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Examiners' Report
June 2023

Int GCSE Biology 4BI1 1B

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June 2023

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Introduction

The new qualification was examined for the third time in a June series. The examiners were impressed with the standard of candidate responses. Centres continue to prepare candidates well for the new style of questions and the new areas of specification content. Most candidates were able to demonstrate very good levels of knowledge and understanding of the specification content. They were also able to apply their knowledge to new contexts both theoretical and practical. There was little evidence of candidates running out of time on the paper and most candidates attempted all questions.

Candidates continue to improve on those items requiring an evaluation response. These items used the command words 'discuss' or sometimes 'explain'. Candidates also did well on applying their knowledge to novel scenarios including those describing practical experiments. Most candidates did well on the items examining the mathematical skills outlined in the appendix at the end of the specification. In the calculations most candidates showed their working so that even if they did not get the final answer, they were able to gain some credit. There were a few cases of responses that failed to gain marks as the candidates described a trend when asked to explain one.

Question 1 (a)(i)

Q01(a)(i) required candidates to state two characteristics that all living organisms share. Most responses gained both marks using a variety of different characteristics.

1 (a) All living organisms share characteristics.

(i) State two characteristics that all living organisms share.

(2)

1 They all move.

2 They all excrete.

ResultsPlus
Examiner Comments

This response scores both marks for referring to movement and to excretion.

ResultsPlus
Examiner Tip

Always write each answer on the numbered lines, don't be tempted to include more than the number asked for.

1 (a) All living organisms share characteristics.

(i) State two characteristics that all living organisms share.

(2)

1 They move

2 They reproduce

ResultsPlus
Examiner Comments

Movement and reproduction are also suitable characteristics. So this example also gains both marks.

1 (a) All living organisms share characteristics.

(i) State two characteristics that all living organisms share.

(2)

1 they respire

2 they grow

This example also gains two marks.

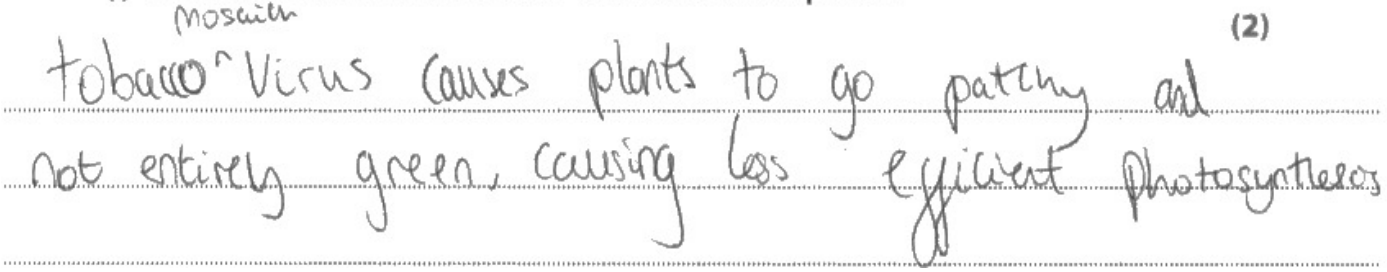
Question 1 (b)(i)

Q01(b)(i) required candidates to describe the effect of a named virus that infects plants. Those candidates that were familiar with the specification content were able to name the tobacco mosaic virus and describe how it leads to yellow leaves or leaves with white spots due to lack of chlorophyll.

(b) Viruses are pathogens but not living organisms.

(i) Describe the effect of a named virus that infects plants.

(2)



ResultsPlus
Examiner Comments

This example gains both marks as it correctly names the tobacco mosaic virus and describes its effect as leaves without green colour and less photosynthesis.

ResultsPlus
Examiner Tip

Ensure that you are familiar with all the specification content.

(b) Viruses are pathogens but not living organisms.

(i) Describe the effect of a named virus that infects plants.

(2)

Tobbaco mozaic virus cause the leaves & plants to go yellow and purple and form mozaic like pattems on the leaves which hinders its ability to photosynthesise.

ResultsPlus
Examiner Comments

This answer also names the virus and correctly describes its effects. There is no penalty for a slight spelling error of mosaic.

(b) Viruses are pathogens but not living organisms.

(i) Describe the effect of a named virus that infects plants.

(2)

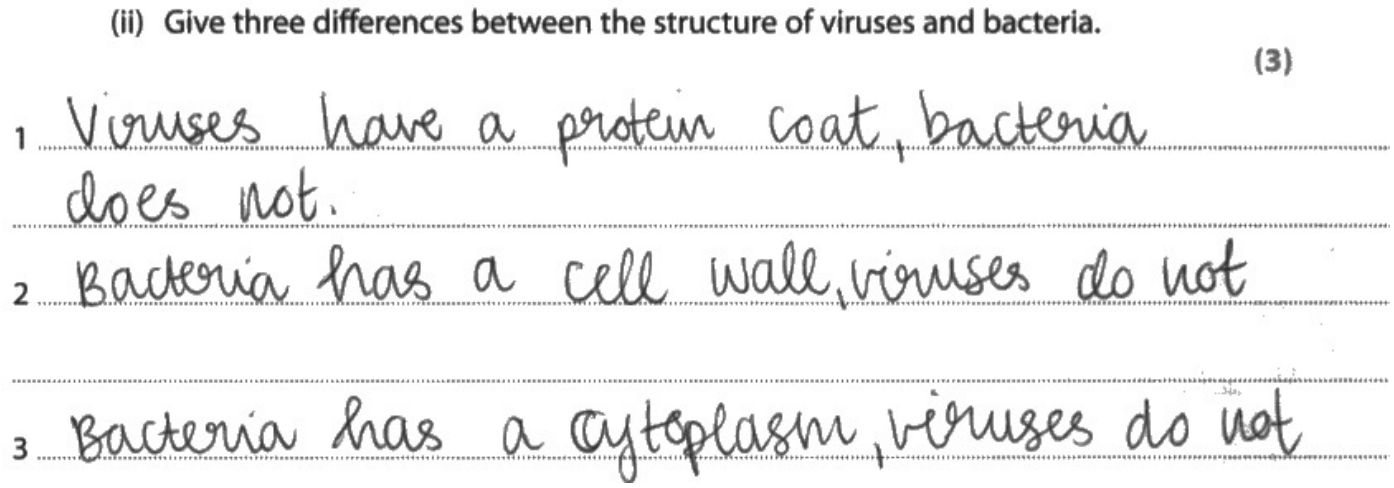
,mucor,
the pamogen releases harmful toxins into the plant which can spread through the ~~pto~~ pheolem around the plant and creates black spots on the leaves and also a lack of chlorophyll

ResultsPlus
Examiner Comments

This response gains no credit as it does not name a virus. Mucor is a fungus.

Question 1 (b)(ii)

Q01(b)(ii) asked candidates to give three differences between the structure of viruses and bacteria. The answer lines were numbered so that candidates could write one difference on each line.



(ii) Give three differences between the structure of viruses and bacteria.

(3)

1 Viruses have a protein coat, bacteria does not.

2 Bacteria has a cell wall, viruses do not

3 Bacteria has a cytoplasm, viruses do not

ResultsPlus
Examiner Comments

This response gains all three marks for correctly stating that viruses have a protein coat, that bacteria have a cell wall and that bacteria have cytoplasm.

ResultsPlus
Examiner Tip

Some responses did not write about structure. Make sure to read the question carefully.

(ii) Give three differences between the structure of viruses and bacteria.

(3)

1 ~~Viruses are smaller is size than bacteria.~~ Bacteria have plasmids while viruses do not.

2 Viruses have a protein coat while bacteria do not.

3 Bacteria have a cell wall ~~with~~ while viruses do not.

ResultsPlus
Examiner Comments

This response also gains three marks for bacteria have plasmids, viruses have a protein coat and bacteria have a cell wall.

(ii) Give three differences between the structure of viruses and bacteria.

(3)

1 Bactria have chromosomes

2 Baetria have Plasmid

3 Baetria have cell wall

ResultsPlus
Examiner Comments

This response gains two marks for bacteria have plasmids and bacteria have a cell wall.

(ii) Give three differences between the structure of viruses and bacteria.

(3)

1 bactera has cellwall but viruses don't have.

2 bacteria carryout respiration but viruses do not.

3 viruses antem protem coat but bactera doesnot.

ResultsPlus
Examiner Comments

This response scores two marks. Bacteria have cell walls and viruses have a protein coat. No credit for carry out respiration as it is not a structural difference.

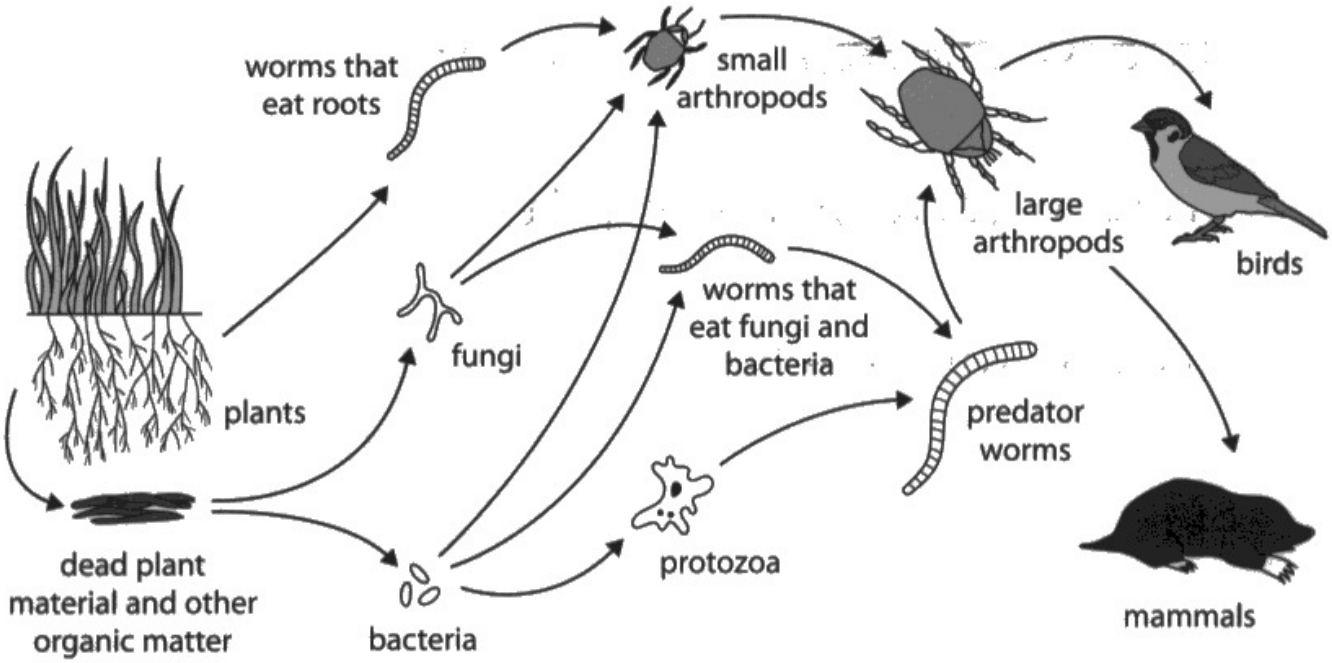
ResultsPlus
Examiner Tip

This question asked for differences in structure so no credit for differences in function.

Question 2 (a)(i)

Q02(a)(i) gave candidates part of a food web from an ecosystem. In this item candidates had to draw a food chain that contains five trophic levels and includes birds. Some responses lost marks by including the arrows incorrectly or drawing a pyramid. Most candidates, however, gained both marks.

2 The diagram shows part of a food web from an ecosystem.



(a) (i) Using the information in the food web, draw a food chain that contains five trophic levels and includes the birds.

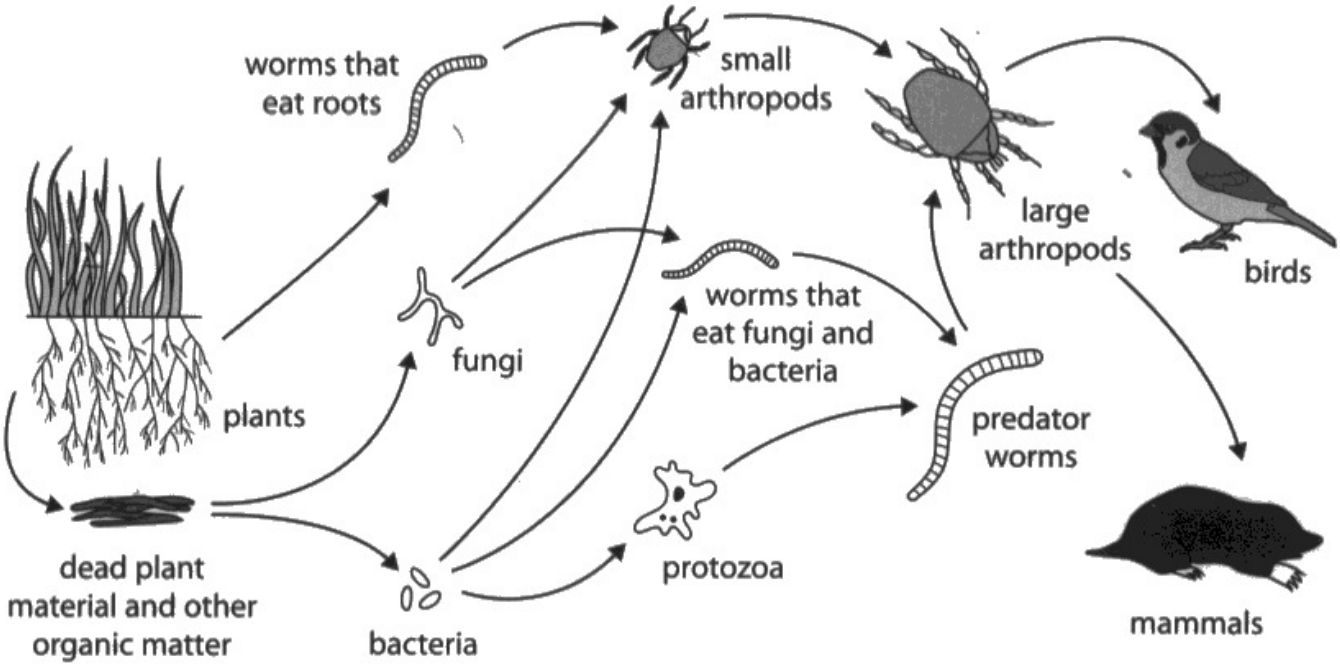
(2)

plants → worms that eat roots → small arthropods → large arthropods → birds

ResultsPlus
Examiner Comments

This scores both marks as it has five levels and includes the birds.

2 The diagram shows part of a food web from an ecosystem.



(a) (i) Using the information in the food web, draw a food chain that contains five trophic levels and includes the birds.

(2)

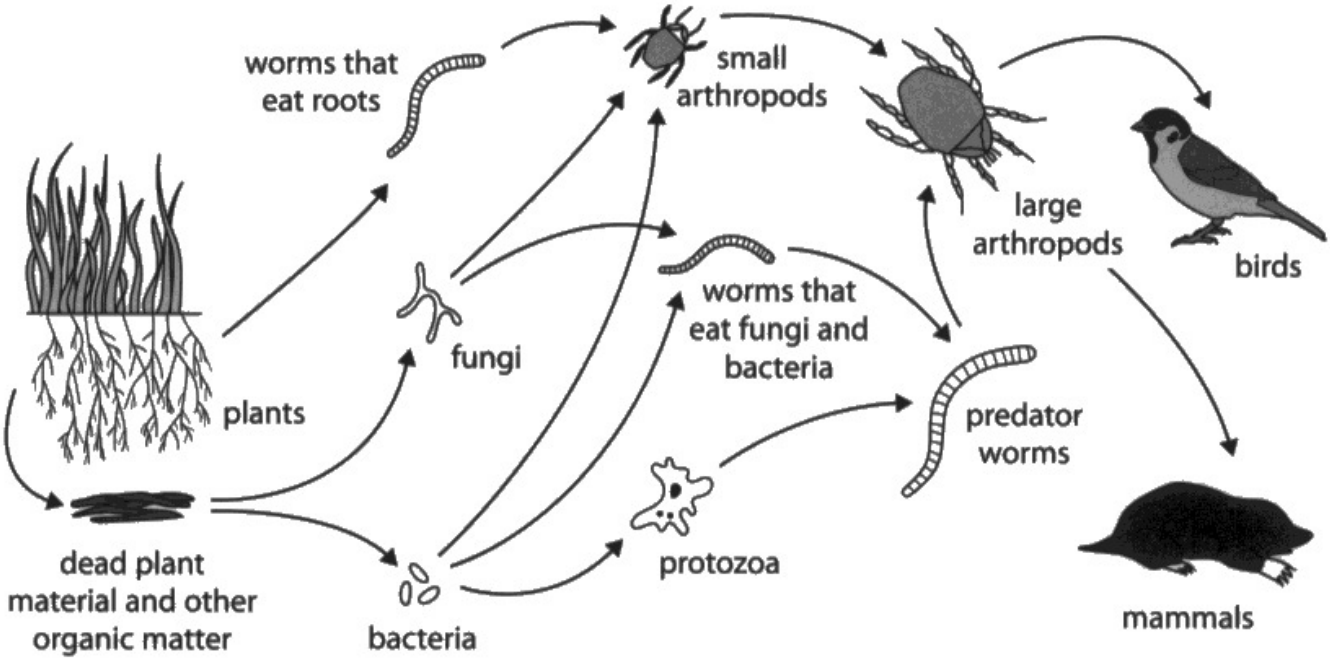
Small arthropods → Large arthropods → Birds

worms that eat roots → plants

ResultsPlus
Examiner Comments

This also gains both marks.

2 The diagram shows part of a food web from an ecosystem.



(a) (i) Using the information in the food web, draw a food chain that contains five trophic levels and includes the birds.

(2)

Plants ~~→~~ worms that eat roots ~~→~~ small arthropods ~~→~~ large arthropods ~~→~~ Birds

ResultsPlus
Examiner Comments

This food chain has the arrows going the wrong way. It therefore only gains one mark.

ResultsPlus
Examiner Tip

Arrows show the direction of energy flow.

Question 2 (a)(ii)

Q02(a)(ii) asked candidates to describe how the bacteria and fungi obtain energy from the organic matter. Marks were given for digestion by saprotrophs (of dead material) using enzymes to provide energy from respiration. Most candidates gained 2 or 3 marks.

(ii) Describe how the bacteria and fungi obtain energy from the organic matter.

(3)

Bacteria and fungi feed on extra-cellular secretion of digestive enzyme. They release digestive enzyme on the ~~food~~ organic matter and digest them into soluble food products which are absorbed by diffusion. The absorbed soluble food product contain glucose. The glucose is used in respiration to produce energy.

ResultsPlus Examiner Comments

This response scores three marks. Reference to digestive enzymes gains digestion and enzymes and glucose being used in respiration.

ResultsPlus Examiner Tip

Although this gains all three marks, the last sentence would be more precise if it stated energy released from respiration.

(ii) Describe how the bacteria and fungi obtain energy from the organic matter.

(3)

→ fungi release digestive enzymes onto organic ~~matter~~ matter. They then absorb the nutrients produced to obtain energy.

ResultsPlus Examiner Comments

This scores two marks for digestive enzymes.

Question 2 (b)

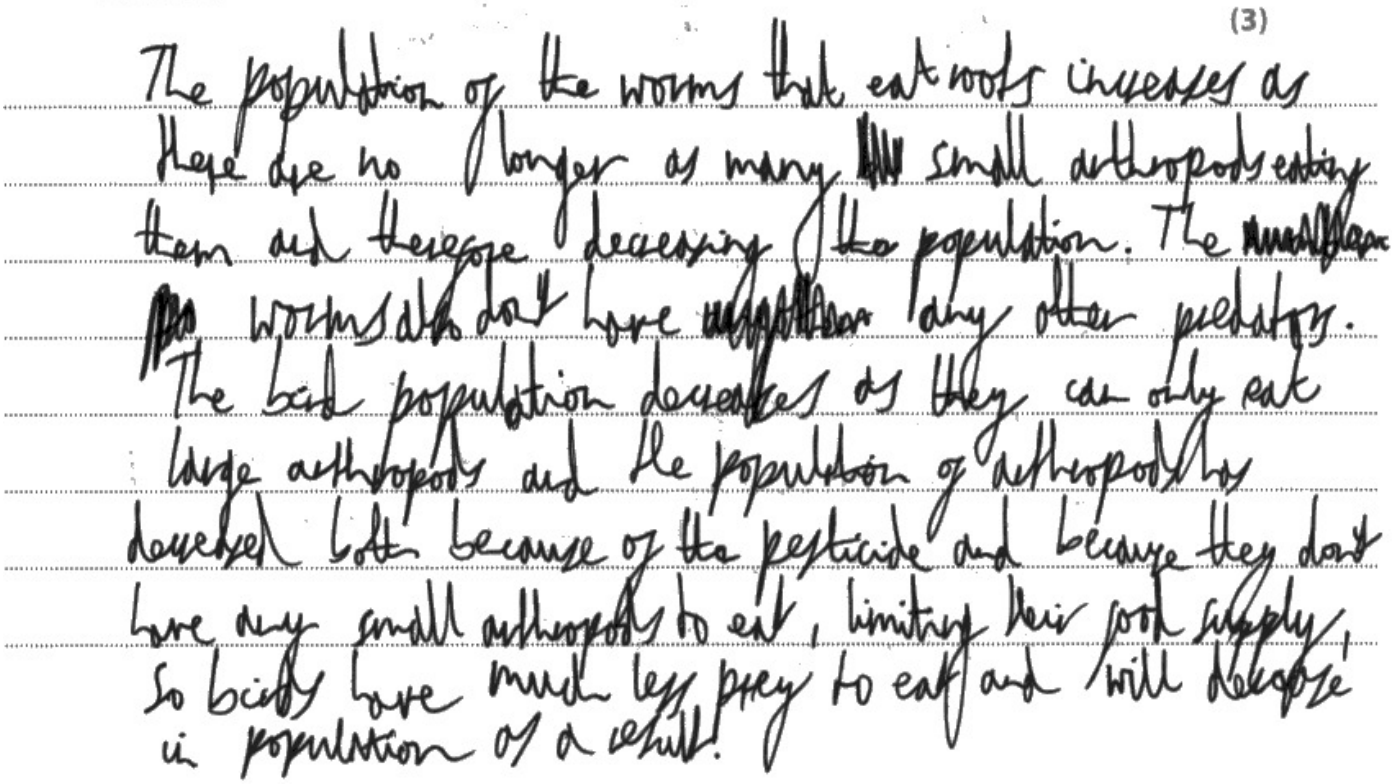
Q02(b) asks candidates to explain how the population of birds and the population of worms that eat roots are affected by a decrease in small and large arthropods. Most responses gained all three marks for explaining that the population of birds would decrease as they would have less food and that the population of worms that eat roots would increase as they will have fewer arthropods feeding upon them.

(b) A pesticide gets into this ecosystem.

The pesticide kills small and large arthropods.

Explain how this affects the population of birds and the population of worms that eat roots.

(3)



ResultsPlus
Examiner Comments

This response gains all marks as it explains that the worm population will increase as there are fewer arthropods to eat them. It also explains that the bird population will decrease as they will have fewer arthropods to eat.

(b) A pesticide gets into this ecosystem.

The pesticide kills small and large arthropods.

Explain how this affects the population of birds and the population of worms that eat roots.

(3)

The total number of the bird population will decrease. This is because birds only eat large arthropods. So when the number of large arthropods decreases it means that the birds will have a ~~less~~ lower number of food supply meaning they will have to fight between themselves for the food. This could make the bird reactive. However, the number of the population of worms* will increase. This is because the worms*1 ~~they~~ will have less predators, or close to non since the number of small arthropods will go down. So the number of the population of worms that eat roots will go up.

1* that eat roots

ResultsPlus
Examiner Comments

This response also scores all marks for explaining that the bird population will decrease as less food for them and that the worm population will increase as they will have fewer predators.

Question 2 (c)

Q02(c) gave candidates a graph showing the numbers of three different soil animals collected by three different traps. Candidates were asked to discuss the number of each animal collected by the three traps. The best responses looked at each animal in turn and described which trap was most effective at catching that animal. They were also given credit for noting that more mites were caught and fewest arthropods were caught. Most candidates were able to score marks with many gaining all five marks.

Discuss the number of each animal type collected by the three traps.

Refer to the scientists' results in your answer.

(5)

The mites were the animals collected in ~~on~~ traps most. Mites were mostly collected in the cul-de-sac trap with (on average) 2.3 mites per day however they were also frequently trapped by the basket trap with 2.25 mites per day. The large arthropods were the most infrequently collected but were mostly collected in the cul-de-sac traps like the mites however only a mean of 0.7 large arthropods per day. The basket trap caught 0.65 large arthropods per day and the pitfall trap caught 0.5 per day on average. The spring tails were caught more frequently than the large arthropods but less frequently than the mites. Unlike the others the most springtails were caught by the basket trap with a mean of 1.5 per day, followed by the cul-de-sac trap with 1.45 per day then the pitfall with 0.65 per day. Pitfall was the least successfull overall

(Total for Question 2 = 13 marks)

ResultsPlus
Examiner Comments

This response gains five marks. It writes that most mites are collected. That mites were collected most in the cul de sac trap. The large arthropods were collected least often. The trap that caught most arthropods was the cul de sac trap. The springtails were collected most by the basket trap.

Discuss the number of each animal type collected by the three traps.

Refer to the scientists' results in your answer.

(5)

The mean number of spring tails caught in the basket trap each day is 1 which is the most effective at catching them. However the pitfall trap seems to be least effective trap at catching springtails. The cul-de-sac trap seemed to be the most effective trap ~~out~~ ei for catching mites as its mean number is 2.3 while the pitfall trap is the least effective. The cul-de-sac trap is the most effective at catching large arthropods while the pit fall trap is the least effective.

ResultsPlus
Examiner Comments

This response also scores five marks. The number of springtails caught in the basket trap is the most effective and pitfall least effective. The cul de sac is the most effective at catching mites and the pitfall is the least effective. The cul de sac trap is most effective at catching arthropods.

ResultsPlus
Examiner Tip

Quoting numbers alone is not going to gain credit so candidates should make sure they use comparisons.

Discuss the number of each animal type collected by the three traps.

Refer to the scientists' results in your answer.

the animal caught most was mites, where there was an average of 5.25 mites caught per day. the animal caught least was the large arthropods where only on average of 1.86 were caught per day. the most effective animal trap was the cul-de-sac trap, which caught an average of 4.46 animals per day whilst the pitfall trap was the least effective only catching an average of 1.9 animals per day. the data taken on number of animals caught per day may not vary across the seasons as some animals may be more prominent at different times of the year. the data may also vary in different locations as ~~some~~ fuel may be greater population of a each animal in different habitats.

(Total for Question 2 = 13 marks)

ResultsPlus
Examiner Comments

This response gains three marks. It scores for most mites caught and fewest caught are arthropods. The most effective trap was the cul de sac which is the same marking point as the pitfall being the least effective trap.

ResultsPlus
Examiner Tip

This response did not compare the numbers of each animal caught by each type of trap. This limited the score it achieved.

Question 3 (b)

Q03(b) required candidates to calculate the surface area to volume ratio of a cell shaped like a cube. The mathematics skills given in the specification include calculation of surface area and volume of regular shapes such as a cube. Many responses gained all three marks however those that did not could still gain credit if some of their working was correct.

(b) A cell is shaped like a cube.

Each side has a length of 0.053 mm.

Calculate the surface area to volume ratio of this cell.

Give your answer in the form n : 1

(3)

$0.053 \times 0.053 \times 6 =$ surface area

$0.016854 =$ SA

$0.053 \times 0.053 \times 0.053 = \checkmark$

$1.48877 \times 10^{-4} = \checkmark$

$0.016854 : 1.48877 \times 10^{-4}$

$\frac{1}{1.48877 \times 10^{-4}} \times \frac{1}{1.48877 \times 10^{-4}}$

surface area to volume ratio = 113.2 : 1

113.2 : 1

113.2075472

ResultsPlus
Examiner Comments

This response scores all three marks for a correct answer of 113.2.

(b) A cell is shaped like a cube.

Each side has a length of 0.053 mm.

Calculate the surface area to volume ratio of this cell.

Give your answer in the form n : 1

(3)

$0.053^2 \times 6 = 0.016854$

$0.053^2 = 1.48877 \times 10^{-4}$

$\frac{0.016854}{m^2} = 113.21$

$= 113$ to 3sf.

surface area to volume ratio = 113 :1

ResultsPlus
Examiner Comments

This response also scores three marks for a correct answer of 113 .

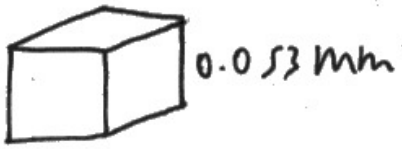
(b) A cell is shaped like a cube.

Each side has a length of 0.053 mm.

Calculate the surface area to volume ratio of this cell.

Give your answer in the form n : 1

(3)



$SA = (0.053 \times 0.053) \times 6 = 0.016854$

$V = 0.053 \times 0.053 \times 0.053 = 1.48877 \times 10^{-4}$

$\times 10000$

$SA = 168.54$

$V = 1.48877$

surface area to volume ratio = 168.54 : 1

ResultsPlus
Examiner Comments

This response fails to get the correct answer. However it gains 2 marks for correctly calculating the surface area as 0.0168 and for calculating the volume as 1.48877×10^{-4}.

Question 3 (c)(i)

Q03(c) told candidates that red blood cells do not have cell walls. They then had to explain how this difference would affect red cells when placed in distilled water. Most candidates were able to score three marks. Those responses that did not gain marks were confused about the direction of water movement in osmosis. The best way for candidates to explain osmosis is the movement of water from a dilute solution to a more concentrated solution. Some candidates explained osmosis in terms of water moving from a region of higher water potential to a region of lower water potential and that is also fine and a good preparation for A level terminology. Describing water as being more concentrated or less concentrated is confusing.

(c) Animal cells, unlike plant cells, do not have a cell wall.

(i) Explain how this difference affects red blood cells when placed in distilled water.

(3)

A hypotonic solution is created and the red blood cell swells until it lyses (bursts). Due to the lack of a cell wall, it is able to burst rather than just being kept turgid like a plant cell. Water keeps entering the cell via osmosis due to lower water potential inside the red blood cell.

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Examiner Comments

This response scores full marks as it refers to the cell bursting, water enters by osmosis due to a lower water potential inside the red blood cell.

(c) Animal cells, unlike plant cells, do not have a cell wall.

(i) Explain how this difference affects red blood cells when placed in distilled water.

(3)

There is a higher water potential outside the red blood cell than inside, so osmosis occurs, causing water to more into the cell, ~~and cause~~ as they don't have a cell wall the prevent water from entering and only a cell membrane, which is partially permeable, allowing water to enter. ~~Ebba~~ This will cause the cell to burst and die as more and water water move into the cell.

ResultsPlus
Examiner Comments

This response also scores three marks. It explains that there is a higher water potential outside the cell so water enters the cell by osmosis. The cell bursts.

(c) Animal cells, unlike plant cells, do not have a cell wall.

(i) Explain how this difference affects red blood cells when placed in distilled water.

(3)

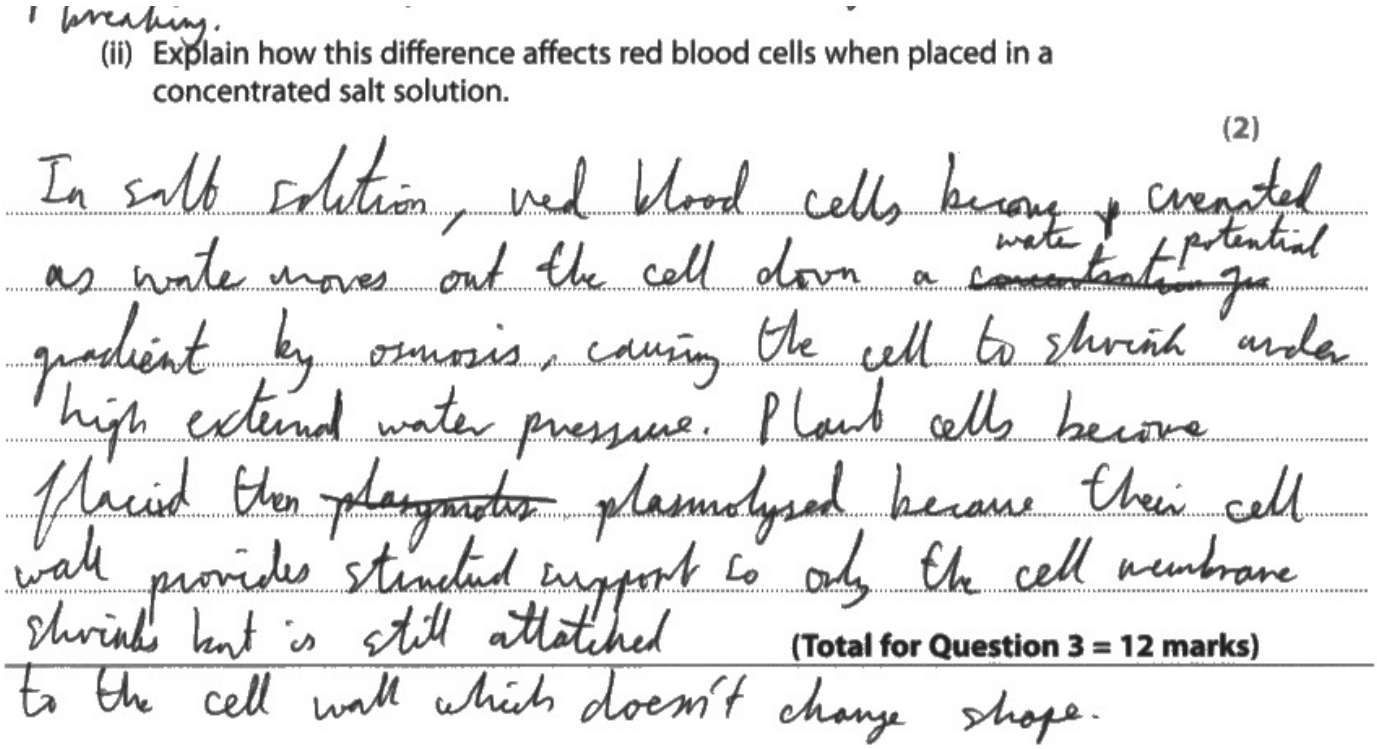
Due to osmosis, the water enters red blood cells damaging the cell and decreases oxyhaemoglobin.

ResultsPlus
Examiner Comments

This scores one mark for explaining that water enters the cell by osmosis.

Question 3 (c)(ii)

Q03(c)(ii) asks candidates to explain how this difference affects red cells placed in a concentrated salt solution. This item also scored well with many candidates gaining two marks for explaining that water leaves the cell by osmosis from a dilute to a more concentrated solution. This causes the cell to shrink. Some candidates wrote about the cell being plasmolysed which gained no credit.



(ii) Explain how this difference affects red blood cells when placed in a concentrated salt solution.

(2)

In salt solution, red blood cells become ~~concentrated~~ crenated as water moves out the cell down a water potential gradient by osmosis, causing the cell to shrink under high external water pressure. Plant cells become flaccid then ~~plasmolysis~~ plasmolysed because their cell wall provides structural support so only the cell membrane shrinks but is still attached to the cell wall which doesn't change shape.

(Total for Question 3 = 12 marks)

ResultsPlus
Examiner Comments

This gains both marks. It explains that the cell will crenate as water moves out of the cell down a water potential gradient by osmosis.

(ii) Explain how this difference affects red blood cells when placed in a concentrated salt solution.

(2)

the red blood cells shrinks, as they are hypotonic to the concentrated salt solution, so water molecules undergo osmosis and move out of the cell across its partically permeable membrane. However, it does not undergo plasmolosis where the cell membrane detaches from the cell wall, as it doesn't have a cell wall.

ResultsPlus
Examiner Comments

This also scores two marks for the cell shrinking as water leaving the cell by osmosis.

(ii) Explain how this difference affects red blood cells when placed in a concentrated salt solution.

(2)

When a red blood cell is placed in to concentrated salt solution the red blood cell has an affect with osmosis Happening this means that the red blood cell will shrivell up to an small thing.

ResultsPlus
Examiner Comments

This scores one mark for the cell shrivels.

ResultsPlus
Examiner Tip

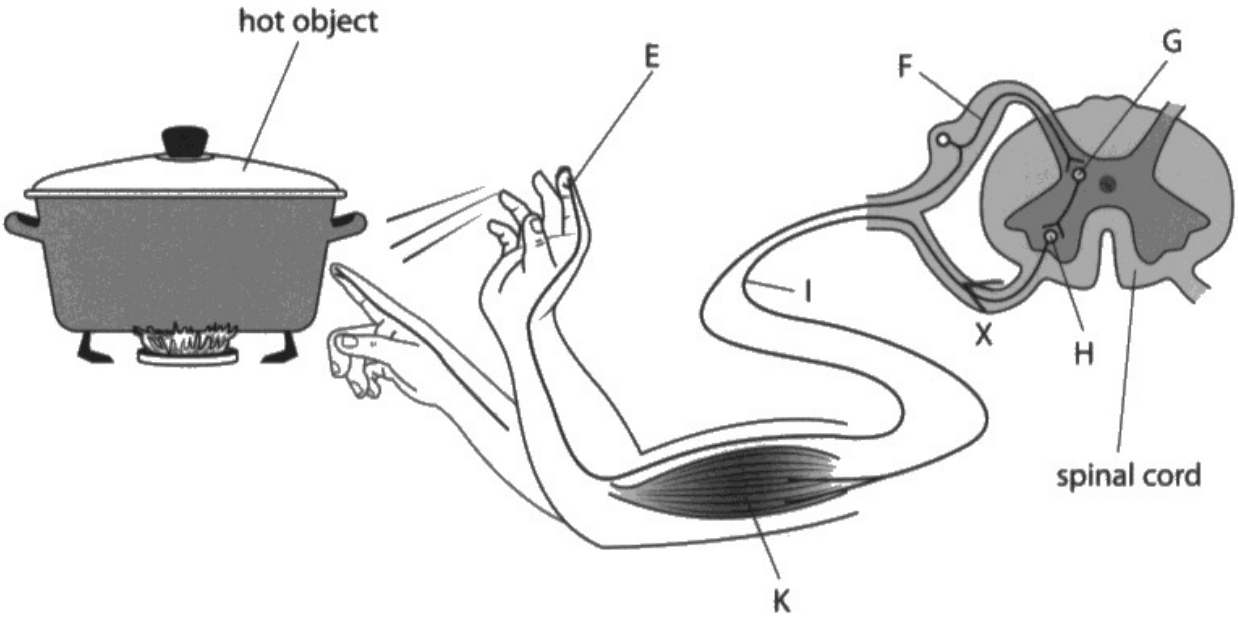
The answer can be improved by explaining the direction of osmosis and the gradient causing it.

Question 4 (a)(i)

In Q04(a)(i) few candidates could correctly name the withdrawal reflex even though it is named in the specification. Credit was also given for describing the reflex as involuntary or automatic or somatic.

4 The diagram shows a human reflex response to touching a hot object.

Some of the structures in the reflex arc are labelled.



(a) (i) Give the name of this reflex response.

(1)

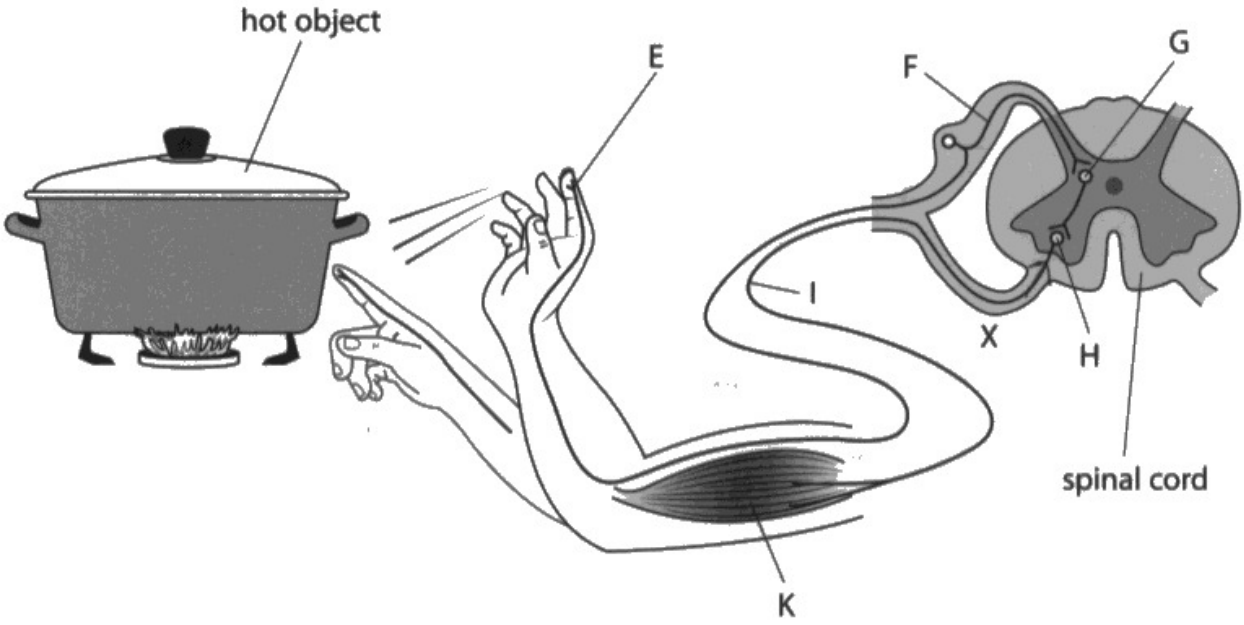
Withdrawal reflex

ResultsPlus
Examiner Comments

This scores the mark for withdrawal.

4 The diagram shows a human reflex response to touching a hot object.

Some of the structures in the reflex arc are labelled.



(a) (i) Give the name of this reflex response.

(1)

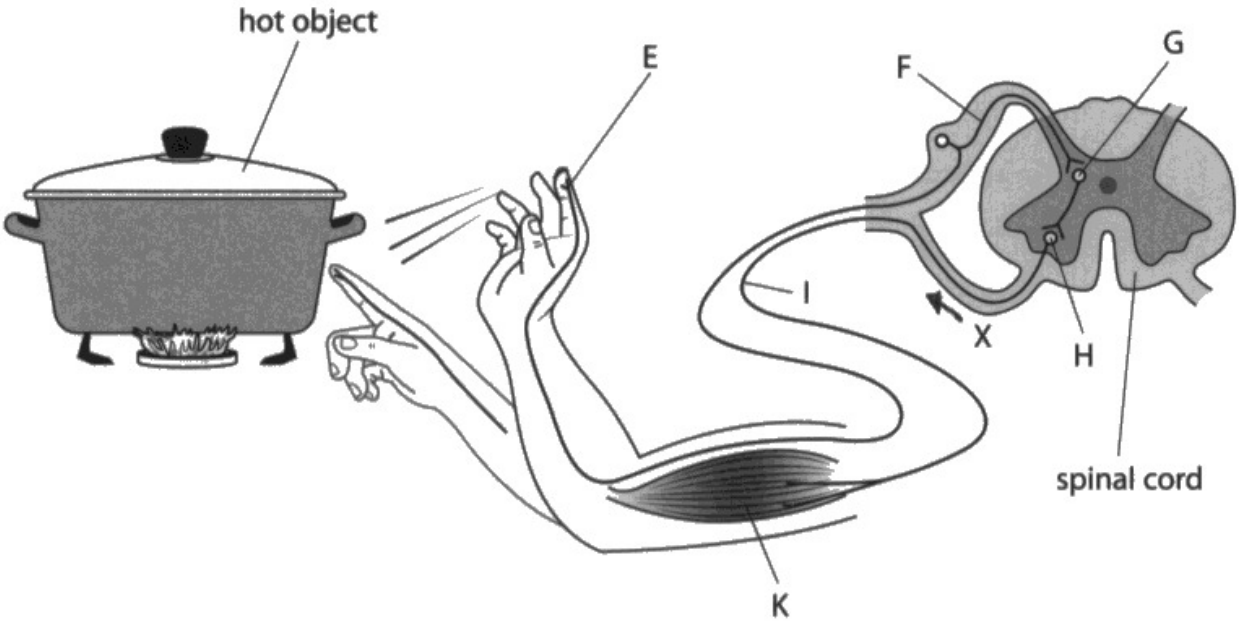
Withdrawl

ResultsPlus
Examiner Comments

This also scores the mark.

4 The diagram shows a human reflex response to touching a hot object.

Some of the structures in the reflex arc are labelled.



(a) (i) Give the name of this reflex response.

(1)

Automatic

ResultsPlus
Examiner Comments

This scores the mark for automatic.

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Examiner Tip

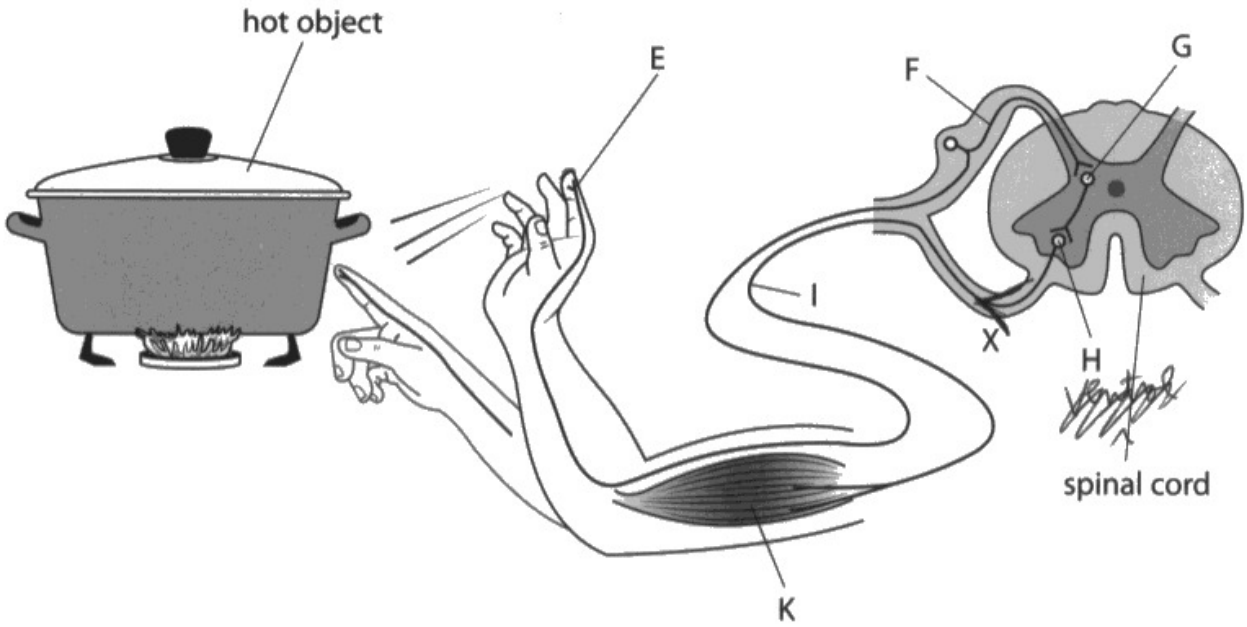
Candidates should be familiar with all of the specification content.

Question 4 (a)(ii)

Q04(a)(ii) required candidates to draw an arrow on the diagram to show the direction of the impulse at point X , the motor neurone. Most responses gained the mark for showing the arrow pointing away from the spinal cord.

4 The diagram shows a human reflex response to touching a hot object.

Some of the structures in the reflex arc are labelled.



(a) (i) Give the name of this reflex response.

(1)

pain reflex action / protection reflex action

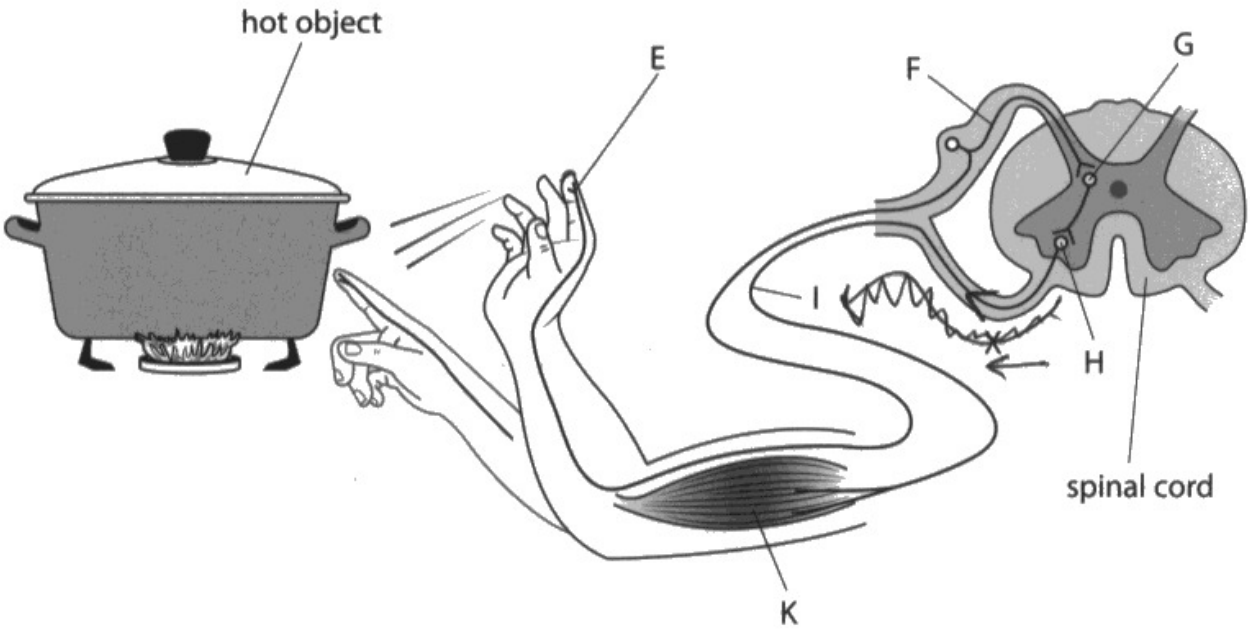
(ii) Draw an arrow on the diagram to show the direction of the nerve impulse at point X.

ResultsPlus
Examiner Comments

Even though the arrowhead has been put on the motor neurone this response was credited as correct.

4 The diagram shows a human reflex response to touching a hot object.

Some of the structures in the reflex arc are labelled.



(a) (i) Give the name of this reflex response.

(1)

automatic

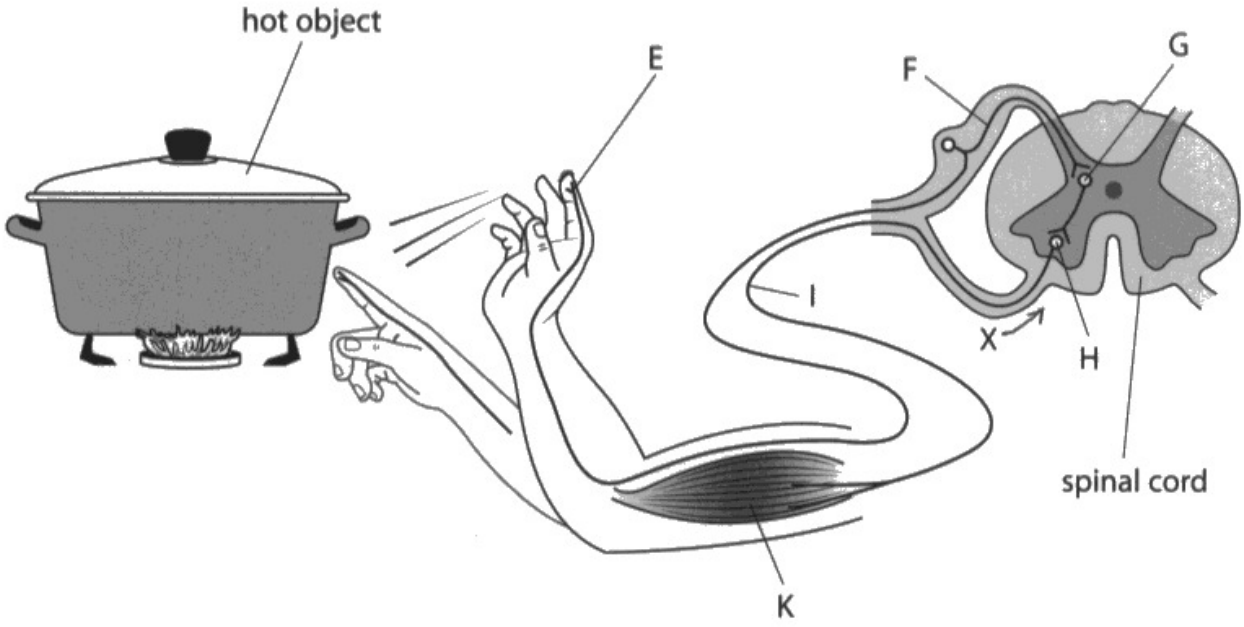
(ii) Draw an arrow on the diagram to show the direction of the nerve impulse at point X.

ResultsPlus
Examiner Comments

This gains the mark for showing the direction away from the spinal cord.

4 The diagram shows a human reflex response to touching a hot object.

Some of the structures in the reflex arc are labelled.



(a) (i) Give the name of this reflex response.

(1)

fight or flight

(ii) Draw an arrow on the diagram to show the direction of the nerve impulse at point X.

ResultsPlus
Examiner Comments

No mark as arrow is pointing towards the spinal cord.

Question 4 (b)(i)

Q04(b)(i) gave candidates the speed of transmission and the length of a neurone and asked them to calculate the time in seconds it would take for an impulse to pass along a neurone. Candidates had to express their answer in standard form. Many candidates were able to do this calculation correctly but some lost a mark because they did not put their answer in standard form. Others gained no credit because of incorrect rounding of decimal places.

(b) (i) A neurone is 1.10 m in length.

The speed of the nerve impulse in this neurone is 120 metres per second.

Calculate the time, in seconds, for the impulse to pass along the neurone.

Give your answer in standard form.

(2)

$\frac{1.10}{120} = 0.00916$

time 9.16×10^{-3} s

ResultsPlus
Examiner Comments

This gains full marks for 9.16×10^{-3} recurring.

(b) (i) A neurone is 1.10 m in length.

The speed of the nerve impulse in this neurone is 120 metres per second.

Calculate the time, in seconds, for the impulse to pass along the neurone.

Give your answer in standard form.

(2)

$\frac{1.10}{120}$

$= 9.17 \times 10^{-3}$ ≈ 0.00917

time 9.17×10^{-3} / ~~0.00917~~ s

ResultsPlus
Examiner Comments

This scores two marks for the correct answer in standard form.

(b) (i) A neurone is 1.10 m in length.

The speed of the nerve impulse in this neurone is 120 metres per second.

Calculate the time, in seconds, for the impulse to pass along the neurone.

Give your answer in standard form.

(2)

Speed = distance / time

$\frac{1.10}{120} = 0.00916$

time 0.00916 s

ResultsPlus
Examiner Comments

This gains one mark for the correct answer but it is not in standard form.

Question 4 (b)(ii)

Q04(b)(ii) asked candidates to describe how an impulse passes from neurone to neurone. Most responses gained both marks for describing the diffusion of a neurotransmitter across a synapse.

(ii) Describe how the impulse passes from neurone to neurone in the reflex arc.

(2)

through a synapse, chemicals called neurotransmitters diffuse across the gap and set of an impulse in the next neurone

ResultsPlus
Examiner Comments

This scores both marks for neurotransmitter diffuses across a synapse.

(ii) Describe how the impulse passes from neurone to neurone in the reflex arc.

(2)

By electrical impulses through neuro transmitters.

ResultsPlus
Examiner Comments

This scores one mark for stating that it involves neurotransmitters but does not mention diffusion or a synapse.

Question 4 (c)(i)

Q04(c)(i) required candidates to explain how sensing pain, such as when an ankle is damaged, benefits an organism. This item was answered well by most candidates with most scoring at least one mark. The best responses noted that pain would lead to the person stopping walking or using the ankle, to prevent further damage and to allow the ankle to recover.

(c) Pain has a survival function.

If a person damages their ankle, they sense pain.

(i) Explain how sensing pain benefits an organism.

(2)

The pain alerts the person that damage has occurred and that they shouldn't continue with their action. This causes them to stop and take a break, allowing the body to repair itself. Once they're healed, the pain leaves. The pain alerts them to seek medical help. It then allows them to catch prey/evade predators better.

ResultsPlus
Examiner Comments

This scores both marks for stopping using the ankle and allowing repair.

(c) Pain has a survival function.

If a person damages their ankle, they sense pain.

(i) Explain how sensing pain benefits an organism.

(2)

This will cause the organism to be more cautionary and try to be able to prevent further damage from the harmful stimulus. Allowing the injured area to be able to heal easily without further damages, to reduce loss of blood.

ResultsPlus
Examiner Comments

This also scores both marks for preventing further damage and allowing the ankle to heal.

(c) Pain has a survival function.

If a person damages their ankle, they sense pain.

(i) Explain how sensing pain benefits an organism.

(2)

It prevent the organism from repeating the action by making hurt so they do not want to do it again as the ankle will not be hurt by that way again. It also makes it is easier for the body to repair the damaged part as pain causes you not to move it so it can heal quicker

ResultsPlus
Examiner Comments

This also scores two marks for repairing the damage and not moving it.

Question 4 (c)(ii)

Q04(c)(ii) asks candidates to explain which components of the nervous system may be affected by medicines that prevent communication between the injured ankle and the brain. Most candidates were able to gain marks with many gaining all four marks. The best answers described how the receptor would be affected so no pain will be detected and no impulse will pass along the sensory neurone or via a synapse to the relay neurone.

(ii) Some medicines are used to reduce pain.

These medicines work by preventing communication between the injured ankle and the brain.

Explain which components of the nervous system may be affected by these medicines.

(4)

a synapse may be blocked as that is how we transfer an electrical impulse from our sensory nurone to our CNS (spinal chord and brain) which detects the pain in our body so if the medicid stops synapses then we wouldnt be able to feel the pain.
it could also effect our receptor cells as that is what starts sending the electrical impulse arroud the body which causes the brain to feel the pain

ResultsPlus
Examiner Comments

This scores four marks for reference to a synapse being affected. No impulse in sensory neurone and receptors being affected.

(ii) Some medicines are used to reduce pain.

These medicines work by preventing communication between the injured ankle and the brain.

Explain which components of the nervous system may be affected by these medicines.

(4)

The receptor will be effected by these medicines because it means that they can't detect the stimulus, so they can't send a signal through to the effector to carry out a response to the pain. Also it can't send a signal or impulse to the CNS, because the communication in the brain isn't workable. This means that you cannot feel the pain because of the receptor, so you don't need to carry out a response.

ResultsPlus
Examiner Comments

This scores three marks. The receptor is affected, so no stimulus detected. No impulse sent.

(ii) Some medicines are used to reduce pain.

These medicines work by preventing communication between the injured ankle and the brain.

Explain which components of the nervous system may be affected by these medicines.

(4)

- The receptors may not be active.
- This means the stimulus is not transferred to the sensory neuron.
- This means the synapse does not transfer the electrical impulse to the next neuron.
- Therefore the brain does not acknowledge the injury causing no feeling of pain in the body part.

ResultsPlus
Examiner Comments

This response also scores four marks. Receptors not active, sensory neurone affected, synapse not functioning, impulse not sent.

Question 5 (a)

In Q05(a) almost all candidates could correctly state two components of blood other than blood cells.

5 Red blood cells and white blood cells are two of the components found in human blood.

(a) State two other components of blood.

(2)

1 platelets

2 plasma

ResultsPlus
Examiner Comments

This scores both marks for plasma and platelets.

5 Red blood cells and white blood cells are two of the components found in human blood.

(a) State two other components of blood.

(2)

1 plasma

2 antigens

ResultsPlus
Examiner Comments

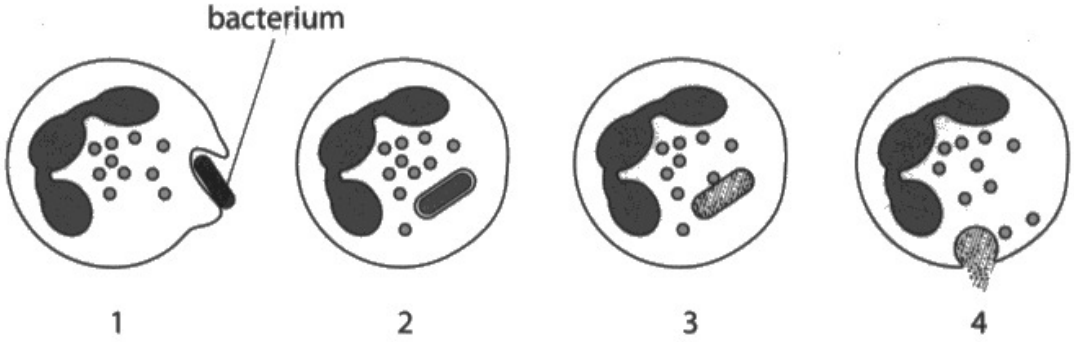
This scores one mark for plasma, antigen is not correct.

Question 5 (b)

Q05(b) gave candidates a series of four diagrams showing how a phagocyte engulfs, digests and expels a bacterium. The candidates were asked to describe what is happening in each stage. Many responses gained all four marks by clearly describing how a phagocyte engulfs the bacterium, how it is held inside, a vesicle fuses with the bacterium allowing enzymes to digest it and how the digested products are then expelled from the cell.

(b) Some white blood cells destroy pathogens.

The diagram shows four stages in this process.



Describe what is happening in each stage of this process.

(4)

- In the first image, the phagocyte is engulfing the pathogen

- The second image shows the phagocyte with the bacterium fully engulfed by it

- The third image shows the pathogen being digested and broken down by the phagocyte

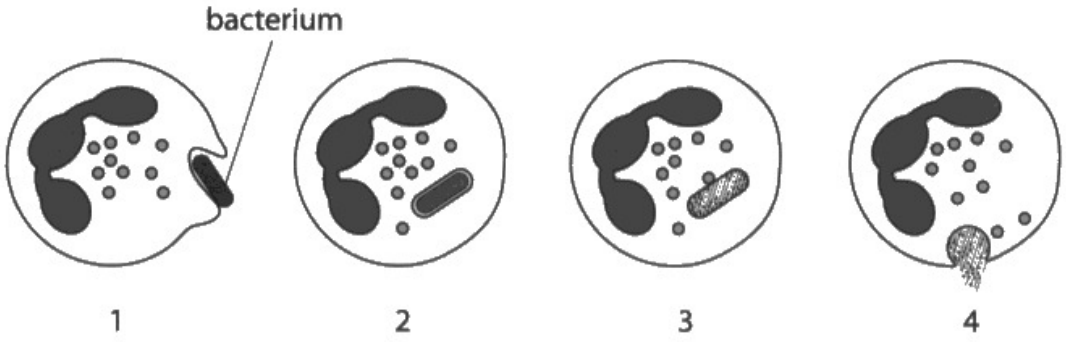
- The final image shows the broken down pathogen being ~~fast~~ excreted from the phagocyte

This response gains all four marks. It describes how the phagocyte engulfs the pathogen. It describes the pathogen as being fully engulfed and how the broken down pathogen is excreted from the phagocyte.

Although this response scores full marks, it does not mention enzymes as being involved in digestion and the use of expelled rather than excreted would be more accurate in stage 4.

(b) Some white blood cells destroy pathogens.

The diagram shows four stages in this process.



Describe what is happening in each stage of this process.

(4)

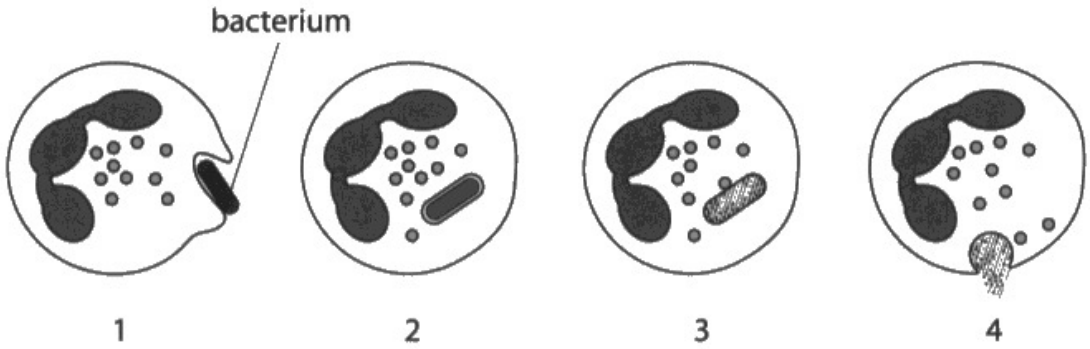
bacterium is being engulfed by phagocyte in 1. bacterium is then being digested in stage 2 and 3 by enzymes. In 2, the bacteria is starting to have been digested in the phagocyte by its enzymes; in stage 3 the the bacteria has been fully digested by the phagocytes enzymes; and in stage 4 its contents are absorbed and then waste is 'eliminated / excreted / egested.

ResultsPlus
Examiner Comments

This response also gains full marks for reference to the bacterium being engulfed by the phagocyte. Being digested by enzymes and being released out of the cell.

(b) Some white blood cells destroy pathogens.

The diagram shows four stages in this process.



Describe what is happening in each stage of this process.

(4)

A phagocyte white bloodcell ~~is~~ covers a bacterium. The bacterium is detected as a pathogen. Digestive enzymes are used to break down the bacterium. The waste products of the phagocyte is released out of the cell.

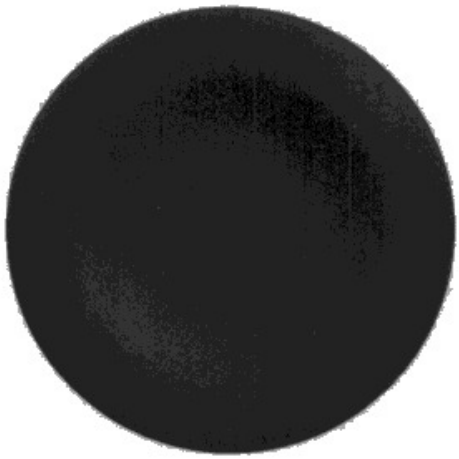
ResultsPlus
Examiner Comments

This response scores three marks. Phagocyte, digestive enzymes breaking down the bacterium and waste products released from the cell.

Question 5 (c)(i)

Q05(c)(i) gave a picture of a red blood cell. Candidates were given the actual diameter of the cell and asked to calculate the magnification. Many candidates gained full marks for this with the rest picking up some marks for their working.

(c) The picture shows a human red blood cell.



© Artem_Graf/Shutterstock

(i) The actual diameter of this human red blood cell is 8.1 µm.

Determine the magnification of the picture.

[1 mm = 1000 µm]

(3)

57 mm × 1000

= 57,000 µm

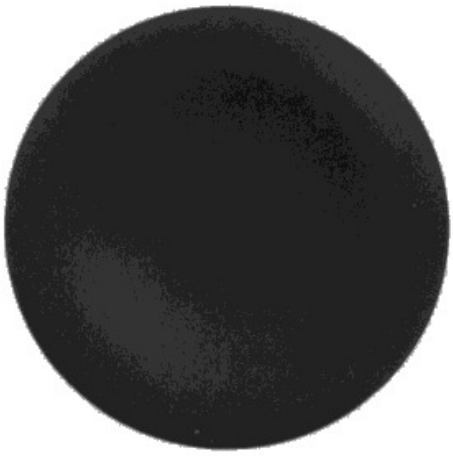
$\frac{57\,000}{8.1}$ = 7037

magnification = 7037 ×

ResultsPlus
Examiner Comments

This gains all three marks for correctly calculating the magnification.

(c) The picture shows a human red blood cell.



© Artem_Graf/Shutterstock

(i) The actual diameter of this human red blood cell is 8.1 µm.

Determine the magnification of the picture.

[1 mm = 1000 µm]

(3)

$8.1 \div 1000 = 8.1 \times 10^{-3}$

magnification = 8.1×10^{-3}

ResultsPlus
Examiner Comments

This gains one mark for converting µm into mm.

Question 5 (c)(ii)

Q05(c)(ii) gave candidates a table with data on % oxygen saturation of blood and tissue deoxygenation per minute for anaemic and non-anaemic patients with normal blood flow and slow blood flow. Candidates were asked to discuss the relationship between anaemia, blood flow, oxygen saturation and tissue deoxygenation and to refer to the data and use their biological knowledge in their answers. Many candidates gained full marks and almost all candidates gained some credit.

Discuss the relationships between anaemia, blood flow, percentage oxygen saturation of blood and rate of tissue deoxygenation.

You should refer to data in the table and use your biological knowledge in your answer.

(5)

Non-Anaemic people with normal blood flow had a mean percentage oxygen saturation of blood of 81%. whereas Anaemic people with normal blood flow had ~~81~~ 76%, 5% less. This suggests someone ~~with Anaemia~~ who is anaemic will have lower oxygen saturation as they have ~~less~~ fewer red blood cells which transport oxygen around the body. Non-anaemic people with slow blood flow had a mean percentage oxygen saturation of 77%, less than those with normal blood flow ~~of~~ but still more than the anaemic people with slow blood flow who only had 68%. People with anaemia have overall lower oxygen saturation of blood and even less with slower blood flow. People with anaemia have a higher rate of tissue deoxygenation per minute compared to non-anaemics, both for normal and slow blood flow, because they have less red blood cells to transport oxygen. However, the group sizes range from 10 to 251 making the mean percentages unfair. We also have no info of the health of the patients, diet, sex or lifestyle

(Total for Question 5 = 14 marks)

This scores five marks. It refers to anaemic patients having a lower oxygen saturation. It notes they have fewer red cells to transport oxygen. It also notes that (anaemic) patients with slow blood flow had a lower saturation than (anaemic) with normal blood flow. Anaemic patients had a higher rate of tissue deoxygenation than non-anaemic patients. It also comments that the group sizes are unequal and that there is no information on diet, sex or lifestyle of the patients.

Discuss the relationships between anaemia, blood flow, percentage oxygen saturation of blood and rate of tissue deoxygenation.

You should refer to data in the table and use your biological knowledge in your answer.

(5)

People who are anaemic have less red blood cells which contain haemoglobin and this contains oxygen, meaning that people with anaemia will have decreased oxygen saturation as seen by the experiment. tissue requiring oxygen to function and if it does not recieve a constant supply then it will deoxygenate fast which means that anaemic people (who have reduced oxygen levels) will have higher levels of deoxygenated blood. People with slow blood flow have will experience lower rates of tissue deoxygenation as the blood will travel around the body slower allowing the haemoglobin to be dispersed more easily.

ResultsPlus
Examiner Comments

This response also gains full marks. It refers to anaemic people having fewer red cells and less oxygen saturation. The anaemic patients have a lower supply (less carried) of oxygen and have faster tissue deoxygenation. People with slow blood flow have lower rates of tissue deoxygenation.

Question 6 (a)

Q06(a) concerned a genetic cross between pea plants with axial flowers and terminal flowers. All of the many offspring plants had axial flowers. Candidates were asked to use a genetic diagram to show the genotypes of the parents, the gametes and the offspring. Many responses scored full marks using a genetic diagram or a Punnett square to show the parent genotypes, gametes and offspring genotypes. Some weaker candidates chose different letters to represent the alleles or did not use the normal capital to represent dominant alleles and lower case to represent recessive alleles.

6 Many characteristics of pea plants are genetically controlled.

One of these characteristics is flower position.

Flower position can either be axial or terminal.

Axial

Terminal

In a first cross, scientists crossed pea plants with axial flowers with pea plants with terminal flowers.

This first cross produced 1120 offspring plants.

All of these offspring plants had axial flowers.

(a) Use a genetic diagram to show the genotypes of the parent plants, the gametes they produce and the genotypes of the offspring plants.

(3)

terminal

	t	t
A	At	At
A	At	At

axil = dominent geno

axil

This scores full marks for clearly showing parent genotypes, gametes and offspring genotypes in a Punnett square.

It is more usual to use the same letter to represent alternative alleles of the same gene.

6 Many characteristics of pea plants are genetically controlled.

One of these characteristics is flower position.

Flower position can either be axial or terminal.

Axial

Terminal

In a first cross, scientists crossed pea plants with axial flowers with pea plants with terminal flowers.

This first cross produced 1120 offspring plants.

All of these offspring plants had axial flowers.

(a) Use a genetic diagram to show the genotypes of the parent plants, the gametes they produce and the genotypes of the offspring plants.

(3)

Parent Genotypes = AA, aa

Parent Gametes = A, A, a, a

	A	A
a	Aa	Aa
a	Aa	Aa

genotypes of offspring = Aa.

ResultsPlus
Examiner Comments

This also gains all three marks.

6 Many characteristics of pea plants are genetically controlled.

One of these characteristics is flower position.

Flower position can either be axial or terminal.

Axial

Terminal

In a first cross, scientists crossed pea plants with axial flowers with pea plants with terminal flowers.

This first cross produced 1120 offspring plants.

All of these offspring plants had axial flowers.

(a) Use a genetic diagram to show the genotypes of the parent plants, the gametes they produce and the genotypes of the offspring plants.

(3)

Axil - AA Aa - Terminal

- Hetrozygous

Hetrozygous dominant

A is dominant over a

100% axil

0% terminal

X	A	a
A	AA	Aa
A	AA	Aa

Hetrozygous

ResultsPlus
Examiner Comments

This scores one mark as it selects incorrect parent genotypes however, as shown in the mark scheme additional guidance, we can allow one mark for selecting gametes in this case.

Question 6 (b)(i)

Q06(b)(i) asked candidates to calculate the ratio of axial to terminal plants from the numbers given.

(b) The scientists allowed the offspring from the first cross to self-fertilise.

This second cross produced 858 second generation plants. 608 of the plants had axial flowers and the other plants had terminal flowers.

(i) Calculate the ratio of plants with axial flowers to plants with terminal flowers.

Give your answer in the form n : 1

(2)

858 - 608 = 250 (terminal)

608 : 250

2.432 : 1

ratio = 2.432 : 1

ResultsPlus
Examiner Comments

This scores both marks.

(b) The scientists allowed the offspring from the first cross to self-fertilise.

This second cross produced 858 second generation plants. 608 of the plants had axial flowers and the other plants had terminal flowers.

(i) Calculate the ratio of plants with axial flowers to plants with terminal flowers.

Give your answer in the form n : 1

858 − 608 = 250

(2)

608 : 250

2·4 : 1

ratio = 2·4 : 1

This also scores both marks.

(b) The scientists allowed the offspring from the first cross to self-fertilise.

This second cross produced 858 second generation plants. 608 of the plants had axial flowers and the other plants had terminal flowers.

(i) Calculate the ratio of plants with axial flowers to plants with terminal flowers.

Give your answer in the form n:1

(2)

A : T : Total

608 : 250 : 858

0.7 0.3 1

ratio = 0.21 :1

ResultsPlus
Examiner Comments

This scores one mark for the unsimplified ratio of 608 to 250.

ResultsPlus
Examiner Tip

Always show the stages in working as even errors in calculation can gain some marks.

Question 6 (b)(ii)

In Q06(b)(ii) candidates were asked to explain why the ratio of plants with axial flowers to plants with terminal flowers was different from the expected ratio. Candidates did not find it easy to express their ideas but the best responses gained full marks for explaining that the ratio was not 3:1 as fertilisation is a random process and that fewer axial plants germinated.

(ii) Explain why the ratio of plants with axial flowers to plants with terminal flowers is different from the expected ratio.

(3)

- Axial flowers have the dominant allele
- However, a plant with Aa can produce offspring of aa if it fertilises with another Aa
- It has a 25% chance to do this
- Terminal flowers have the recessive allele
- offspring from the first cross could self-fertilise
- This means they fertilise at random
- The ratio could have been any number.

ResultsPlus
Examiner Comments

This response scores all three marks. Reference to the expected ratio having 25% aa plants, reference to fertilisation and it being a random process.

(ii) Explain why the ratio of plants with axial flowers to plants with terminal flowers is different from the expected ratio.

(3)

The expected ratio is 3:1, axial to terminal because crossing Aa with Aa leads to AA, Aa, Aa, aa — 3 of which have the axial phenotype.

Decisions of alleles is random and therefore doesn't have to allign with expected ratio

Perhaps Terminal plant more likely to survive germination and so had advantage.

ResultsPlus
Examiner Comments

This response also gains three marks. Reference to expected ratio, reference to random and terminal plants more likely to germinate is converse of marking point 4.

(ii) Explain why the ratio of plants with axial flowers to plants with terminal flowers is different from the expected ratio.

(3)

As the ratio is based off of a percentage, it is not definately going to be that exact* ratio.* Additionally, some plants may be at a disadvantage due to mutations of a lacks of sunlight or* even being eaten by an animal. Lastly, terminal plants may be better adapted than axial plants, or vice versa, which may lead to them surviving for a longer time and therefore being able to reproduce more.

* as it is based off pure chance.

ResultsPlus
Examiner Comments

This gains two marks. Reference to role of chance and to the idea that terminal plants may be more likely to survive.

Question 6 (c)

In Q06(c) candidates were asked to design an investigation to discover whether plants with axial flowers produce more seeds than plants with terminal flowers. Candidates are well prepared by centres for these design items and in this case, many candidates scored full marks.

(c) Scientists want to discover if plants with axial flowers produce more seeds than plants with terminal flowers.

Design an investigation to discover whether plants with axial flowers produce more seeds than plants with terminal flowers.

Include experimental details in your answer and write in full sentences.

(6)

Prepare three axial flowers and three terminal flowers.
They are all same species.
Repeat this investigation for reliability.
They are given same light intestine, water, temperature.
And the humidity, wind are same too.
30 days later, count the number of seeds ~~of~~ produced by axial flowers and terminal flowers.

ResultsPlus
Examiner Comments

This response scored full marks. It gained marks for R, C, O, S1, S2, M2 and M1.

(c) Scientists want to discover if plants with axial flowers produce more seeds than plants with terminal flowers.

Design an investigation to discover whether plants with axial flowers produce more seeds than plants with terminal flowers.

Include experimental details in your answer and write in full sentences.

(6)

I prepare ~~# six flowers and each~~ three of axial flowers and three of terminal flowers. I use the same flowers for each and I measure the number of seeds they produce after a month. I repeat this for reliable result. I ~~use~~ give the same water amount to the eaeh flower and keep the temperature the same.

ResultsPlus
Examiner Comments

This also scored full marks. For R, C, M1, M2, S2, S1.

ResultsPlus
Examiner Tip

It would be better to refer to the volume of water rather than amount, but in this case we allowed reference to same water given.

(c) Scientists want to discover if plants with axial flowers produce more seeds than plants with terminal flowers.

Design an investigation to discover whether plants with axial flowers produce more seeds than plants with terminal flowers.

Include experimental details in your answer and write in full sentences.

(6)

You should repeat the experiment around 3 times

- Plant a assigned amount of axial flow seeds and in a ~~one~~ one area and the same amount of terminal ~~flow~~ flower seeds in the same or similar area. Allow
- The plants should have the same conditions while growing. control nutrients, water supply ect.

- After growth collect and count the seeds.

ResultsPlus
Examiner Comments

This response scores four marks. It gains R, C, S2, and M1.

Question 7 (a)

In Q07 an experiment was described to investigate the effect of temperature on the digestion of lipid. In Q07(a) candidates had to state why the test tubes were left in a water bath for 5 minutes in steps 6 and 7. Most responses could state that this allows the contents to reach the required temperature or the same temperature.

(a) State why the student leaves the test tube and the beaker in the water bath for 5 minutes in steps 6 and 7.

(1)

So they are both the same temperature.

ResultsPlus
Examiner Comments

This gains the mark for reference to both at the same temperature.

(a) State why the student leaves the test tube and the beaker in the water bath for 5 minutes in steps 6 and 7.

(1)

so that the contents of the beaker is fully heated to the desired temperature

ResultsPlus
Examiner Comments

This also gains the mark for 'the desired temperature'.

Question 7 (b)(i)

In Q07(b)(i) most responses correctly gave the dependent variable as the time taken for the contents to lose their pink colour.

(b) (i) Give the dependent variable in this investigation.

(1)

time taken for colour change

ResultsPlus
Examiner Comments

This response gains the mark.

(b) (i) Give the dependent variable in this investigation.

(1)

Time taken for contents to lose the pink colour in seconds

ResultsPlus
Examiner Comments

This also gains the mark.

Question 7 (b)(ii)

In Q07(b)(ii) most candidates could state one variable that the student controls in their investigation. Suitable examples included volume of lipase, volume of milk, number of drops of indicator.

(ii) State one variable the student controls in their investigation.

(1)

the volume of milk used

ResultsPlus
Examiner Comments

This response scores the mark for volume of milk.

(ii) State one variable the student controls in their investigation.

(1)

Volume of lipase

ResultsPlus
Examiner Comments

Volume of lipase also gains the mark.

Question 7 (c)

Q07(c) asked candidates to suggest the purpose of the indicator in this investigation. Most responses gained the mark for suggesting it is to show when all the lipid has been digested to produce fatty acids or when the pH changes.

(c) Suggest the purpose of the phenolphthalein indicator in the investigation.

(1)

To examine the PH of the solution.

ResultsPlus Examiner Comments

This response was allowed as show the pH is in the mark scheme.

(c) Suggest the purpose of the phenolphthalein indicator in the investigation.

(1)

to see when the colour chages to see the production of fatty acids and glycerol.

ResultsPlus Examiner Comments

This response also gains the mark.

(c) Suggest the purpose of the phenolphthalein indicator in the investigation.

(1)

To see ~~the~~ the change in pH from alkaline to ~~acid~~ acidic or neutral.

ResultsPlus Examiner Comments

To show change in pH gains the mark.

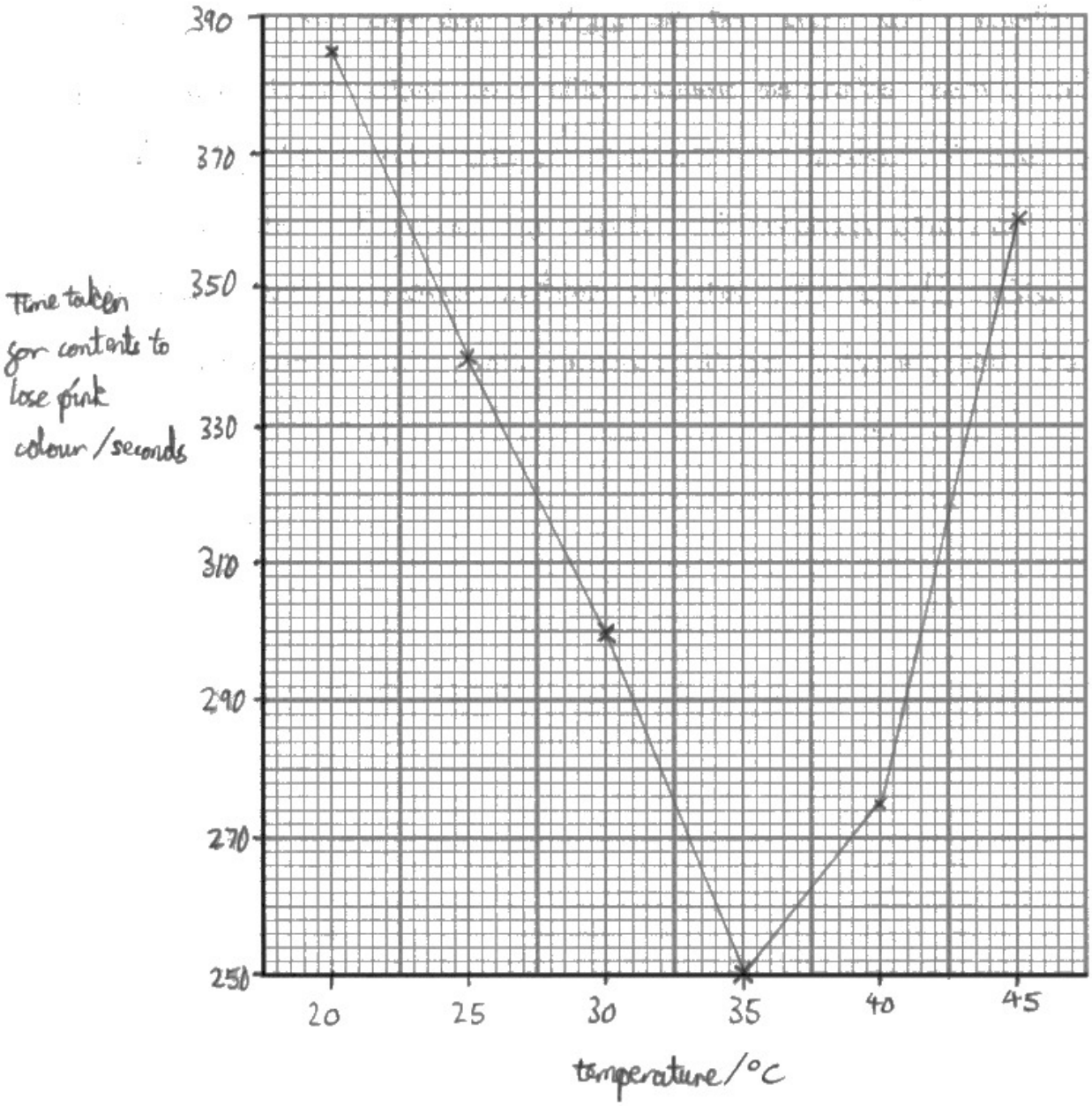
Question 7 (d)

In item Q07(d) candidates had to plot a line graph to show the effect of temperature on the time taken for the contents of the test tube to lose their pink colour. Most graphs gained 4 or 5 marks. Those candidates who did not gain full marks had usually chosen a poor scale that did not use the full size of the grid or missed out units from the axes.

Plot a line graph to show the effect of temperature on the time taken for the contents of the test tube to lose the pink colour.

Use a ruler to join your points with straight lines.

(5)



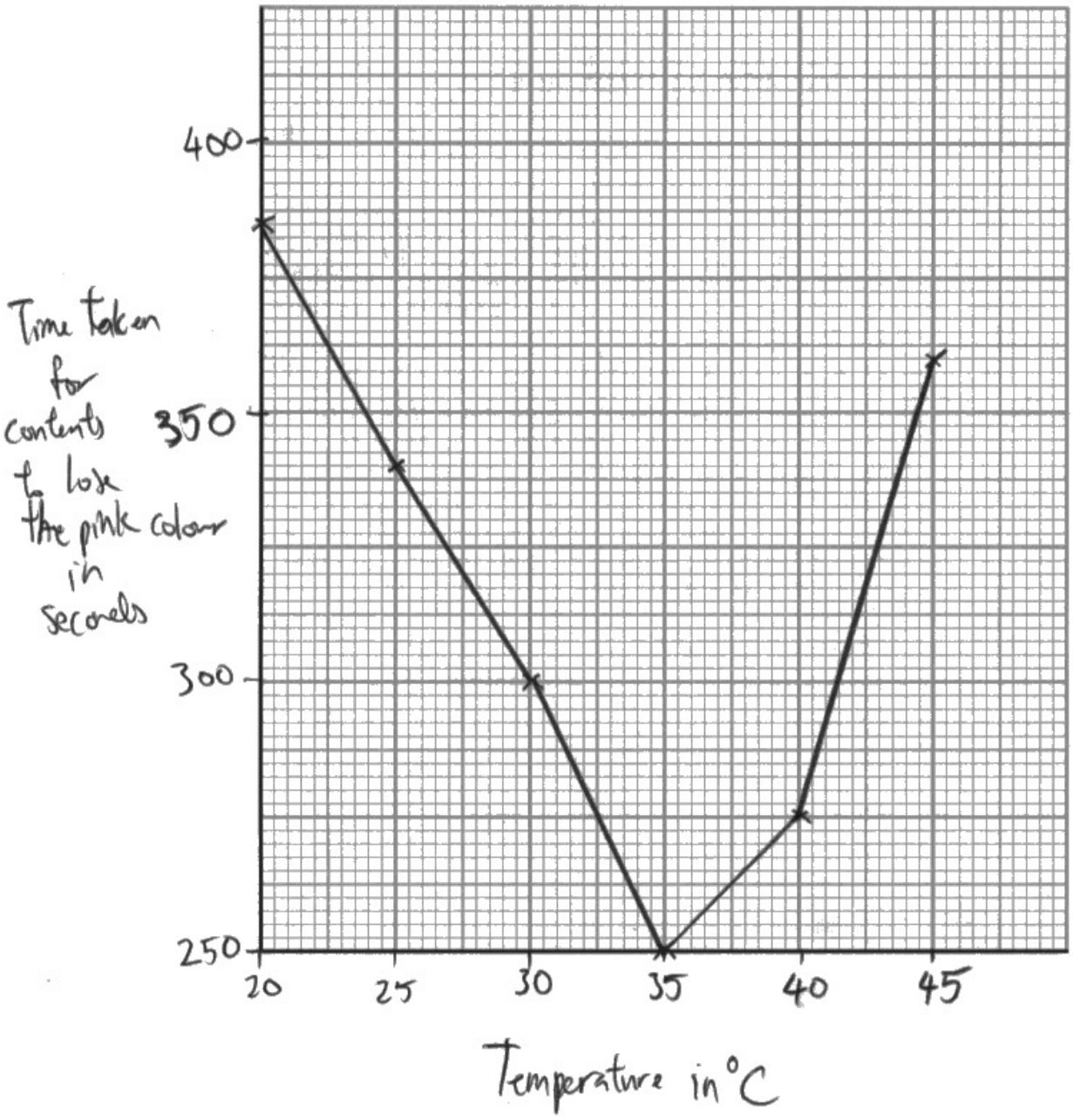
ResultsPlus
Examiner Comments

This graph gains full marks.

Plot a line graph to show the effect of temperature on the time taken for the contents of the test tube to lose the pink colour.

Use a ruler to join your points with straight lines.

(5)



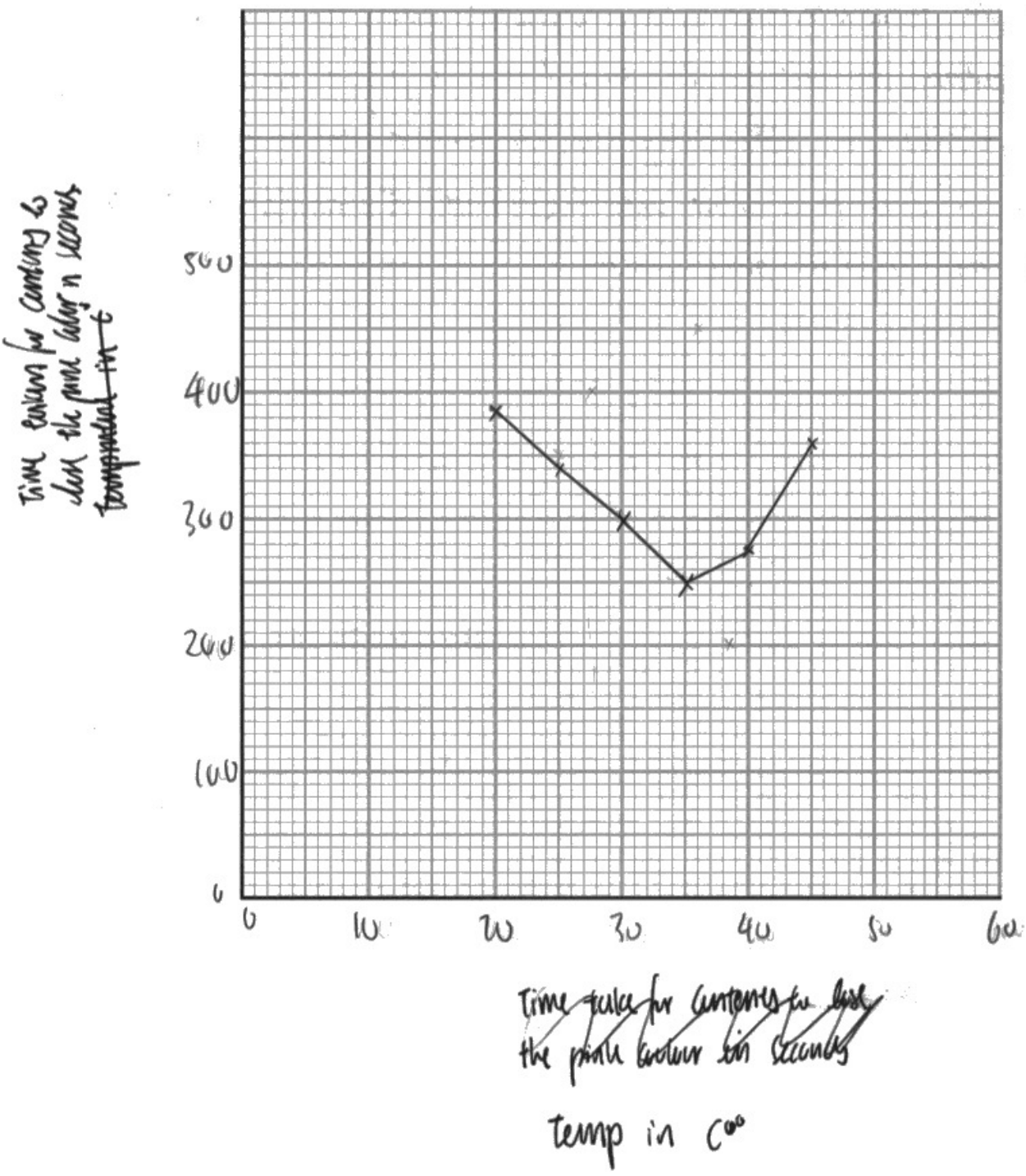
ResultsPlus
Examiner Comments

This also scores 5 marks.

Plot a line graph to show the effect of temperature on the time taken for the contents of the test tube to lose the pink colour.

Use a ruler to join your points with straight lines.

(5)



This scores 4 marks as it does not have a plot covering 2.5 large squares.

Candidates should choose a scale that allows the plot to use most of the grid area.

Question 7 (e)

In Q07(e) candidates were asked to explain why increasing the temperature effects the time taken for the contents of the tube to lose their pink colour. Many responses gained full marks with only a few describing rather than explaining the effect.

(e) Explain why increasing temperature affects the time taken for the contents of the test tube to lose the pink colour.

(4)

Initially, as temperature increases, time for test tubl to lose the pink colour decreases, as lipase enzyme gain kinetic energy and move faster, so more ~~the~~ frequency of successful collisions between substrate and ~~of~~ active site, until optimum temperature, where it is the best rate of successful collisions, after optimum temperature, as temperature increases, ~~enzym~~ lipase ~~as~~ enzyme denatures, as active site ~~is~~ changes ~~of~~ shape; so substrate can no longer fit in active site, so ~~less~~ more time taken for test tube to change colour.

(Total for Question 7 = 13 marks)

ResultsPlus
Examiner Comments

This response gains all four marks. It refers to time taken decreasing as kinetic energy increases until optimum. After optimum the enzyme denatures as active site changes shape.

(e) Explain why increasing temperature affects the time taken for the contents of the test tube to lose the pink colour.

(4)

Increasing temperature increases rate of enzyme activity as it creates more kinetic energy ~~and~~ This means contents ~~enzymes~~ with lose colour faster ~~means more particles~~ because of more frequent particle collisions. If temperature reaches above 37°C enzymes will start to change shape of active site and ~~denature~~ denature.

ResultsPlus
Examiner Comments

This response also gains four marks. It refers to increase in kinetic energy, contents lose colour faster, changing shape of active site and enzymes denature.

(e) Explain why increasing temperature affects the time taken for the contents of the test tube to lose the pink colour.

(4)

Increasing tempreture ~~increase~~ ~~increasise~~ increases enzyme activity as ∑ enzymes will have more kinetic energy causing them to collide with a substrate more often causing the chemical reaction rate to increase, ~~increasing the o~~ causing colour change to happen more quickly due to lipase working faster to digest lipids. at optimum temperature.

ResultsPlus
Examiner Comments

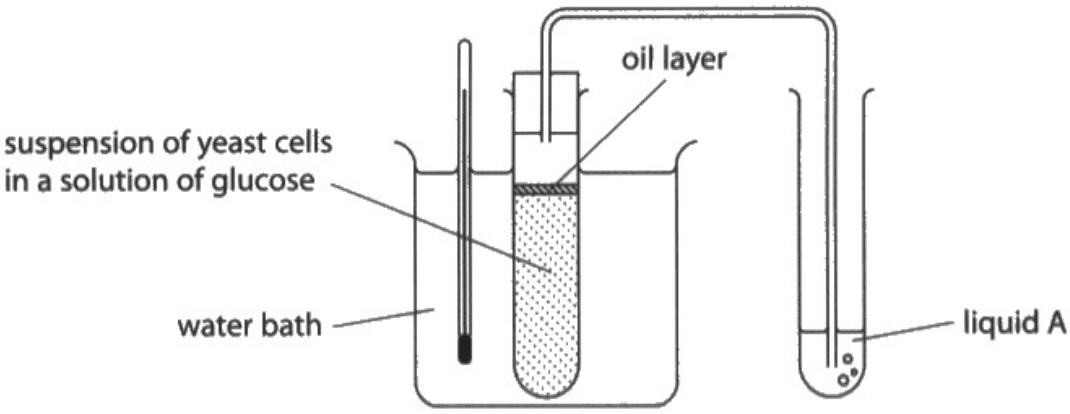
This response scores three marks. It refers to increase in collisions, rate increasing and at optimum temperature.

Question 8 (a)

In Q08(a) candidates were given a diagram of apparatus used to measure the rate of anaerobic respiration in yeast. They were asked to give the function of the water bath. Many candidates were able to give the function to maintain a constant temperature.

8 Yeast can be used in experiments to investigate the effect of different concentrations of glucose solution on the rate of anaerobic respiration.

The diagram shows apparatus used to measure the rate of anaerobic respiration in yeast.



(a) Give the function of the water bath.

(1)

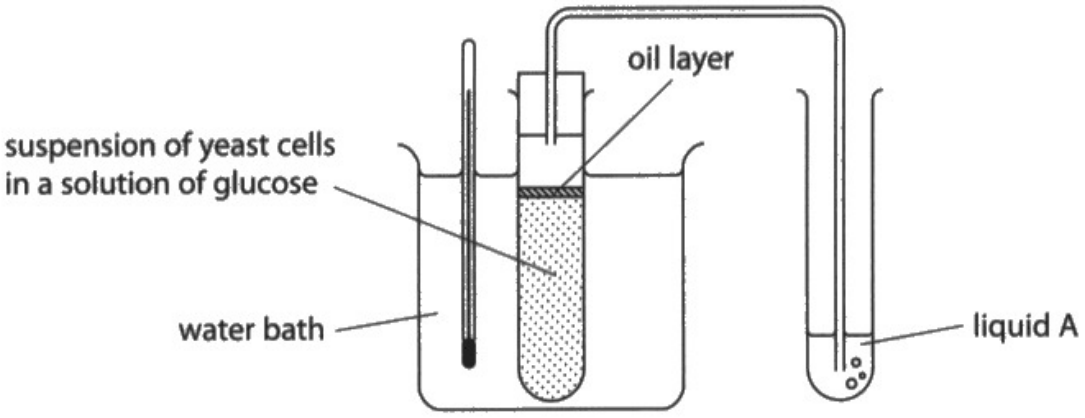
Keeps temperature constant throughout experiment so the temperature doesn't effect results of experiment.

ResultsPlus
Examiner Comments

This response gains the mark.

8 Yeast can be used in experiments to investigate the effect of different concentrations of glucose solution on the rate of anaerobic respiration.

The diagram shows apparatus used to measure the rate of anaerobic respiration in yeast.



(a) Give the function of the water bath.

(1)

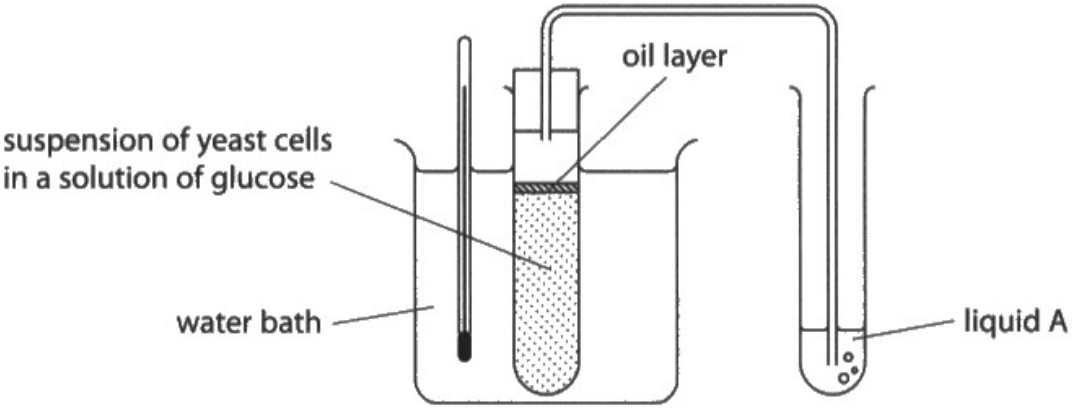
to maintain the temperature

ResultsPlus
Examiner Comments

This response also gains the mark.

8 Yeast can be used in experiments to investigate the effect of different concentrations of glucose solution on the rate of anaerobic respiration.

The diagram shows apparatus used to measure the rate of anaerobic respiration in yeast.



(a) Give the function of the water bath.

(1)

To speed up the reaction

ResultsPlus
Examiner Comments

This response does not gain the mark.

Question 8 (b)

Q08(b) asks candidates to explain what liquid can be used to identify the gas released during anaerobic respiration. Almost all candidates gained both marks for explaining that limewater goes cloudy with carbon dioxide.

(b) Liquid A can be used to identify the gas released during anaerobic respiration by the yeast.

Explain which substance can be used as liquid A.

(2)

Limewater can be used as it turns milky/cloudy when carbon dioxide is present.

ResultsPlus Examiner Comments

This scores both marks.

(b) Liquid A can be used to identify the gas released during anaerobic respiration by the yeast.

Explain which substance can be used as liquid A.

(2)

limewater, it turns cloudy when carbon dioxide is present.

ResultsPlus Examiner Comments

This also gains both marks.

(b) Liquid A can be used to identify the gas released during anaerobic respiration by the yeast.

Explain which substance can be used as liquid A.

(2)

lime water as carbon dioxide would be released in anaerobic respiration of plants

ResultsPlus
Examiner Comments

This gains one mark for limewater but it does not get the second mark as it does not refer to the change in limewater with carbon dioxide.

Question 8 (c)

In Q08(c) almost all responses could correctly state the additional apparatus required to accurately measure the rate of anaerobic respiration. Candidates gained the mark for gas syringe, measuring cylinder or stopwatch.

(c) A student wants to accurately measure the rate of anaerobic respiration in yeast using this apparatus.

State what additional apparatus they would require.

(1)

Stopwatch or timer to measure time taken.

ResultsPlus
Examiner Comments

This gains the mark for stopwatch.

(c) A student wants to accurately measure the rate of anaerobic respiration in yeast using this apparatus.

State what additional apparatus they would require.

(1)

measuring cylinder

ResultsPlus
Examiner Comments

This gains the mark for measuring cylinder.

Question 8 (d)(i)

Q08(d)(i) required candidates to explain how named conditions in an industrial fermenter are controlled. Most responses earned some credit with many gaining full marks. Candidates were expected to be precise in their explanations, for example, writing about maintaining an optimum temperature or preventing overheating rather than just maintaining temperature.

(d) The process of anaerobic respiration is sometimes referred to as fermentation.

Industrial fermenters are used to grow microorganisms. These microorganisms produce penicillin, an antibiotic that is used to treat bacterial infections.

(i) Explain how named conditions in an industrial fermenter are controlled.

(4)

It has a waterjacket to keep it at the optimum temperature. high pressure steam is put through to sterilise the fermenter. There is an incubator to keep the production well and healthy. Stirring rods to make sure everything is combined well.

ResultsPlus
Examiner Comments

This response scores four marks. It refers to maintaining optimum temperature by using a water jacket. It also refers to mixing contents using stirring rods.

(d) The process of anaerobic respiration is sometimes referred to as fermentation.

Industrial fermenters are used to grow microorganisms. These microorganisms produce penicillin, an antibiotic that is used to treat bacterial infections.

(i) Explain how named conditions in an industrial fermenter are controlled.

(4)

- Cooling Jacket is used to regulate the temperature of industrial fermenter from heat produced.
- Steam is used to steralise fermenter to ensure aseptic conditions, to reduce competition.
- Paddles used to stir contents in fermenter so they are equally distributed.
- Air vents used to prevent other cultures from developing inside industrial fermenter.

ResultsPlus
Examiner Comments

This response explains how conditions are controlled and scores all four marks. It describes how a cooling jacket prevents overheating. It also describes how aseptic conditions are maintained using steam. It has attained full marks but also would have gained marks for mixing the contents using paddles.

(d) The process of anaerobic respiration is sometimes referred to as fermentation.

Industrial fermenters are used to grow microorganisms. These microorganisms produce penicillin, an antibiotic that is used to treat bacterial infections.

(i) Explain how named conditions in an industrial fermenter are controlled.

(4)

Equipment and the environment is sterilised to prevent any competing micro-organisms for the desired ones. This means that the desired organism doesn't need to share resources. Optimum temperatures are maintained for fast reactions and large amounts of glucose are provided.

ResultsPlus
Examiner Comments

This gains three marks. It refers to preventing growth of competing microorganisms by sterilising. It also refers to optimum temperature but does not say how it is maintained.

Question 8 (d)(ii)

Q08(d)(ii) asks candidates to explain how bacteria have evolved so that antibiotics are less effective. Most responses earned full credit. Those that did not were imprecise in their use of terminology, writing about immunity and antibodies rather than resistance and antibiotics.

(ii) Some antibiotics are becoming less effective at controlling bacterial infections.

Explain how bacteria have evolved so that antibiotics are less effective.

(4)

Some bacteria develop mutations that make them resistant ~~to~~ to antibiotics, which allows them to survive longer than to survive longer than those that don't. This means the mutated bacteria are able to ~~create offspring that are also resistant to antibio~~ pass down these genes to their offspring.

ResultsPlus
Examiner Comments

This response scores four marks. It refers to mutations making the bacteria resistant. It enables them to survive and pass on their alleles.

(ii) Some antibiotics are becoming less effective at controlling bacterial infections.

Explain how bacteria have evolved so that antibiotics are less effective.

(4)

Bacteria can gain resistance towards certain antibiotics. A mutation could occur which would cause bacteria to not be ~~impacting~~ impacted by the antibiotics. Through natural selection and variation, these bacteria will gain an advantage as they would have a better chance of survival than the other organisms (survival of the fittest). other bacterium would die due to the antibiotics, while resistant bacteria would survive and start to multiply/ reproduce. The allele which codes for the resistance will pass onto the offsprings, evolving them to become resistant to the antibiotic.

(Total for Question 8 = 12 marks)

ResultsPlus
Examiner Comments

This response also gains full marks. It refers to bacteria becoming resistant, mutations occurring, bacteria surviving and reproducing. It also describes passing on their alleles.

(ii) Some antibiotics are becoming less effective at controlling bacterial infections.

Explain how bacteria have evolved so that antibiotics are less effective.

(4)

bacteria get used to the antibiotics and are able to overcome ~~this~~ them. They are able to survive and reproduce in large amounts.

ResultsPlus
Examiner Comments

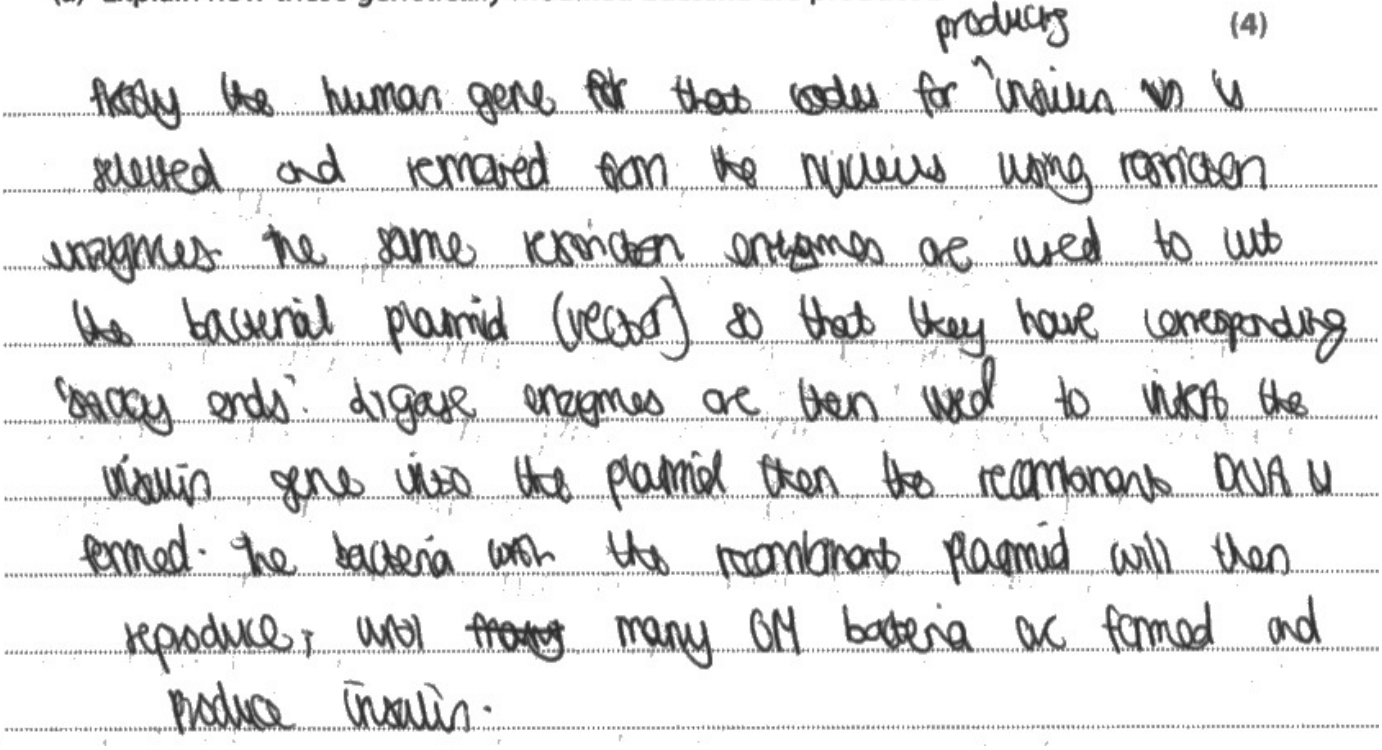
This gains two marks for reference to bacteria survive and reproduce.

Question 9 (a)

Q09(a) asked candidates to explain how bacteria are genetically modified to produce insulin. Many candidates failed to earn credit but those that had learnt this section of the specification gained full marks. A detailed account referred to the use of a restriction enzyme to cut the plasmid and the gene for insulin production, how these are joined using ligase to join their sticky ends and the insertion of the plasmid into the bacterium.

9 Genetically modified bacteria are used to produce the hormone insulin.

(a) Explain how these genetically modified bacteria are produced. **(4)**



ResultsPlus
Examiner Comments

This response gains full marks. It refers to using restriction enzyme to remove the insulin gene, using this enzyme to cut the plasmid, producing complementary sticky ends, ligase used to insert the gene into the plasmid.

9 Genetically modified bacteria are used to produce the hormone insulin.

(a) Explain how these genetically modified bacteria are produced.

(4)

The insulin-producing organism, has a sample of its cell taken. The section of the insulin-proucing DNA is cut out using a restriction enzyme. Then the bacteria's plasmid, is taken out and using the some restriction enzyme, has it's DNA cut open where the insulin-producing gene is stuck in using ligase on the sticky-ends. This is put back in the bacteria's plasmid and is soon able to produce insulin. It can then reproduce, and its offspring will be able to do the same.

ResultsPlus
Examiner Comments

This response also gains full marks. It refers to using restriction enzyme to cut the DNA coding for insulin and the bacterial plasmid and sticking them using ligase to join the sticky ends.

9 Genetically modified bacteria are used to produce the hormone insulin.

(a) Explain how these genetically modified bacteria are produced.

(4)

using restriction enzyme cut out a gene and use the same enzyme to cut the vector DNA. using a ligase enzyme you can join them together.

They can mutate and reproduce to make insulin when put under the correct conditions. since ib using a vector which is a plasmid it will be called a recombant DNA.

ResultsPlus
Examiner Comments

This response gains two marks. It gains a mark for cutting the gene using restriction enzyme and use of ligase to join the DNA. They do not mention plasmid.

Question 9 (b)

Q09(b) asked candidates to explain the role of insulin. Some responses failed to score but many were able to describe how insulin is released to reduce blood glucose when the level gets too high by converting glucose to glycogen in the liver. Weaker responses wrote about insulin controlling or maintaining blood sugar but did not explain how.

(b) Explain the role of insulin in the human body.

(2)

Insulin is released from an endocrine gland when the concentration of glucose in the blood is too high. It converts this glucose into glycogen which is then stored in the liver.

ResultsPlus Examiner Comments

This response gains two marks. It refers to insulin release when blood glucose is too high and the conversion of glucose to glycogen.

(b) Explain the role of insulin in the human body.

(2)

~~reduce blood glucose level. So it can prevent diabets~~ reduce blood glucose level if it increase than normal to maintain glucose at normal level

ResultsPlus Examiner Comments

This also gains two marks for reference to reducing blood glucose if it increases.

(b) Explain the role of insulin in the human body.

(2)

Insulin controls the concentration of sugar in the blood and cells which is then delivered to the liver to store as glycogen

ResultsPlus
Examiner Comments

This gains one mark for reference to converts sugar in the blood to glycogen in the liver.

Question 9 (c)(i)

Q09(c) asked candidates to explain why insulin is injected rather than taken by mouth. Although many candidates struggled to express themselves, the best responses explained that insulin is a protein and would therefore be digested into amino acids by protease enzymes in the stomach or small intestine. Credit was also given to responses that suggested that the protein would be denatured by the acid in the stomach.

(c) Some people are unable to produce insulin.

This condition is called diabetes mellitus.

People with diabetes mellitus control the condition by using insulin injections, controlling their diet, and monitoring how much they exercise.

(i) Explain why the insulin is injected rather than taken by mouth.

(2)

Insulin is a protein and will be broken down and digested by the digestive system it taken by the mouth which is why it is injected instead.

ResultsPlus
Examiner Comments

This answer gains full marks. It notes that insulin is a protein and will be digested if taken by the mouth.

(c) Some people are unable to produce insulin.

This condition is called diabetes mellitus.

People with diabetes mellitus control the condition by using insulin injections, controlling their diet, and monitoring how much they exercise.

(i) Explain why the insulin is injected rather than taken by mouth.

(2)

insulin is needed to be injected into the blood stream directly where glucose is and since insulin is a hormone made up of protein the ~~gastric~~ acid conditions in the stomach from hydrochloric acid can denature them.

ResultsPlus
Examiner Comments

This also gains full marks for reference to insulin being a protein that would be denatured by acid in the stomach.

(c) Some people are unable to produce insulin.

This condition is called diabetes mellitus.

People with diabetes mellitus control the condition by using insulin injections, controlling their diet, and monitoring how much they exercise.

(i) Explain why the insulin is injected rather than taken by mouth.

(2)

So that it can enter the bloodstream immediately and directly, if it was taken by mouth, the insulin would just be digested and excreted.

ResultsPlus
Examiner Comments

This scores one mark for if taken by mouth would be digested.

Question 9 (c)(ii)

In Q09(c)(ii) candidates were asked why people with diabetes need to monitor how much they exercise. Many correct responses stated for example that exercise uses glucose for respiration.

(ii) State why people with diabetes mellitus need to monitor how much they exercise.

(1)

bease exasise uses glucose

ResultsPlus Examiner Comments

This scores one mark for exercise uses glucose.

(ii) State why people with diabetes mellitus need to monitor how much they exercise.

(1)

To ensure that their body doesn't produce too much glucose through respiration.

ResultsPlus Examiner Comments

No credit for exercise produces glucose through respiration.

Question 9 (c)(iii)

Finally Q09(c)(iii) asked candidates to state how people with diabetes need to modify their diet compared to people without diabetes. Most responses were able to state that people with diabetes need to limit the glucose or sugars they consume.

(iii) State how people with diabetes mellitus may need to modify their diet compared with people who do not have diabetes mellitus.

(1)

People with diabetes must not consume too much sugar.

ResultsPlus Examiner Comments

This response gains the mark.

(iii) State how people with diabetes mellitus may need to modify their diet compared with people who do not have diabetes mellitus.

(1)

to to regulate how much glucose they ingest as they can't produce insulin to remove excess glucose from blood.

ResultsPlus Examiner Comments

This response also gains the mark for regulate how much glucose they ingest.

(iii) State how people with diabetes mellitus may need to modify their diet compared with people who do not have diabetes mellitus.

(1)

They may need to reduce the amount of sugar that they eat. ~~so that they~~

ResultsPlus
Examiner Comments

This response also gains the mark.

Paper Summary

Based on their performance on this paper, candidates should:

- Ensure that you read the question carefully and include sufficient points to gain full credit.
- Include as many points as there are marks available in discuss items.
- Make sure you have practised calculations, especially magnification and that you understand and know how to apply formulae and always include all your working.
- Write in detail and use correct and precise biological terminology.
- Revise practical work to help in questions about unfamiliar or novel practical procedures. These questions require candidates to make links between different parts of the specification, so when considering a question remember to use all the knowledge and understanding you have gained throughout the specification.
- Make sure you know and understand all of the terms in the specification including examples such as tobacco mosaic virus and the withdrawal reflex.
- Always be able to name the independent variable in experimental design questions and give the range of values, the dependent variable, how you are going to measure it and the control variables and explain how these will be controlled.
- Always read through your responses and ensure that what you have written makes sense and answers the question fully.

Grade boundaries

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