
Common mistakes

Some candidates invert the equation and divide the actual size by the image size. This gives an answer of 4.0×10^{-4} which they incorrectly convert to $\times 40\,000$.

Question 3

3 The diagram shows some of the features used to classify animals in the phylum arthropods.

In the diagram, which letter, **A**, **B**, **C** or **D**, could represent insects?



Candidate answer: A

Mark awarded = 1

Examiner comment

Insects have three pairs of legs and therefore only option A can be correct.

Common mistakes

Some candidates confuse insects with arachnids and select option B. Candidates should not lose confidence when they see an unfamiliar diagram. They should use the facts they are confident with and see if they can work out the answer by elimination.

Question 4

4 Which processes can **only** occur through a membrane?

	active transport	diffusion	osmosis
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✗	✓

key:
✓ = yes
✗ = no

Candidate answer: C

Mark awarded = 1

Examiner comment

Diffusion can occur in liquids and gases so doesn't require the presence of a membrane. Therefore, only options C and D can be correct. Active transport involves transport of molecules or ions across a membrane so option D must be incorrect.

Common mistakes

Most candidates know that osmosis is the movement of water through a membrane so a tick must be present in that column. Fewer know that active transport is always across a membrane so a tick must also be present in that column.

Question 5

5 A student cuts four cylinders from a potato.
Each cylinder is 30 mm long. The cylinders are all of the same diameter.

The potato cylinders are placed in sugar solutions of different concentrations. After one hour, the lengths of the cylinders are measured again. The results are shown in the table.

Which sugar solution has a water potential closest to that of the potato cells?

	concentration of sugar / g per dm ³	starting length / mm	length after one hour / mm
A	35	30	33
B	105	30	31
C	135	30	27
D	170	30	26

Candidate answer: B

Mark awarded = 1

Examiner comment

The potato in the sugar solution that is closest to the concentration of the cell will change the least in length. As all the starting lengths are the same, 30 mm, the smallest change in length is option B.

Common mistakes

Some candidates get confused by the fact that some potatoes increase in length and some decrease in length. In this question, it doesn't matter as we are looking for the smallest change, therefore, the increase or decrease can be ignored.

Question 6

6 An area of grass plants becomes flooded with sea water.

Sea water contains a higher concentration of salt than the root hair cells of the grass plants.

What is the effect of the sea water on the functions of the root hairs?

	uptake of ions by root hairs	uptake of water by root hairs
A	no longer occurs	no longer occurs
B	no longer occurs	still occurs
C	still occurs	no longer occurs
D	still occurs	still occurs

Candidate answer: C

Mark awarded = 1

Examiner comment

The uptake of ions is an active process and occurs against a concentration gradient, therefore only options C and D can be correct. Uptake of water by osmosis requires a concentration gradient from the soil to the root hair cells, so in this case, uptake of water by osmosis will no longer occur.

Common mistakes

Some candidates think that sea water is toxic to all plants and therefore uptake of ions and water will both stop, therefore they select option A.

Question 7

7 Large biological molecules are made from smaller molecules.

Which row shows the correct molecules?

	starch	protein	lipid	DNA
A	fatty acids and glycerol	nucleotides	glucose	amino acids
B	glucose	fatty acids and glycerol	nucleotides	amino acids
C	nucleotides	amino acids	fatty acids and glycerol	glucose
D	glucose	amino acids	fatty acids and glycerol	nucleotides

Candidate answer: D

Mark awarded = 1

Examiner comment

Starch is made from glucose, therefore only options B and D can be correct. Option B states that proteins are made from fatty acids and glycerol which is incorrect.

Common mistakes

Most candidates know that starch is made from glucose but fewer can recall that DNA is made from nucleotides.

Question 8

8 Enzyme action can be explained by the lock and key hypothesis.

Which row is correct for the active site and for the substrate?

	active site is on the enzyme	active site is on the substrate	substrate is the lock	substrate is the key
A	✓	✗	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

✓ = yes
✗ = no

Candidate answer: B

Mark awarded = 1

Examiner comment

The enzyme contains the active site so options C and D can be eliminated. The substrate fits into the active site so the substrate must be the key.

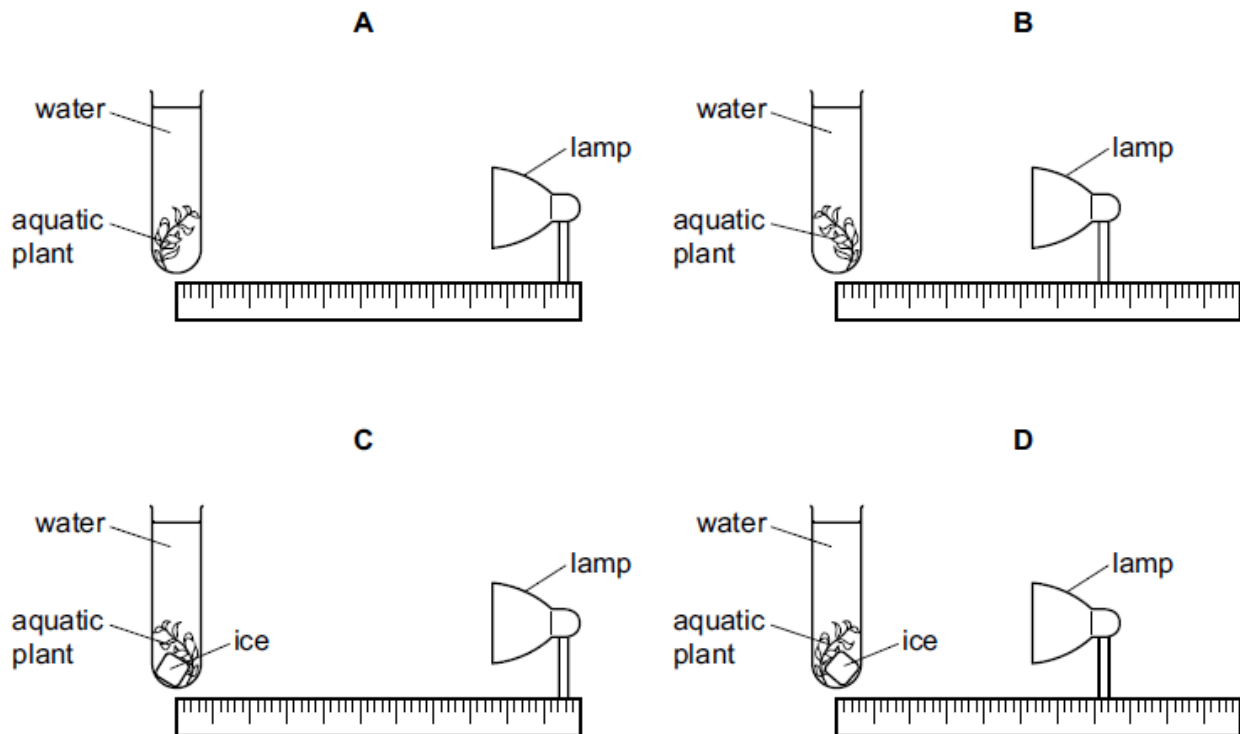
Common mistakes

Some candidates confuse the lock and the key and therefore select option C.

Question 9

- 9 The diagrams show an experiment to find the rate of photosynthesis in an aquatic plant in different conditions.

Which plant produces the most bubbles per minute?



Candidate answer: B

Mark awarded = 1

Examiner comment

Aquatic plants release bubbles when they photosynthesise. The greater the rate of photosynthesis the greater the number of bubbles. Photosynthesis requires light therefore options B and D are possible answers. Option D has ice added so the temperature of the water will be low and the rate of photosynthesis will be low. Therefore, option B is the best choice.

Common mistakes

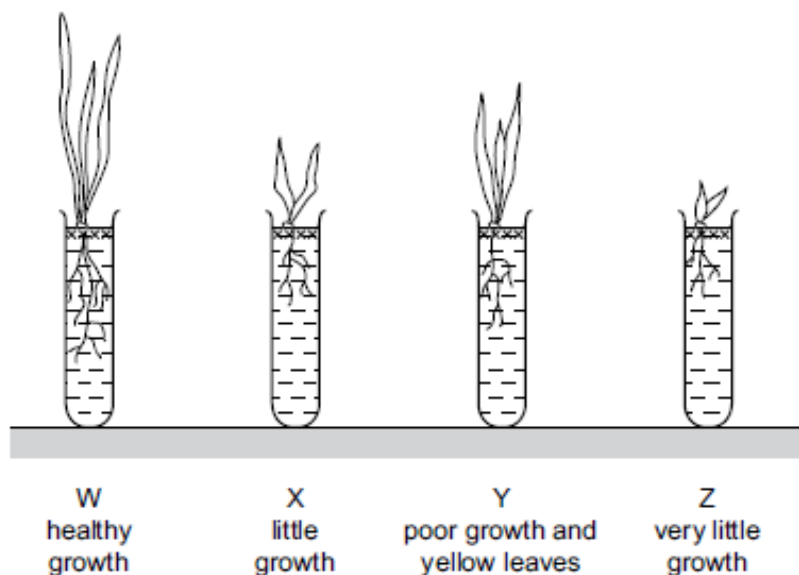
When answering questions with diagrams candidates should start by identifying the differences in the diagrams. In this case, the position of the lamp and the presence of ice. The effect of these two variables can then be applied to the question.

Question 10

10 A student grows young plants in four different test-tubes.

Tube W contains all the mineral ions needed for healthy plant growth.

The diagram shows the appearance of the plants after two weeks.



What do tubes X, Y and Z contain?

	X	Y	Z
A	all minerals except magnesium ions	all minerals except nitrate ions	water only
B	all minerals except magnesium ions	water only	all minerals except nitrate ions
C	all minerals except nitrate ions	all minerals except magnesium ions	water only
D	water only	all minerals except magnesium ions	all minerals except nitrate ions

Candidate answer: C

Mark awarded = 1

Examiner comment

Plants require magnesium to make chlorophyll so a deficiency of magnesium results in yellow leaves. Therefore, options C and D are possible choices. Plants grown in 'water only' will grow less than plants grown in 'all minerals except nitrate ions' so option D must be incorrect.

Common mistakes

Most candidates recall that magnesium is required to make chlorophyll and select either option C or D. Many miss the fact that X has all the minerals it requires except nitrate ions and so will grow more than a plant in just water.

Question 11

- 11 Which row shows how the rate of transpiration changes when conditions in the atmosphere change?

	reduced wind	increased humidity
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

Candidate answer: A

Mark awarded = 1

Examiner comment

High humidity means a low rate of transpiration. Reducing wind also increases the humidity around the leaf so the rate of transpiration will decrease. Option A correctly states that reduced wind and increased humidity both decrease the rate of transpiration.

Question 12

- 12 Which foods can be eaten to prevent scurvy, anaemia and rickets?

	prevent scurvy	prevent anaemia	prevent rickets
A	cheese and milk	oranges and lemons	red meat
B	cheese and milk	red meat	oranges and lemons
C	oranges and lemons	cheese and milk	red meat
D	oranges and lemons	red meat	cheese and milk

Candidate answer: D

Mark awarded = 1

Examiner comment

Citrus fruits prevent scurvy, so options A and B are incorrect. To choose between C and D, it should be remembered that red meat contains iron in haemoglobin and can therefore prevent anaemia. Cheese and milk contain vitamin D and prevent rickets.

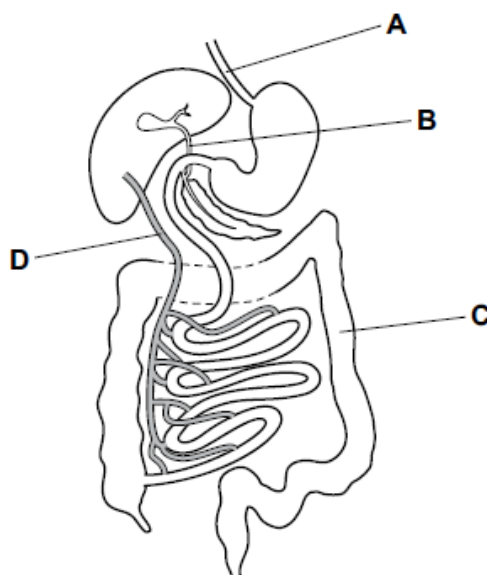
Common mistakes

Most candidates recall that magnesium is required to make chlorophyll and select either option C or D.

Question 13

13 The diagram shows parts of the human digestive system and associated organs.

Which part would contain high concentrations of glucose and amino acids, four hours after eating a meal?



Candidate answer: D

Mark awarded = 1

Examiner comment

Option A can be eliminated because food quickly passes through the oesophagus and enters the stomach. Four hours after a meal, the products of digestion are being absorbed into the bloodstream and will be transported to the liver via the hepatic portal vein, which is labelled D.

Common mistakes

Some candidates mistake the structure labelled B for the hepatic portal vein. B is the bile duct.

Question 14

14 What is the approximate percentage of carbon dioxide in expired air released by a human?

- A 0.04%
- B 0.4%
- C 4.0%
- D 14%

Candidate answer: C

Mark awarded = 1

Examiner comment

Recall the fact that there is 4.0% carbon dioxide in expired air.

Common mistakes

Some candidates do not read the question carefully and select option A which is the percentage of carbon dioxide in inspired air.

Question 15

15 What are the products of aerobic respiration in animals and plants?

- A carbon dioxide and glucose
- B carbon dioxide and water
- C glucose and oxygen
- D lactic acid

Candidate answer: B

Mark awarded = 1

Examiner comment

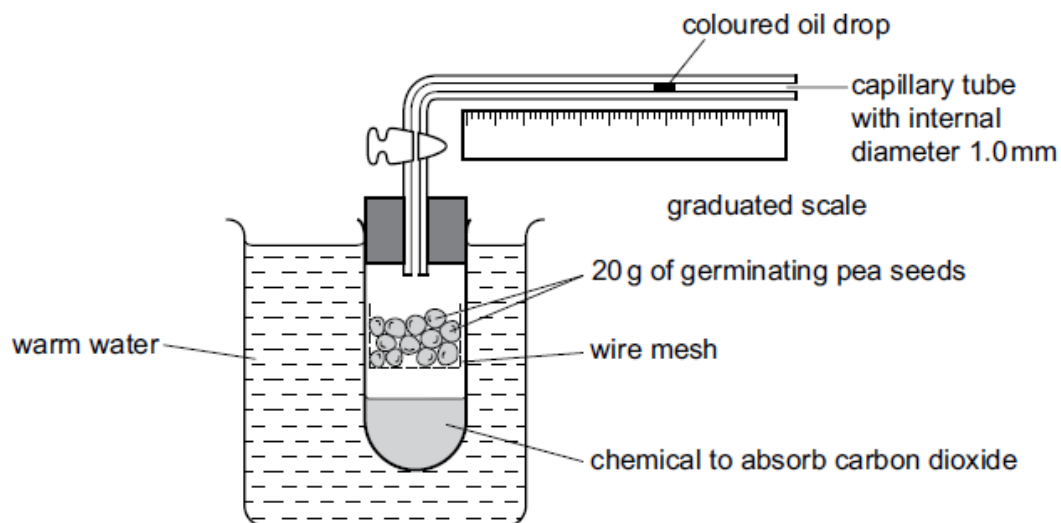
Recall the fact that the products of aerobic respiration are carbon dioxide and water.

Common mistakes

Some candidates realise that carbon dioxide is produced and glucose is involved in aerobic respiration so incorrectly select option A. Glucose is the substrate for aerobic respiration, not the product.

Question 16

16 The diagram shows apparatus used to investigate the rate of respiration of germinating pea seeds.



In an experiment, the coloured oil drop moved 24 mm to the left in 30 minutes.

Calculate the rate of respiration of the pea seeds in:

mm^3 of oxygen, per gram of pea seeds, per minute.

Assume $\pi = 3.0$

- A $0.03 \text{ mm}^3/\text{g}/\text{min}$
- B $0.06 \text{ mm}^3/\text{g}/\text{min}$
- C $0.12 \text{ mm}^3/\text{g}/\text{min}$
- D $0.60 \text{ mm}^3/\text{g}/\text{min}$

Candidate answer: A

Mark awarded = 1

Examiner comment

area of capillary tube = $3 \times 0.5^2 = 0.75 \text{ mm}^2$

vol of oxygen = area x length = $0.75 \times 24 = 18 \text{ mm}^3$

then divide by 30 to get the answer per minute,

then divide by 20 to get the answer per g,

= $0.03 \text{ mm}^3 / \text{g} / \text{min}$

Common mistakes

Some candidates forget to halve the diameter when calculating the area of the capillary tube which causes them to select option C.

Question 17

17 What is the sequence of contractions in one heartbeat?

- A** left atrium and left ventricle together, pause, right atrium and right ventricle together
- B** left atrium, left ventricle, right atrium, right ventricle, pause
- C** right atrium and left atrium together, right ventricle and left ventricle together, pause
- D** right atrium, right ventricle, left atrium, left ventricle, pause

Candidate answer: C

Mark awarded = 1

Examiner comment

Contraction starts in the atria and forces blood in both sides of the heart down into the ventricles therefore only option C can be correct.

Common mistakes

Some candidates select option B because they imagine that the heart has two functions, to pump blood round the body and to pump blood to the lungs. Both are true but contraction must be coordinated, and so contraction starts in the atria and moves down into the ventricles.

Question 18

18 The diagram shows a section through part of a vein.



What could be the first organs found in directions 1 and 2 on the diagram?

	direction 1	direction 2
A	heart	brain
B	intestine	liver
C	liver	heart
D	lung	heart

Candidate answer: A

Mark awarded = 1

Examiner comment

The orientation of the valve in the diagram means that it will prevent blood from flowing left to right. Valves ensure that blood flows in one direction, towards the heart, so direction 1 can only be the heart.

Question 19

19 What is a difference between the contents of plasma and the contents of tissue fluid?

	plasma	tissue fluid
A	dissolved glucose	no dissolved glucose
B	less dissolved glucose	more dissolved glucose
C	more protein molecules	fewer protein molecules
D	no white blood cells	white blood cells

Candidate answer: C

Mark awarded = 1

Examiner comment

Tissue fluid forms when plasma is put under pressure in the capillaries. Glucose is a relatively small molecule and can pass through the capillary walls so option A must be incorrect. Most proteins are large molecules so they cannot pass through the capillary wall and therefore there must be more of them in the plasma than in the tissue fluid. Option C is therefore correct. White blood cells are transported by the plasma and are too large to pass through the capillary wall so cannot be present in the tissue fluid. White blood cells are transported by the plasma, therefore option D must be incorrect.

Common mistakes

Some candidates incorrectly select option B as they think that glucose will be more concentrated in the tissue fluid than in the plasma. However, as glucose enters the tissue fluid it is taken up by the cells and is therefore at a lower concentration than the plasma.

Question 20

20 Which statement describes an example of active immunity?

- A** Antibodies pass through the placenta from the blood of a mother to the blood of a fetus, giving the baby immunity to some diseases.
- B** A person is given an injection of antibiotics to kill bacteria which are causing a disease.
- C** A person is given an injection of antigens from pathogens that cause a disease and after this the body produces antibodies against these pathogens.
- D** The clotting of blood prevents disease-causing bacteria entering the circulatory system.

Candidate answer: C

Mark awarded = 1

Examiner comment

Active immunity involves antibodies, so options B and D are incorrect. Option A states that the mother gives antibodies to the fetus, which is true, but that is short-term passive immunity. Therefore, option C must be correct.

Common mistakes

Candidates often confuse passive and active immunity and therefore cannot choose between options A and C. It should be remembered that active immunity involves antibody production after vaccination or being infected by a pathogen whereas passive immunity involves a person getting short-term immunity from breast-feeding or medical injection.

Question 21

21 Which words **all** describe the organism that causes malaria?

- A** microscopic, parasite, sexually transmitted
- B** microscopic, parasite, pathogen
- C** mosquito, pathogen, vector
- D** parasite, sexually transmitted, vector

Candidate answer: B

Mark awarded = 1

Examiner comment

Recall the fact that malaria is caused by a microscopic, parasitic, pathogen.

Common mistakes

Candidates recall that mosquitoes are involved in the spread of malaria, so they select option C. However, mosquitoes do not cause the disease, they are merely vectors.

Question 22

22 Which action can prevent the spread of the human immunodeficiency virus (HIV)?

- A keeping healthy by taking regular exercise
- B avoiding contact with saliva
- C breast-feeding babies
- D using condoms during sexual intercourse

Candidate answer: D

Mark awarded = 1

Examiner comment

HIV spreads through contact with blood, semen or vaginal fluid so using a condom will reduce the risk of being infected. Option D is therefore correct. HIV can also be passed from mother to child through breast-feeding. However, option C must be incorrect as it would increase the spread of HIV. HIV cannot be spread through contact with saliva, unless it contains blood, so option B is incorrect. Keeping healthy by taking regular exercise has no effect on the spread of HIV so option A is incorrect.

Common mistakes

Some candidates select option B as they think that HIV can be spread by contact with all body fluids. Saliva cannot transmit HIV unless it contains blood from mouth ulcers or sores.

Question 23

23 Which row matches the parts of the urinary system to their functions?

	makes urine	carries urine	holds urine	removes urine from body
A	bladder	ureter	urethra	kidney
B	bladder	urethra	ureter	kidney
C	kidney	ureter	bladder	urethra
D	kidney	urethra	bladder	ureter

Candidate answer: C

Mark awarded = 1

Examiner comment

The kidney makes urine so only options C and D can be correct. Both C and D state that the bladder holds urine so that fact cannot be used to determine which option is correct. Option C is correct and must be determined by recalling that the urethra removes urine from the body or that the ureters carry urine to the bladder.

Common mistakes

Candidates frequently confuse the urethra with the ureters. Candidates must be able to recall the difference.

Question 24

24 Which action is **not** an example of a simple reflex action?

- A** blinking when sand blows in your eyes
- B** jumping when hearing a loud noise
- C** removing your hand from a hot object
- D** stopping a car at a road junction

Candidate answer: D

Mark awarded = 1

Examiner comment

As this is a 'not' question the correct option will be the action that requires a conscious action, not a reflex. Options A, B and C are all protective reflex actions.

Common mistakes

This is a 'not' question so care must be taken to not select the first correct statement. With 'not' questions it is always worth reading the question twice to make sure the meaning of the question is fully understood.

Question 25

25 A person is reading a book in a room with low light intensity.

Which row shows the state of the eye muscles?

	ciliary muscles	iris circular muscles	iris radial muscles
A	contracted	contracted	relaxed
B	contracted	relaxed	contracted
C	relaxed	contracted	relaxed
D	relaxed	relaxed	contracted

Candidate answer: B

Mark awarded = 1

Examiner comment

In low light intensity the iris will have a large diameter to let in light so the iris circular muscles will be relaxed and the iris radial muscles will be contracted. Therefore, options B and D could be correct. When looking at a near object, such as a book, the lens must be thick so the ciliary muscles must be contracted, therefore option B is correct.

Common mistakes

Some candidates confuse the actions of the iris muscles. Candidates would benefit from recalling that when the iris circular muscles contract the pupil gets smaller in diameter.

Question 26

26 Which structures are **all** involved in controlling human body temperature?

- A** blood vessels near the skin surface, pituitary gland and sweat glands
- B** blood vessels near the skin surface, hypothalamus and muscles
- C** kidneys, pituitary gland and sweat glands
- D** kidneys, hypothalamus and muscles

Candidate answer: B

Mark awarded = 1

Examiner comment

Options C and D can be ruled out because the kidneys do not control body temperature. Option A includes the pituitary gland which does control many aspects of the body chemistry but it does not directly control temperature. Option B includes blood vessels near the skin, sweat glands and the hypothalamus, all of which control body temperature.

Common mistakes

Candidates often confuse the roles of the pituitary gland and the hypothalamus. Candidates must be able to recall their respective roles.

Question 27

27 Which row shows the effects of the hormones glucagon and insulin?

	effect of glucagon	effect of insulin
A	Glucose is converted into glycogen in the liver.	Glycogen in the liver is converted into glucose.
B	Glycogen in the liver is converted into glucose.	Glucose is converted into glycogen in the liver.
C	Glycogen in the liver is converted into glucose.	Glucose is converted into glycogen in the pancreas.
D	Glycogen in the pancreas is converted into glucose.	Glucose is converted into glycogen in the pancreas.

Candidate answer: B

Mark awarded = 1

Examiner comment

The pancreas produces insulin and glucagon, it does not store glycogen so option D is incorrect. The liver is the main site for the interconversion of glucose and glycogen. Insulin and glucagon have opposite effects on

blood glucose concentration - insulin lowers the blood glucose concentration whereas glucagon increases it. Therefore, option B is correct.

Common mistakes

Candidates often get confused by the terminology – glycogen, glucose and glucagon. Candidates would benefit from recalling that the hormone glucagon causes the conversion of glycogen in the liver into glucose. This glucose is then released into the bloodstream.

Question 28

28 What is the role of auxin in the control of phototropism in the shoot of a plant?

- A** Auxin is only made on the shaded side of the shoot.
This causes the cells on the shaded side to grow longer.
- B** More auxin is distributed on the shaded side of the shoot.
This causes the cells on the shaded side to grow longer.
- C** The light side of the shoot contains more auxin and so grows less.
This causes the shoot to bend towards the light.
- D** The light side of the shoot contains more auxin.
This stimulates cell division and so the light side of the shoot grows more.

Candidate answer: B

Mark awarded = 1

Examiner comment

Auxin is made in the entire shoot tip so option A must be incorrect. Light causes auxin to accumulate on the shaded side of the shoot so option C is also incorrect. Auxin causes cells to elongate, not divide, so option D is incorrect.

Common mistakes

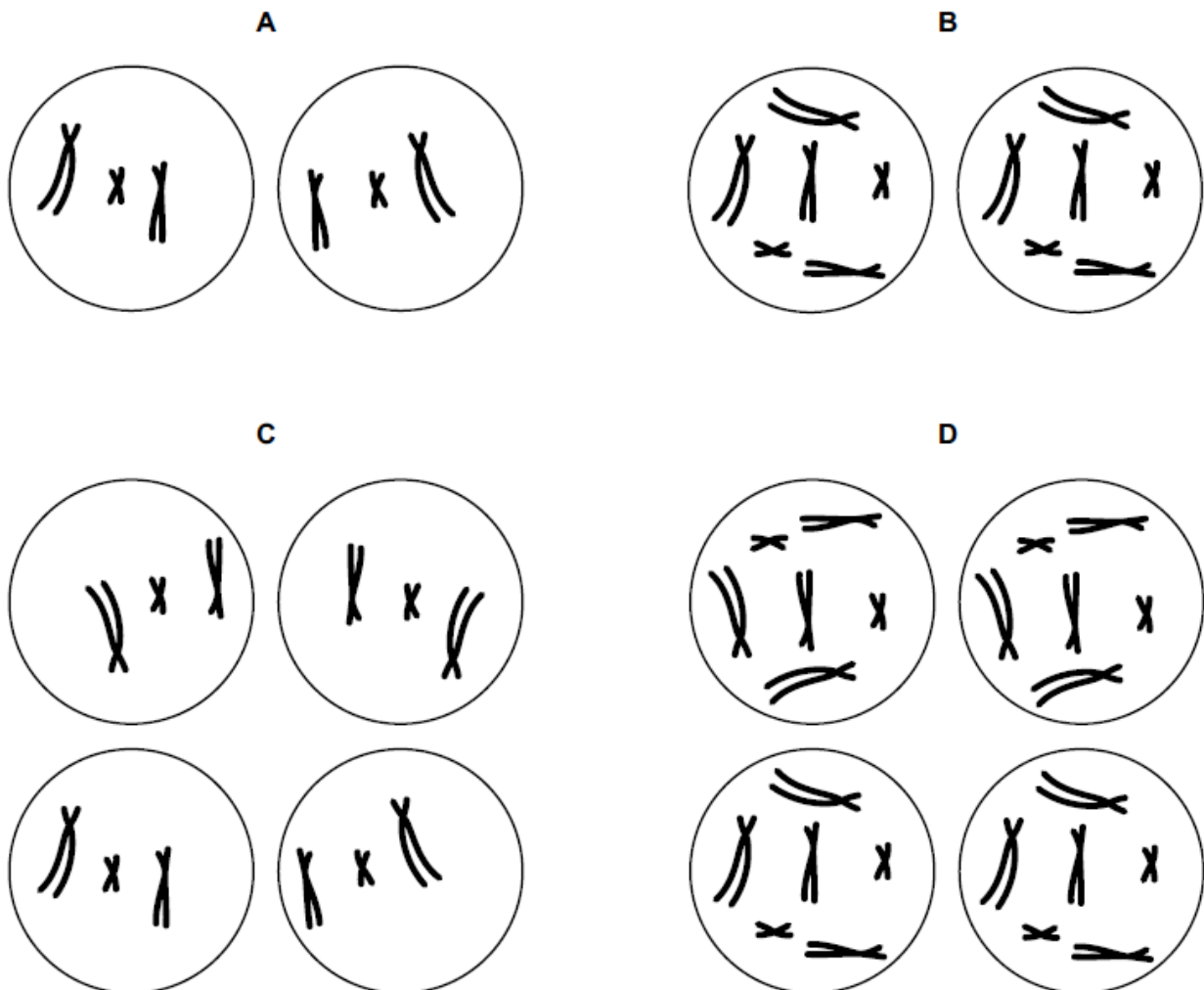
Candidates often confuse cell division with cell elongation. Auxin stimulates cells on the shaded side of the stem to elongate and as this elongation is more than the cells on the light side of the stem, the plant grows towards the light.

Question 29

29 The diagram shows the chromosomes in a cell nucleus.



Which diagram shows the product of one division of the cell nucleus by mitosis?



Candidate answer: B

Mark awarded = 1

Examiner comment

Mitosis produces two daughter cells so options C and D are incorrect. Mitosis also produces genetically identical daughter cells so simply matching the chromosomes in the parent cell to the daughter cells gives option B as the correct option.

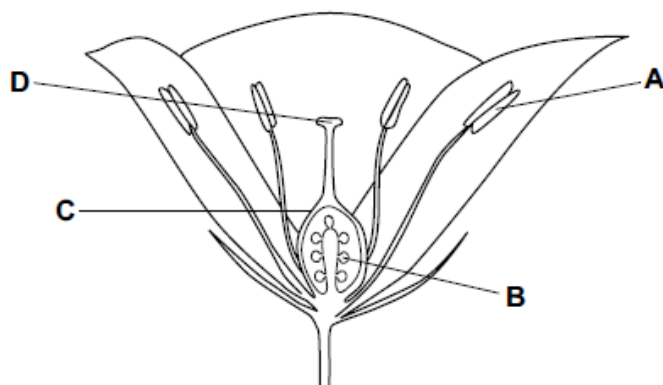
Common mistakes

Most candidates recall that mitosis produces two daughter cells so select A or B. Some candidates confuse mitosis with meiosis and think that the chromosome numbers halve, causing them to incorrectly select option A.

Question 30

30 The diagram shows the parts of a flower.

Where must pollen land to pollinate the flower?



Candidate answer: D

Mark awarded = 1

Examiner comment

Option A cannot be correct as it labels an anther which is the male part of the flower responsible for producing pollen. Options B, C and D are all parts of the carpel but option D labels the stigma which is where pollen must land for pollination.

Common mistakes

Some candidates confuse pollination with fertilisation and select option B, the ovule. The ovule is the site of fertilisation, not pollination.

Question 31

31 Which conditions are needed for the germination of most seeds?

	carbon dioxide	oxygen	water
A	✓	✓	✗
B	✗	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key:
✓ = yes
✗ = no

Candidate answer: D

Mark awarded = 1

Examiner comment

To germinate, the cells in the seed must respire and therefore oxygen is required. Water is required to hydrate the cells and start enzyme activity. Carbon dioxide is needed by seedlings when they photosynthesise but it is not required by seeds for germination. Therefore, option D is correct.

Common mistakes

Some candidates confuse germination with growth. Plant growth requires carbohydrates from photosynthesis and therefore requires carbon dioxide. Seeds do not photosynthesise because they do not have any chloroplasts. Germination requires oxygen, water and warmth so the cells can respire.

Question 32

32 Which row correctly matches a hormone with its function in the menstrual cycle?

	hormone	function
A	FSH	stimulates release of eggs
B	LH	stimulates release of eggs
C	oestrogen	maintains uterus lining
D	progesterone	repairs uterus lining

Candidate answer: B

Mark awarded = 1

Examiner comment

Recall that LH causes ovulation.

Common mistakes

Many candidates confuse the roles of the sex hormones due to the fact that they interact with each other. Candidates would benefit from being able to recall the functions of each hormone.

Question 33

33 Which human feature shows discontinuous variation?

- A** blood group
- B** hair colour
- C** height
- D** foot length

Candidate answer: A

Mark awarded = 1

Examiner comment

Discontinuous variation involves characteristics that are discrete, for instance, blood groups in humans. Hair colour, height and foot length are all continuous characteristics so A is the correct option.

Common mistakes

Candidates often select hair colour as an example of discontinuous variation in humans. Some hair colours are more common than others but hair colours come in a range of shades and therefore shows continuous variation.

Question 34

34 Which statements about genes and chromosomes are correct?

	A chromosome contains DNA.	A gene is a section of DNA.
A	true	true
B	true	false
C	false	true
D	false	false

Candidate answer: A

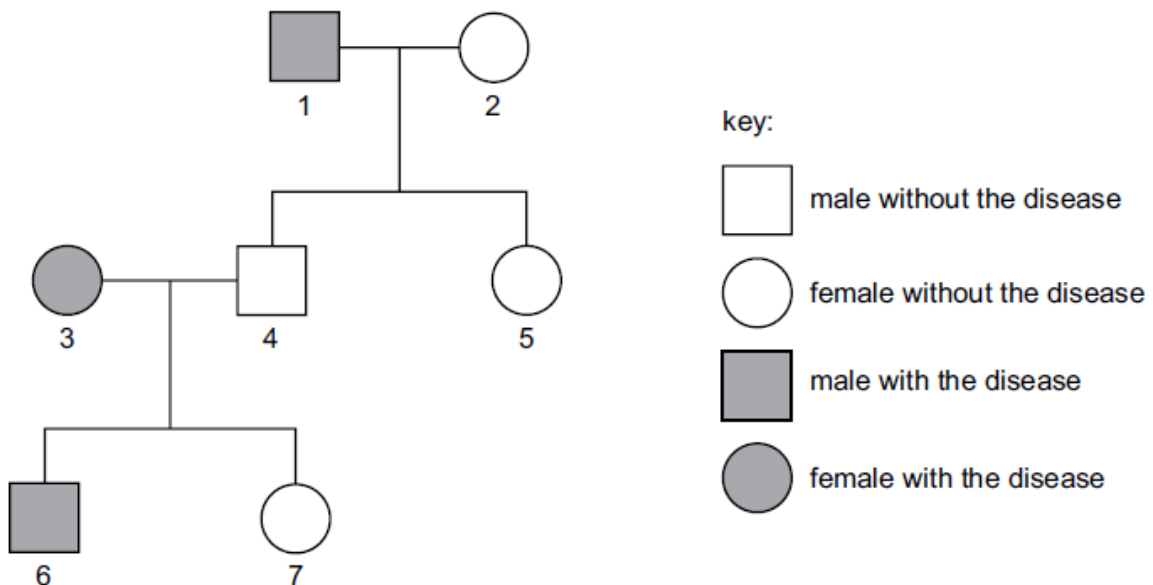
Mark awarded = 1

Examiner comment

Recall that chromosomes contain DNA (and proteins) and that a gene is a section of DNA.

Question 35

35 The diagram shows a family in which some members suffer from a disease caused by a recessive allele.



Identify two members of the family who **must** be heterozygous for the gene?

- A 5 and 7 B 3 and 6 C 2 and 5 D 1 and 4

Candidate answer: A

Mark awarded = 1

Examiner comment

As the allele is recessive person 1 must be homozygous recessive and they must pass on one recessive allele to each child, therefore, person 4 and person 5 must both be heterozygous. As with person 1, person 3 must be homozygous recessive and they must pass on one recessive allele to each child, therefore person 7 must be heterozygous. Option A includes person 5 and 7 so is the correct choice.

Common mistakes

Candidates commonly miss that the allele is recessive and therefore interpret the genetic diagram incorrectly. This highlights the importance of reading questions extremely carefully and paying attention to every single word. Some candidates select option C as they determine that person 5 is heterozygous and presume that person 2 is heterozygous. However, person 2 could be homozygous dominant.

Question 36

36 Which statement identifies a possible benefit of genetically modified crop plants?

- A** Some crop plants can be genetically modified to give resistance to diseases.
- B** Cross-pollination of genetically modified crop plants with weeds could produce new varieties of weeds.
- C** The use of genetically modified crops may explain the increase in food allergies in children.
- D** There is more research needed on the long-term effects of genetically modified crops on the environment.

Candidate answer: A

Mark awarded = 1

Examiner comment

All four options are correct statements about genetically modified crop plants. However, option A is the only option that describes a possible benefit. Options B, C and D describe possible disadvantages of genetically modified crops and are therefore incorrect.

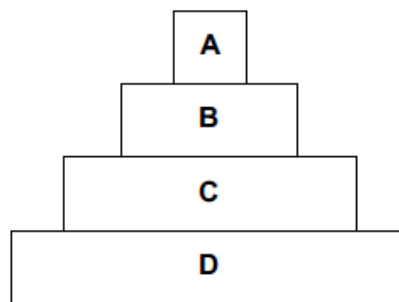
Common mistakes

Candidates often miss the fact that the question is about the benefits of genetically modified crops and therefore try to determine which statement gives the best description rather than which statement describes a possible benefit.

Question 37

37 The diagram shows a pyramid of biomass for a food chain.

Which level represents the producers?



Candidate answer: D

Mark awarded = 1

Examiner comment

Recall the fact that producers are always the base of any pyramid.

Question 38

38 Which stage of the carbon cycle depends on the presence of bacteria and fungi in the soil?

- A combustion
- B decomposition
- C photosynthesis
- D respiration

Candidate answer: B

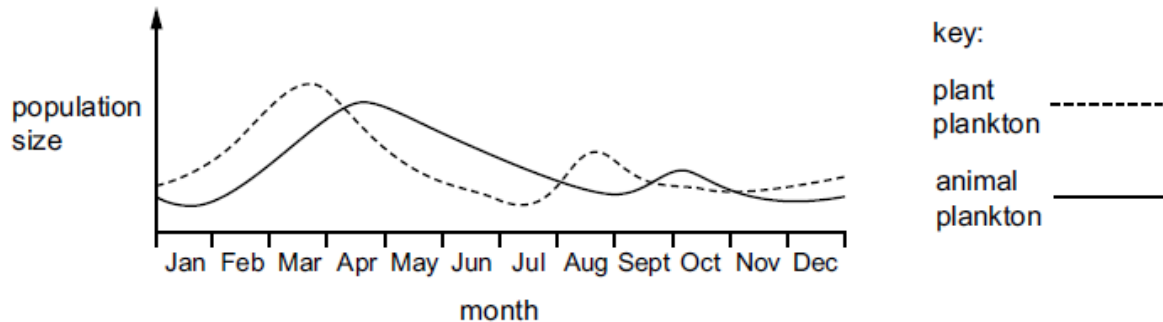
Mark awarded = 1

Examiner comment

Recall that bacteria and fungi are responsible for decomposition.

Question 39

- 39 The graph shows changes in the populations of plant and animal plankton (microscopic organisms) in a lake.



Consider the following statement in relation to the data provided by the graph.

'Population changes in animal plankton occur after similar changes in plant plankton because the animals feed on the plants.'

Which description fits this statement?

- A It is a **possible** interpretation of the data.
- B The data do **not** support the statement.
- C The data are too random to be interpreted.
- D It is the **only** way to interpret the data.

Candidate answer: A

Mark awarded = 1

Examiner comment

The data shows a clear correlation between the two population sizes with the animal plankton population lagging behind the plant plankton population. Therefore, options B and C are incorrect. Option D states that it is the only way to interpret the data but it is impossible to say that it is the only way, therefore, the possible interpretation stated in option A must be correct.

Common mistakes

Some candidates incorrectly select option D. However, data is always suggestive and never absolute so stating it is the only interpretation is inappropriate.

Question 40

- 40 When untreated sewage flows into a river, why does the oxygen concentration decrease?

- A Less oxygen is absorbed from the air.
- B There is a decrease in the number of plants.
- C There is an increase in the number of bacteria.
- D There is an increase in the number of fish.

Candidate answer: C

Mark awarded = 1

Examiner comment

When untreated sewage enters a river it will act as a food source for bacteria. These bacteria will quickly reproduce, and as they respire they will use the oxygen in the water. Therefore, option C is correct.

Common mistakes

Some candidates select option D because an increase in the number of fish would cause the oxygen concentration to decrease. However, fish reproduction takes considerable time so option D is not plausible.

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