Pearson
Edexcel

Examiners' Report
June 2023

Int GCSE Single Science

ResultsPlus

Introduction

This was the second time that candidates had an opportunity to sit a full Summer series examination since 2019. The examiners noted that almost all candidates attempted to answer all questions and there was little evidence of candidates running out of time on this paper. Candidates and centres are becoming more familiar with the reformed qualification and are able to access all question types and demonstrate their knowledge and understanding of the specification content and are able to apply this in familiar and novel contexts. Candidates generally were better able to answer the experiment design item and evaluative items than in previous series.

Question 1 (a)

In Q01(a) most candidates were able to state two of the characteristics shared by living organisms. Most common answers were reproduction and respiration. Some weaker responses wrote about having cell structures.

1 Living organisms share a number of characteristics.

(a) State two of the characteristics shared by living organisms.

(2)

1 Move

2 ~~Nutri~~ Growth

ResultsPlus
Examiner Comments

This response scores both marks for reference to movement and growth.

1 Living organisms share a number of characteristics.

(a) State two of the characteristics shared by living organisms.

(2)

1 Growth

2 Reproduction

ResultsPlus
Examiner Comments

This response also gains both marks for growth and reproduction.

1 Living organisms share a number of characteristics.

(a) State two of the characteristics shared by living organisms. **(2)**

1 they do Resperation use glucose for energy

2 they do growth Movement & Sexual reproduction

ResultsPlus
Examiner Comments

This response also gains both marks for respiration and growth.

Question 1 (c)

Q01(c) asked candidates to explain one reason why viruses are not classified as living organisms. Many candidates gained at least one mark, with the best responses explaining that viruses do not show the characteristics of living organisms such as respiration or growth. Others gained both marks for explaining that viruses can only reproduce inside a host cell.

(c) Viruses are not classified as living organisms.

Explain one reason why viruses are not classified as living organisms.

(2)

Viruses are not able to carry out any of the characteristics of living organisms, except for reproduction, but that too is carried out parasitically (taking over host cell & producing more virus cells/particles).

(Total for Question 1 = 6 marks)

ResultsPlus
Examiner Comments

This response gains both marks for explaining that a virus can only reproduce using a host cell.

(c) Viruses are not classified as living organisms.

Explain one reason why viruses are not classified as living organisms.

(2)

Virus's are parasites they require a host to be able to reproduce and they don't have any other characteristic of a living organism.

ResultsPlus
Examiner Comments

This response also gains both marks for explaining that a virus can only reproduce using a host.

(c) Viruses are not classified as living organisms.

Explain one reason why viruses are not classified as living organisms.

(2)

Because they don't follow all the life proceses which are ~~nessesy~~ nessesery to be charactarised as a living organism if you don't follow ALL of them then you can't be classified ass a living organisms

ResultsPlus
Examiner Comments

This gains one mark for explaining that viruses do not have the characteristics of living organisms.

ResultsPlus
Examiner Tip

If the response had given a suitable example such as growth it would have gained the second mark.

Question 2 (b)

In Q02(b) candidates were asked to describe the processes that take place in the small intestine. Most responses gained at least one mark for describing digestion or absorption. The best responses also described the function of the enzymes released into the small intestine and the role of the villi.

(b) Describe the processes that take place in the small intestine.

(4)

when Digested food enters the small intestine through the duodenum (first part of small intestine). Here enzymes from the pancreas break down proteins (trypsin), lipids (lipases) as well as carbohydrates (& amylase). Bile is secreted from the liver and along with pancreatic juice from the pancreas, neutralise hydrochloric acid from the stomach, entering the small intestine. Peptideses and maltases are secreted by the small intestinal walls and break peptides to amino acids (Peptideses) and maltases break down glucose to glycogen. These nutrients are absorbed by small intestinal walls to the blood stream, through large surface area. Thus, digestion ends in small intestine.

ResultsPlus
Examiner Comments

This response scores 4 marks. It refers to digestion and absorption. It also mentions lipids digested by lipase, peptides into amino acids.

(b) Describe the processes that take place in the small intestine.

(4)

~~Inside the small~~ The small ~~inte~~ intestine contains ~~mad~~ villi. ~~Villi's was~~ Villis are only one cell thick for short distance of diffusion. The capillaries contain glycerol and amino acids for the absorption of food.

ResultsPlus
Examiner Comments

This scores 2 marks for reference to absorption and the role of villi.

(b) Describe the processes that take place in the small intestine.

(4)

- The food is broken down by acids in the intestine.

- The foods Nutrients such as protien get absorbed by the small intestine and carried into the blood stream.

ResultsPlus
Examiner Comments

This response also scores 2 marks for reference to food being broken down and food being absorbed.

Question 2 (c)

Q02(c) presented candidates with a table of results of four food tests on four food substances. Most candidates scored one or two marks for correctly identifying the presence of starch or glucose in the food types. Responses were less likely to identify the presence of lipid or protein in the food substances. The very best candidates were able to appreciate that the Benedict's test indicated that substance W contained more sugars than substance Z.

Use the information in the table to deduce the composition of each food.

(5)

Firstly Food W ~~to~~ since it has ~~reacted with~~ a blue black colour, red colour, purple colour and milky white colour, we can say that it composes of starch, glucose, protien and lipids, However food X does not have starch nor lipids since it remained yellow in iodine test and clear in ~~t~~ Ethanol, ~~h~~but it does have glucose and protien. Furthermore food Y ~~t~~ did not have, starch nor glucose, but it did have protien and lipids. Finally food Z had starch, and protien however since it produced green in Benadict's test, it may have lesser composition of glucose, and to conclude, Food Z does not have lipids.

ResultsPlus
Examiner Comments

This response gains 5 marks for noting that food W contains starch, glucose, protein and lipid. They also note that food Z contains less glucose than food W.

Use the information in the table to deduce the composition of each food.

(5)

Food W has starch as well as a high amount of glucose and has protein as well as fats, this all is due to the iodine test being black, indicating the presence All this can be proved by the iodine test being black, indicating starch, the benedicts test being red indicating glucose, the biuret test being purple, indicating protein and the ethanol emulsion being a milky-white colour indicating fats (lipis). Food X has no starch as the test is yellow, has no glucose as the benedicts test is blue and no protein as the biuret test has protein as the biuret test is purple and has fats. Food X has no starch and a medium amount glucose and no protein as the biuret test is blue but has fats (lipids) as there is a milky-white colour in the ethenol emulsion test. Food Z has starch and a little glucose as the test is green with no protein and no fats

ResultsPlus
Examiner Comments

This response also scores all 5 marks. It notes food W contains starch, a high amount of glucose, protein and fats. It also notes that food Z has a little glucose.

(c) A student investigates the composition of four foods, W, X, Y and Z.

He uses four tests to compare the substances present in each food.

The table shows the student's results.

Food	Results of test			
	Iodine test	Benedict's test	Biuret test	Ethanol emulsion test
W	black colour	red colour	purple colour	milky-white colour
X	yellow colour	blue colour	purple colour	stays clear
Y	yellow colour	yellow colour	blue colour	milky-white colour
Z	black colour	green colour	blue colour	stays clear

Use the information in the table to deduce the composition of each food.

(5)

- In Food W, there is starch, simple sugars, proteins, and lipids present in its composition.
- In Food X, there is not starch, not simple sugars, and not lipids, but there are proteins in its composition.
- In Food Y, there is no starch and no proteins, but there are simple sugars and lipids in its composition.
- In Food Z - there is starch and simple sugars, but there aren't proteins and there aren't lipids in its composition

ResultsPlus
Examiner Comments

This response scores 4 marks. It notes that food W contains starch, sugar, protein and lipid.

Question 3 (a)

In Q03 candidates were given a diagram showing a cross-section through a leaf. In Q03(a) they were asked to determine the magnification of the diagram when given the actual length of the line PQ. Candidates found this item challenging although most scored at least one mark, usually for measuring the line PQ correctly. The best candidates could convert mm to µm and divide the diagram size in µm by 1100.

(a) The actual thickness of the leaf, from X to Y, is 1100 µm.

[1 mm = 1000 µm]

Determine the magnification of the diagram.

(3)

1100µm = 1.1 mm

70 : 1.1

700 : 11

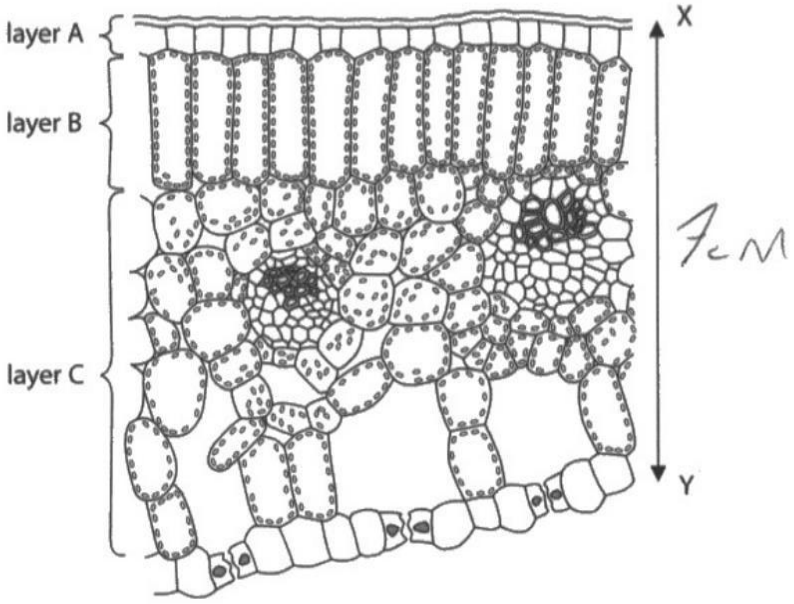
63.64 : 1

magnification = 63.64 : 1

ResultsPlus
Examiner Comments

This response gains full marks for correctly calculating the magnification.

3 The diagram shows a cross-section through a leaf.



(a) The actual thickness of the leaf, from X to Y, is 1100 µm.

[1 mm = 1000 µm]

Determine the magnification of the diagram.

(3)

7cM = 70 mm

70 x 1000 = 70,000

magnification = 70,000

ResultsPlus
Examiner Comments

This response scores 2 marks. It correctly measures the line PQ. It also multiplies 70 by 1000 converting mm into µm.

ResultsPlus
Examiner Tip

This candidate gains 2 out of 3 marks because they have shown the stages of their working. This shows the importance of always showing your working in calculations.

(a) The actual thickness of the leaf, from X to Y, is 1100 µm.

[1 mm = 1000 µm]

Determine the magnification of the diagram.

(3)

The magnification of the diagram

=) $\frac{1100\mu m}{1000\mu m}$ = 1.1 mm

magnification = 1.1 mm

ResultsPlus
Examiner Comments

This response scores 1 mark for converting µm into mm.

Question 3 (b)

Q03(b) asked candidates to describe the differences between layer B and layer C. Many candidates were able to score one or two marks, with the best candidates describing how B is only one cell layer and in B the cells are closely packed and that B contains many chloroplasts. Some responses wrote about layer A.

(b) Describe the differences between layer B and layer C.

(3)

↳ B has more Chloroplasts in each cell due to being closer to the Surface of leaf, closer together, Stronger.

↳ C is more Spongy, plump cells, giving Shape and full of water

ResultsPlus
Examiner Comments

This response scores all 3 marks. It states that B has more chloroplasts and is closer to the surface of the leaf. It also states that C is more spongy.

(b) Describe the differences between layer B and layer C.

(3)

layer B does the most photosynthesis as it has more chloroplast in it. Layer C contains xyloem and Pholem which transports substances around the body, while laye A does not. Cells in layer B are more compat and tightly aranged towards sunlight while layer C is spongy and losley aranged.

ResultsPlus
Examiner Comments

This response also scores 3 marks. It states layer B has more chloroplasts, layer C has xylem and layer B compact and layer C spongy.

(b) Describe the differences between layer B and layer C.

(3)

~~One difference between layer B and C is that layer C is much more bigger than layer~~ one difference between layer B and C is that layer C has more space in the leaf compared to layer B. Layer C also has more functions than layer B and more components compared to layer B

ResultsPlus
Examiner Comments

This response scores 1 mark. It states layer C has more space.

ResultsPlus
Examiner Tip

This response wrote layer C as having more components, which is not quite enough for only different cell type. Candidates should try and use correct biological terminology to improve scores.

Question 3 (c)

In Q03(c) candidates were asked to explain how layers A and B are adapted for their function. Many responses gained one or two marks and the best scored three marks for explaining how the epidermis is transparent to let light through and has a waxy cuticle to reduce water loss and the entry of pathogens. Layer B contains many chloroplasts to absorb light, the palisade cells are packed tightly to absorb light and contains xylem to transport water for photosynthesis. Some candidates wrote about layer C, having misread the question.

(c) Explain how layers A and B are adapted for their function.

(5)

A ~~contains many chloroplasts to allow photosynthesis~~ ~~they are tightly packed so that maximum photo-~~ ~~synthesis can take place~~. Contains a waxy cuticle to prevent pathogens in and too much water out. Transparent to allow lots of light through to the palisade mesophyll. Name is the upper epidermis.

B ~~Not tight~~ Tightly packed together for absorption of light. Contains many chlorophyll for photosynthes for when the light goes through upper epidermis. Tightly packed so light doesn't pass ~~through~~ inbetween

ResultsPlus
Examiner Comments

This responses scores all 5 marks. It explains that A has a waxy cuticle to stop pathogens and reduce water loss. It also writes that it is transparent to let light through. In B it explains that cells are tightly packed for absorption of light for photosynthesis.

(c) Explain how layers A and B are adapted for their function.

(5)

A Layer A's surface is made out of a waxy cuticle, this prevents water loss by transpiration, so more can be used for photosynthesis. Moreover, it is clear, and transparent, allow more light to pass through for photosynthesis.

B Layer B contains many (more) chloroplasts, which are needed to obtain the most sunlight for photosynthesis.
Moreover, they are located at the top to reach the most sunlight.
Are also packed closely together preventing loss of gases

(Total for Question 3 = 11 marks)

ResultsPlus
Examiner Comments

This response also gains 5 marks. Layer A has a waxy cuticle to prevent water loss and it is transparent to let light through. Layer B has many chloroplasts to obtain most light for photosynthesis. Near top of leaf for more sunlight.

(c) Explain how layers A and B are adapted for their function.

(5)

A transpants with waxy cutiole layers. allows light pass reduce water losy

B c adapted for photosynthesis. with Many chloroplast.

ResultsPlus
Examiner Comments

This response scores 3 marks. For A it gains with waxy cuticle allow light through and reduce water loss. In B many chloroplasts for photosynthesis.

ResultsPlus
Examiner Tip

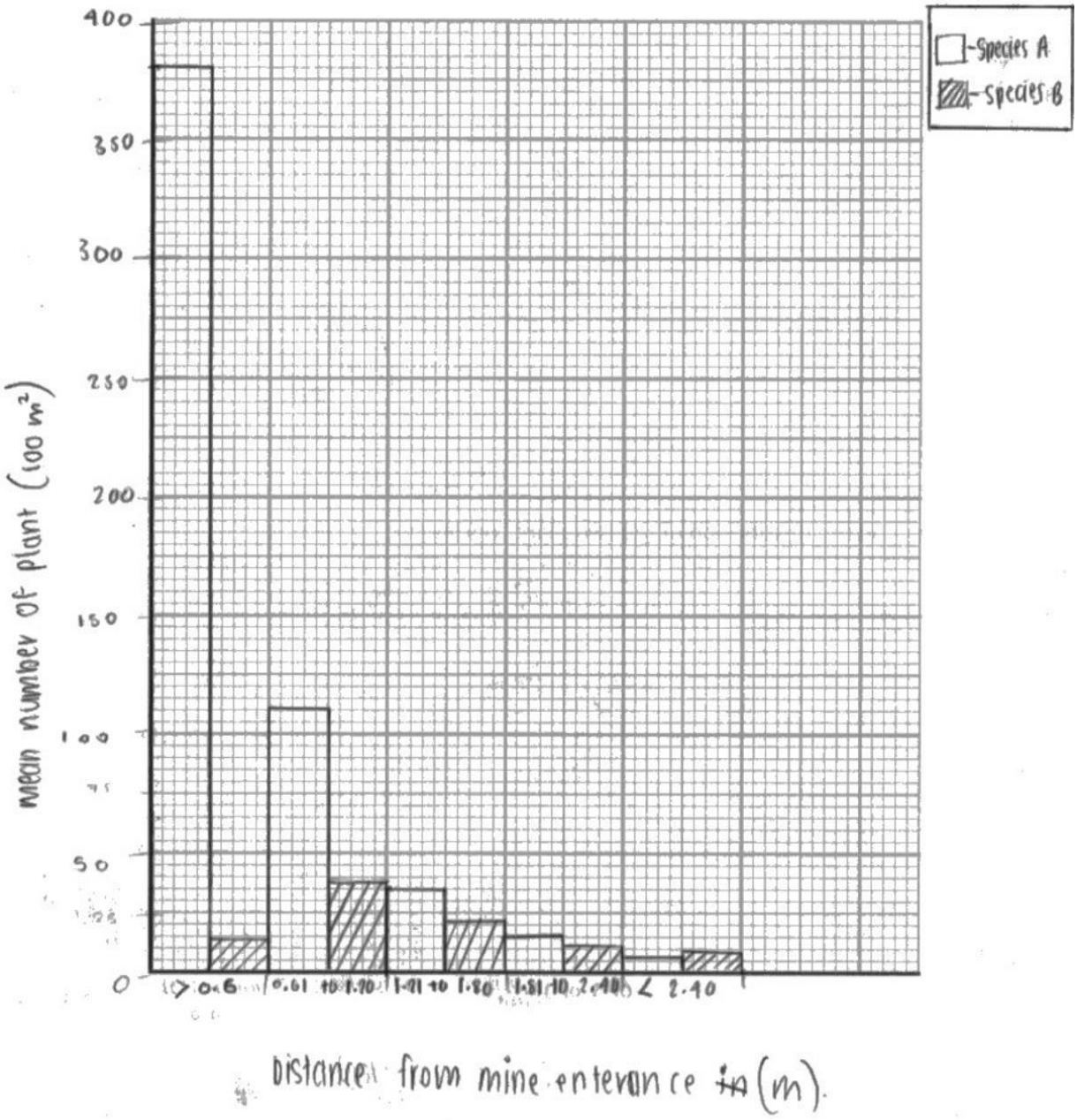
To gain full marks responses need to link each structure or adaptation with a function. So for example, many chloroplasts to absorb sunlight, xylem to bring water for photosynthesis.

Question 4 (a)

Q04(a) gave candidates data on the number of two plant species growing at different distances from a mine. They were asked to plot a bar graph to show how the mean number of plants of species A and species B changes with the distance from the mine. Most bar graphs scored at least 3 marks. The best responses scored full marks and chose a sensible scale that allowed the data to be easily plotted. They labelled the axes with units and used a clear key to identify species A and B. Common errors involved not using a linear scale or omitting units from the graphs.

(a) Plot a bar graph to show how the mean number of plants of species A and the mean number of plants of species B changes with distance from the mine entrance.

(5)

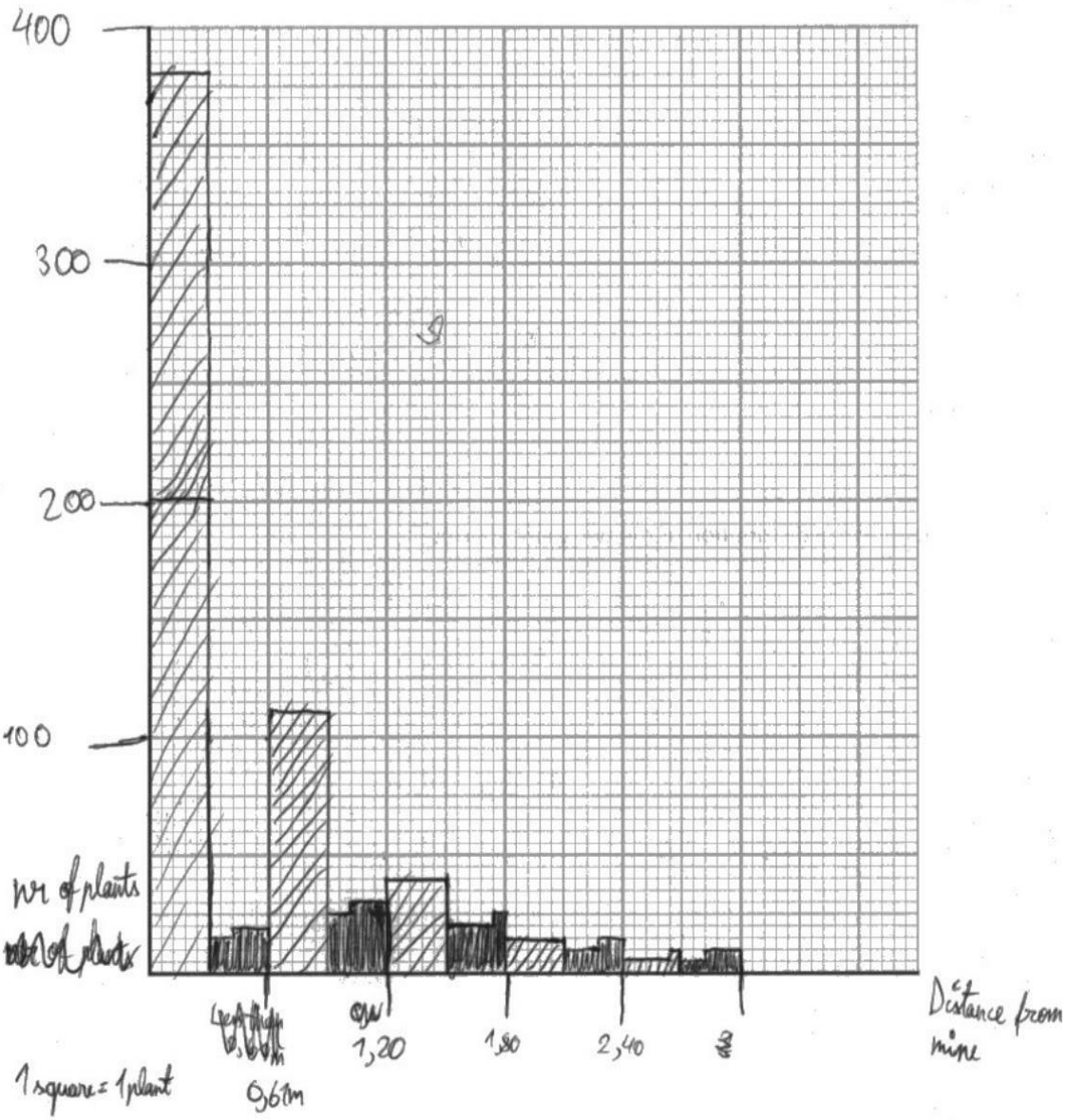


ResultsPlus
Examiner Comments

This scores 5 marks.

(a) Plot a bar graph to show how the mean number of plants of species A and the mean number of plants of species B changes with distance from the mine entrance.

(5)

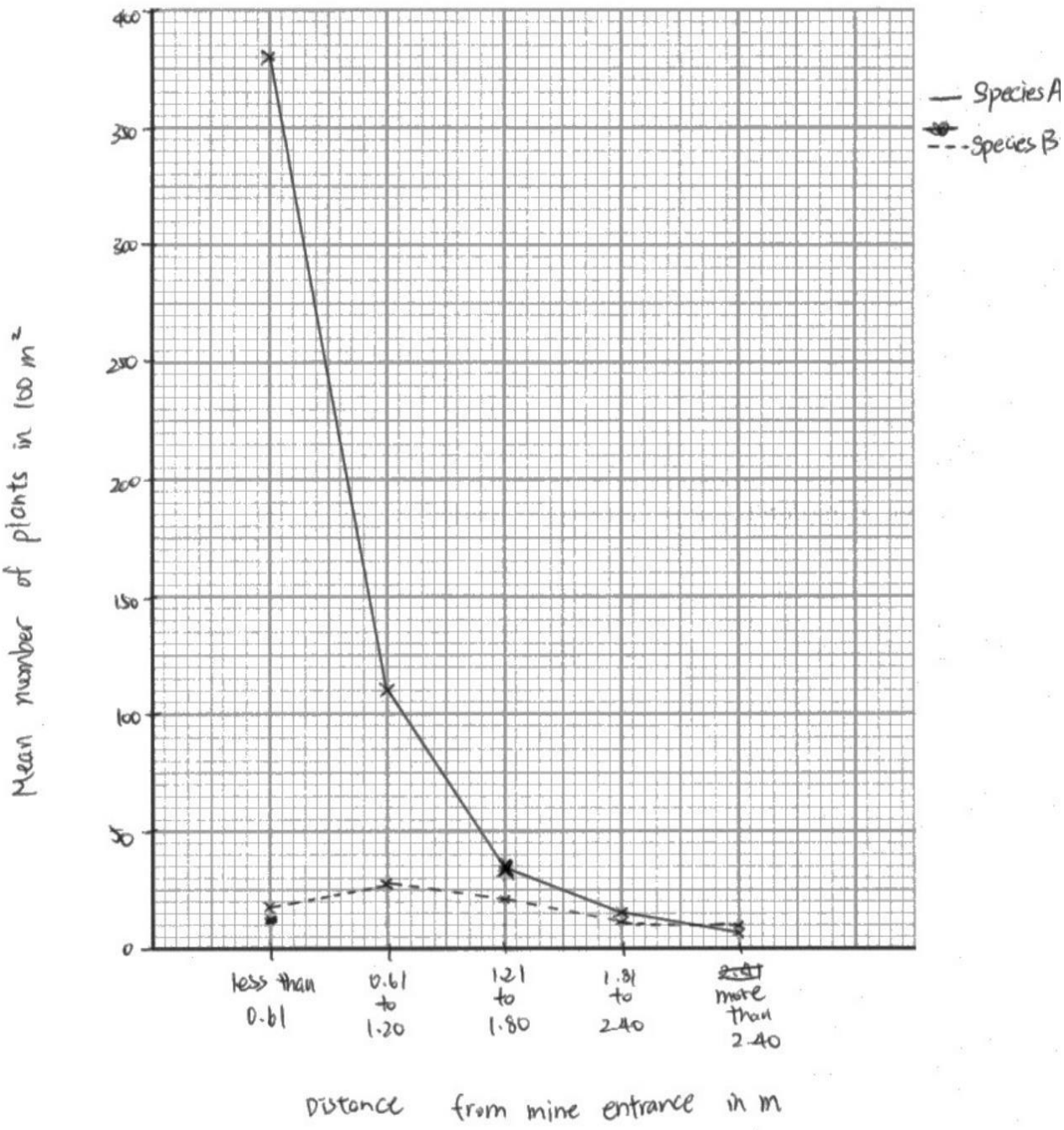


ResultsPlus
Examiner Comments

This scores 4 marks as it does not have the correct units for the x axis in m or y axis as it does not have per 100 m^2.

(a) Plot a bar graph to show how the mean number of plants of species A and the mean number of plants of species B changes with distance from the mine entrance.

(5)



ResultsPlus
Examiner Comments

This scores 4 marks as it is a line graph.

Question 4 (b)

Q04(b) required candidates to describe a method the scientists could use to determine the mean number of plants of species A in $100m^2$. Most responses gained credit with the best responses describing how the scientists could use a quadrat and count the number of species A present in, for example, a $0.25m^2$ quadrat. They could then repeat this and then scale the answer up to get the number per $100m^2$.

(b) Describe a method that the scientists could use to determine the mean number of plants of species A in $100\,m^2$.

(3)

- Use quadrats
- Toss quadrats in random place
- Counts number of plants in quadrat
- Repeat ~~ex~~ few times
- Calculate mean number with data collected

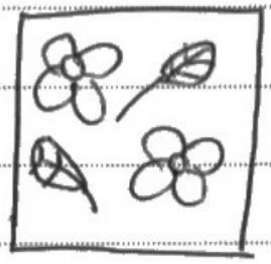
ResultsPlus
Examiner Comments

This response gains 3 marks for using quadrat, counting number of plants and repeating.

(b) Describe a method that the scientists could use to determine the mean number of plants of species A in 100 m^2.

(3)

- use quadrat method
- dived area up and use random number generator ↔ $1M^2$
- quadrant and count plants
- do 15 - 20 more times
- then calculate Mean



ResultsPlus
Examiner Comments

This response also gains 3 marks for use quadrats, count the plants and repeat.

(b) Describe a method that the scientists could use to determine the mean number of plants of species A in 100 m^2.

(3)

P&R. Can one method scientists could use to determine the mean number of plants of species is by calculating the number of plants in that certain area and aditing it down. ~~Compute and~~ do this with areas of the same plant and determine the mean because one could be outlied.

ResultsPlus
Examiner Comments

This response scores one mark for repeating.

ResultsPlus
Examiner Tip

This answer uses calculate rather than count, so does not gain marking point 2.

Question 4 (c)

In Q04(c) candidates were asked to comment on the distribution of the two plant species. Most responses gained marks with the best candidates commenting that overall fewer of species B were found. They also noted that species A grew at a higher frequency near the mine and decreased as the distance from the mine increased. This means species A is tolerant to copper ions. Species B grew at highest frequency between 0.61 and 1.2m from the mine and then also decreased further away. That both species decrease means that they face more competition from other plant species.

(c) Comment on the distribution of the two plant species.

(4)

There are more species A than species B in the area closest to the mine entrance, which determines that species A must have more durability to soil with copper than species B. Species A starts to reduce in number as it gets more further from the entrance of the mine. This may be because other species can now survive better as there is less soil with copper ~~they~~ species A get less chance of survival. Species B, on the otherhand starts to decrease in number and is lower than species A until it gets to more than 2.40m point, where it is a bit higher in number than species A. This suggest that species B is not much adopted to survive in copper soil so even a little bit of copper in soil gets affected.

ResultsPlus
Examiner Comments

This response gains 4 marks. Species A more frequent near to the mine. Can grow in soil with copper. Other species survive better. They write that species B also decreases in number until 2.4m when it is higher than Species A.

(c) Comment on the distribution of the two plant species.

(4)

We can see that in Species A the amount of plants less than 0.61m is very high in contrest with species B where there are only 8, but then in 0.61 to 1.20 meters species B number of plants is higher than before in section A the quantity keeps high with 110, then from 1.21 to 1.80m Species A decreases a lot and then Species B does also decrease but not as much as A, From 1.81 to 2.40 m the decrease on the sections continue but happends the same as before, section A decreasion is higher than B and finaly in more than 2.40 m species B mean amount of plants is 8, two more than section A then ends up with 6.

ResultsPlus
Examiner Comments

This response also scores 4 marks. Species A grows best near to the mine. Species B grows best from 0.61 to 1.2 m. Species A decreases as does species B further away from the mine. More of species B at 2.4m than species A.

(c) Comment on the distribution of the two plant species.

(4)

Both ~~species~~ species A are more distributed near the ~~f~~ mine entrance whereas species B is more distributed in a little bit further away from the entrance. which means that that species A is more adapted to copper soil ~~than~~ than species B.

ResultsPlus
Examiner Comments

This response scores 2 marks. Species A grows more near the mine entrance and species A is more adapted to copper.

Question 5

Q05 gave candidates a passage about genetic modification and they were asked to complete the passage by writing a suitable word in each space. Most responses scored some marks with the best responses gaining full marks. Some responses did not get the word 'transgenic' or failed to recognise restriction or ligase enzymes. The terms are directly from the specification.

5 The passage contains information about genetic modification.

Complete the passage by writing a suitable word in each blank space.

(5)

Human insulin is an example of a protein that is manufactured on a large scale using genetically modified bacteria.

Genetic modification involves taking a ..... gene ..... from one species and inserting it into the DNA of another species.

As this produces an organism containing the DNA from two species, it is called a

..... transgenic ..... organism.

Two enzymes are used in this process.

DNA is cut at a specific site using the enzyme called

..... restriction enzyme .....

Then a second enzyme called ..... ligase enzyme ..... is used to

..... join together ..... the pieces of DNA.

ResultsPlus
Examiner Comments

This response gains full marks for gene, transgenic, restriction, ligase and join.

5 The passage contains information about genetic modification.

Complete the passage by writing a suitable word in each blank space.

(5)

Human insulin is an example of a protein that is manufactured on a large scale using genetically modified bacteria.

Genetic modification involves taking a ..... Jeae Jene ..... from one species and inserting it into the DNA of another species.

As this produces an organism containing the DNA from two species, it is called a

..... double combined ..... organism.

Two enzymes are used in this process.

DNA is cut at a specific site using the enzyme called

..... restriction enzyme .....

Then a second enzyme called ..... Ligase enzyme ..... is used to

..... connect ..... the pieces of DNA.

(Total for Question 5 = 5 marks)

res Edit
rest
Vector

ResultsPlus
Examiner Comments

This response gains 4 marks for gene, restriction, ligase and connect.

5 The passage contains information about genetic modification.

Complete the passage by writing a suitable word in each blank space.

(5)

Human insulin is an example of a protein that is manufactured on a large scale using genetically modified bacteria.

Genetic modification involves taking a ..... gene ..... from one species and inserting it into the DNA of another species.

As this produces an organism containing the DNA from two species, it is called a

..... organism.

Two enzymes are used in this process.

DNA is cut at a specific site using the enzyme called

..... restriction .....

Then a second enzyme called ..... lipase ..... is used to

..... join ..... the pieces of DNA.

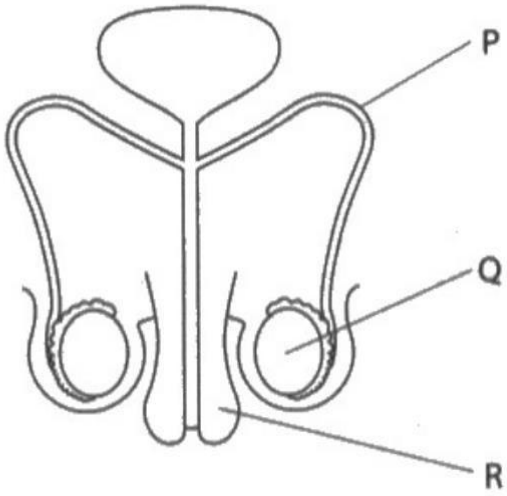
ResultsPlus
Examiner Comments

This response gains 3 marks for gene, restriction, and join. Lipase is another enzyme so misspelling cannot be credited here.

Question 6 (a)(i)

In Q06(a)(i) candidates were given a diagram of the male reproductive system with some structures labelled. They were asked to give the names of two structures. Almost all responses could scores one mark for naming the testes but fewer were able to name the sperm duct.

6 (a) The diagram shows the male reproductive system with some structures labelled.



(i) Give the names of structures P and Q.

(2)

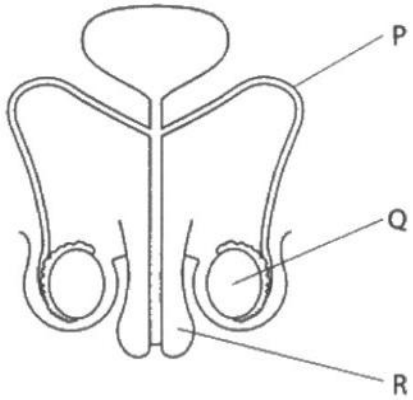
P sperm duct

Q testes

ResultsPlus
Examiner Comments

This scores both marks for correctly naming the sperm duct and the testes.

6 (a) The diagram shows the male reproductive system with some structures labelled.



(i) Give the names of structures P and Q.

(2)

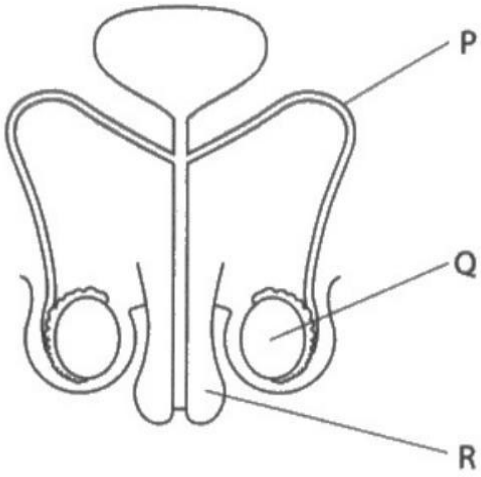
P ~~Penis Sex gland.~~ Penis

Q Testes

ResultsPlus
Examiner Comments

This scores one mark for naming the testes.

6 (a) The diagram shows the male reproductive system with some structures labelled.



(i) Give the names of structures P and Q.

(2)

P Urethra

Q ? Testes

ResultsPlus
Examiner Comments

This also scores one mark for correctly labelling the testes.

Question 6 (a)(ii)

Q06(a)(ii) asked candidates to describe the role of structure R in reproduction. The best responses gained both marks for describing the role of the penis as being placed into the vagina during copulation to transfer semen. Some candidates had difficulty in expressing the answer using appropriate and precise biological terms.

(ii) Describe the role of structure R in reproduction.

(2)

R to be inserted into the females vagina. ~~the~~ Where sperm is released into the vagina. To find the egg cell and to fertalise.

ResultsPlus
Examiner Comments

This response scores 2 marks for insertion into female vagina to release sperm.

(ii) Describe the role of structure R in reproduction.

(2)

Ejaculates sperm into the vagina during sex.

ResultsPlus
Examiner Comments

This also scores both marks for ejaculates sperm into vagina.

(ii) Describe the role of structure R in reproduction.

(2)

Structure R, the penis, goes into the vagina and evaculates and fertilises the egg.

ResultsPlus
Examiner Comments

This also scores both marks for goes into vagina and ejaculates.

Question 6 (b)(i)

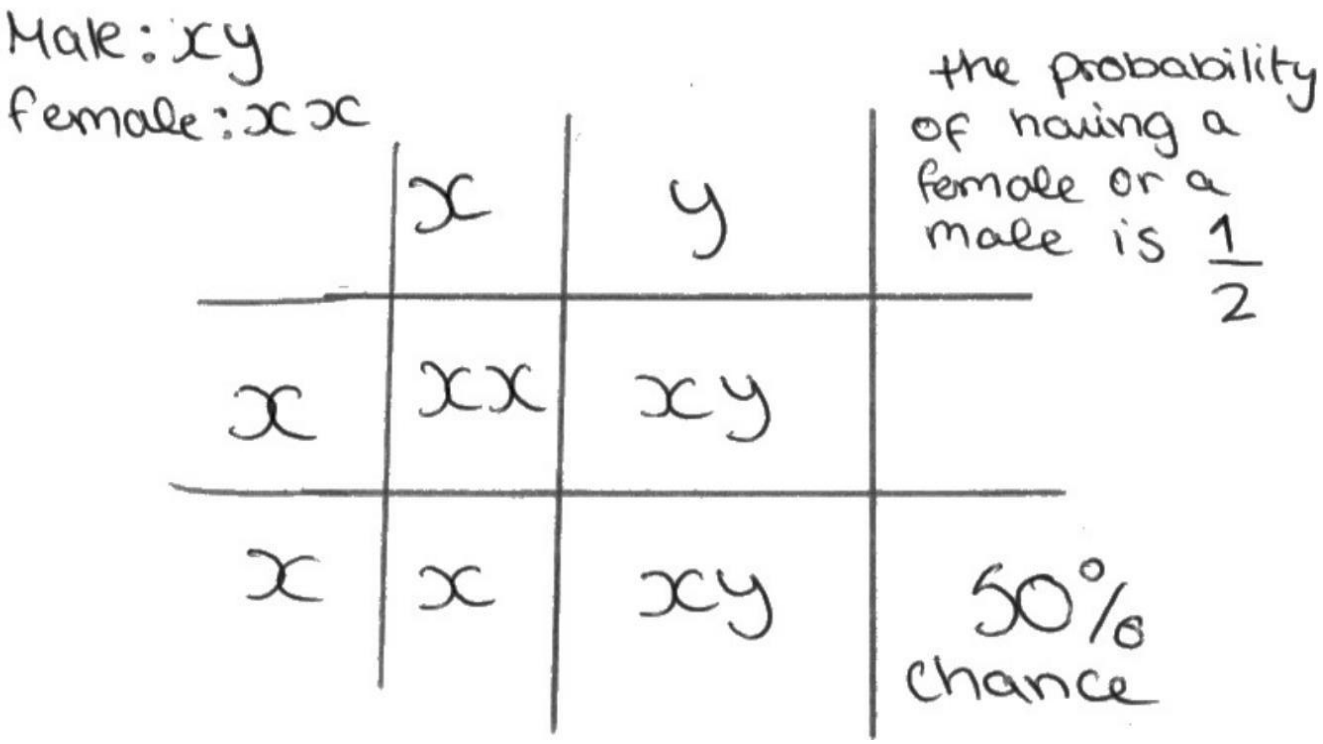
In Q06(b)(i) candidates had to use a genetic diagram to show how the sex of a rat offspring is determined. Even though this come straight from specification point 3.27, only the best candidates were able to gain all three marks. They did this by showing how XX and XY produce gametes X and X or Y leading to equal chance of XX or XY offspring. Some candidates tried to use different letters or missed out gametes from their diagram.

(b) The inheritance of sex in rats is the same as in humans. $\frac{1}{2}$

The sex of a rat is determined by the gametes inherited from the parents.

(i) Use a genetic diagram to show how the sex of the rat offspring is determined.

(3)



ResultsPlus
Examiner Comments

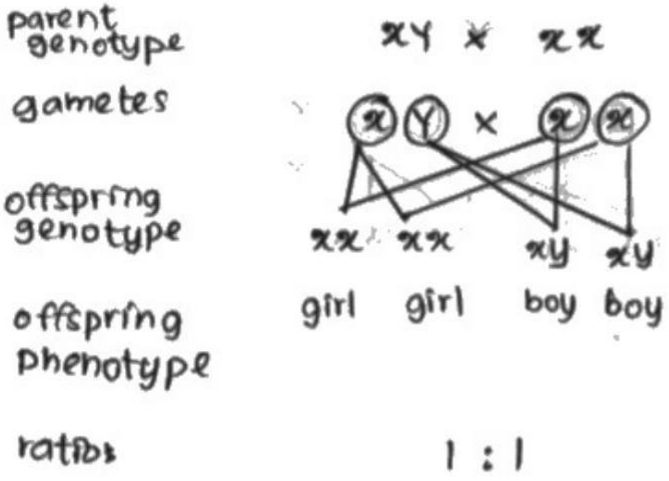
This Punnett gains full marks.

(b) The inheritance of sex in rats is the same as in humans.

The sex of a rat is determined by the gametes inherited from the parents.

(i) Use a genetic diagram to show how the sex of the rat offspring is determined.

(3)



ResultsPlus
Examiner Comments

This diagram also gains full marks for showing parents, gametes formed and offspring and phenotypes.

(b) The inheritance of sex in rats is the same as in humans.

The sex of a rat is determined by the gametes inherited from the parents.

(i) Use a genetic diagram to show how the sex of the rat offspring is determined.

(3)

X and Y chromosomes.

XY boy

XX girl.

ResultsPlus
Examiner Comments

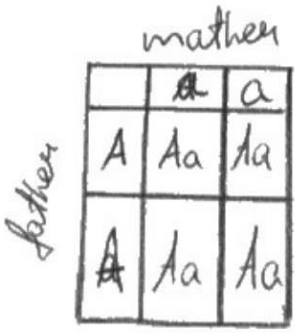
This response gains one mark for showing XX as female and XY as male.

(b) The inheritance of sex in rats is the same as in humans.

The sex of a rat is determined by the gametes inherited from the parents.

(i) Use a genetic diagram to show how the sex of the rat offspring is determined.

(3)



male offspring – 50%
female offspring - 50%

ResultsPlus
Examiner Comments

This response does not score as candidates need to use XX and XY to show sex determination.

Question 6 (b)(ii)

In Q06(b)(ii) candidates were told that rats had three offspring and to calculate the probability that all three rat offspring were male. This was a challenging item at the end of the paper so examiners were encouraged that the best candidates were able to calculate the probability correctly. Candidates who knew that the chance of one male offspring was 0.5 gained one mark.

(ii) A male rat and a female rat have three offspring.

Calculate the probability that all three of the offspring will be male.

(2)

$0.5 \times 0.5 \times 0.5 = 0.125$

probability = 0.125

ResultsPlus
Examiner Comments

This response gains both marks for correctly calculating the probability.

(ii) A male rat and a female rat have three offspring.

Calculate the probability that all three of the offspring will be male.

(2)

~~50 × 50 × 50~~

~~125000~~

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$

$= 0.125$

probability = 12.5%

ResultsPlus
Examiner Comments

This also gains both marks for calculating the probability as a fraction and converting it to a percentage.

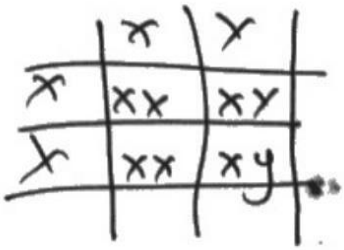
ResultsPlus
Examiner Tip

We would prefer probability to be expressed as a decimal but allowed a fraction or a percentage.

(ii) A male rat and a female rat have three offspring.

Calculate the probability that all three of the offspring will be male.

(2)



$\frac{2}{4} = 50\%$

probability = 50%

ResultsPlus
Examiner Comments

This gains one mark for showing that the probability of one male is 50%.

Question 7

Finally, Q07 was the experiment design item. Candidates were asked to design an investigation to determine the effect of changing the colour of light on the rate of photosynthesis in a water plant. Most candidates scored at least 3 marks, with many gaining full marks for a clear description of a suitable controlled experiment using a water plant.

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

(6)

We should prepare two plants with same age, species, the tube with room temperature water, two lighters with different color of light, a room with room temperature and ~~same amount of carbon dioxide~~ and the water in the tube should be the same amount.

Now we finish the preparation, we could start the experiment.

First, we put the plants into the tube with the same amount of water.

Put the tube in the room with stable room temperature.

Next, we put the lighters in the front of the plants. Make sure the plants could get enough sunlight. And repeat the step that we did in the past two step. But change the lighters with different color of light.

Thirdly, we could open the lighters at the same time. And pupils could count the bubbles produced by photosynthesis. Count the number each minutes.

Then after 5 minutes, the first experiment finish. The pupils could compare the difference between rate of photosynthesis for two plants but with different color of sunlight absorbed.

In the end, repeat the experiment three times. Make sure the result will not have a big difference.

ResultsPlus
Examiner Comments

This response gains full marks. It refers to using the same plant species (O), controlling the temperature (S2), changing the colour of light (C), counting the number of bubbles (M1), in a stated time (M2) and repeating the experiment (R).

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

(6)

In this experiment we will be ~~reacting~~ investigating the effect of changing the colour of light on the rate of photosynthesis in a water plant. The independant variable would be light and we will have 5 different colors; red, white, yellow, green and blue. ~~The organism~~ Firstly, ~~we must~~ take the water plant and put it in a test tube ~~certain~~ filled with water. Then, ~~we then~~ the test tube should be kept on a stand in a completely dark room. ~~we will too~~ Afterwards, we will then take a lamp ~~and~~ directly pointing at the plant and place it 10 cm away. The lamp should not be moved from this distance in order to make it a fair test. We shall then take our different coloured light bulbs which all have the same ~~not~~ power ~~on the light bu~~ and screw one of them onto the lamp. All bulbs have the same power will ensure the light intensity remains the same. We the turn on one of the light bulbs for one minute and count the bubbles produced by the plant. We then turn the lamp off until the plant stops photosynthesizing and repeat with the other bulbs. The experiment should be repeated three times and the average bubbles produced should be calculated. The color with the most bubbles produced ~~is~~ increased the rate of photosynthesis the most and vice versa.

ResultsPlus
Examiner Comments

This gains 5 marks for (C) changing the colour, (S1) keeping the distance the same, (M1) counting the bubbles, (M2) in a minute and (R) repeating.

7 Photosynthesis depends on the light available to the leaves of a plant.

Design an investigation to determine the effect of changing the colour of light on the rate of photosynthesis in a water plant.

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

(6)

There should be 2 ~~the~~ water tanks of the same size and with glass of ~~same~~ the same type and width. Each should contain a water plant of the same ages, species and sizes. The pH of the water should be the same in all the tanks and the water filtered. The temperature of the water must also be the same in all the tanks. Each tank will then be kept in different rooms of the same conditions such as temp and air quality. Each tank will be exposed to a diffent colour of light of the same intensity and distance and position from the tank. Then photosynthesis measured.

ResultsPlus
Examiner Comments

This scores 4 marks for (O) same species, (S2) temperature, (C) changing colour and (S1) distance of light.

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 comment or deduce items.
- Include how each feature is adapted for its function in explain items, such as how a leaf layer is adapted.
- Make sure you have practised calculations, especially magnification, understand and know how to apply formulae and always include all your working.
- Write in detail and use correct and precise biological terminology, such as those in reproduction.
- Make links between different parts of the specification, and 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 transgenic, ligase and restriction enzyme.
- Be able to use genetic diagrams correctly and understand the inheritance of sex determination.
- 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.