Additional Assessment Materials
Summer 2021

Pearson Edexcel GCSE in Combined Science
Biology (1SC0) Foundation

Resource Set Topic 1: Key Concepts in Biology

Mark Scheme and Examiner report

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Additional Assessment Materials, Summer 2021

General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment materials presented in this booklet are an optional part of the range of evidence you may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow you to adapt them to use with your candidates.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions. The mapping guidance will also highlight where the question originally came from to allow you to access further support materials (mark schemes, examiner reports).
- Use of these assessment materials will assist you in assessing candidates' current performance in areas not assessed elsewhere. Their use will also provide an extra opportunity for candidates to demonstrate their performance at the end of their course of study.
- Specific guidance relating to this selection of material for this subject is detailed below.
- These materials are only intended to support the summer 2021 series.

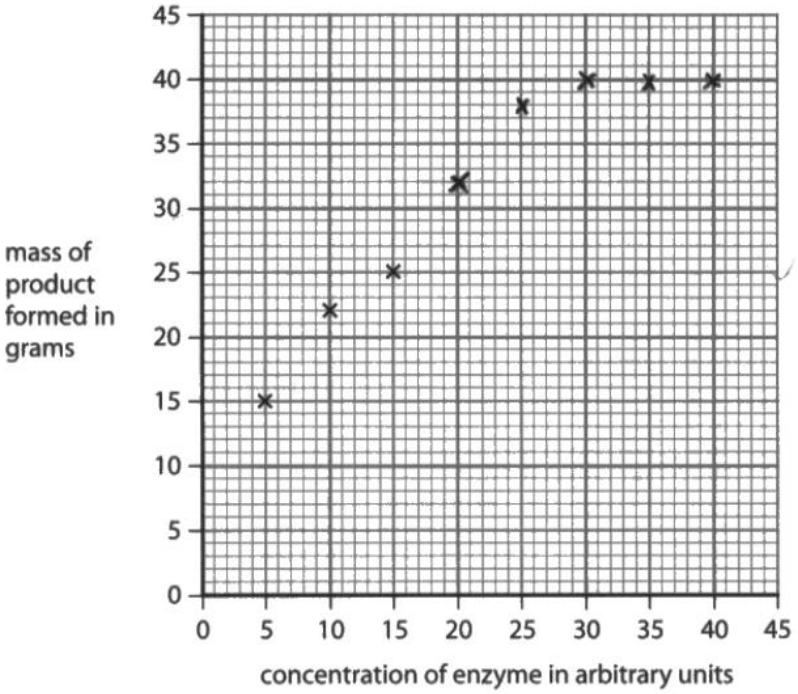
Question Number	Answer	Additional guidance	Mark
5(a)	• **all** points plotted correctly to +/- ½ small square (1) • a line showing a steady increase that levels off at 30au/40g (1)	 accept dot-to-dot line	**(2)** AO 2 2

Question 5 (a)

This question required candidates to plot five points on a graph and then draw a line to show the trend in the data. While the majority of candidates were successful in achieving the first marking point, many candidates did not go on to draw a line, which precluded them from gaining marking point 2. A line showing a steady increase, then levelling off at 30 arbitrary units was required. Dot-to-dot lines were accepted.

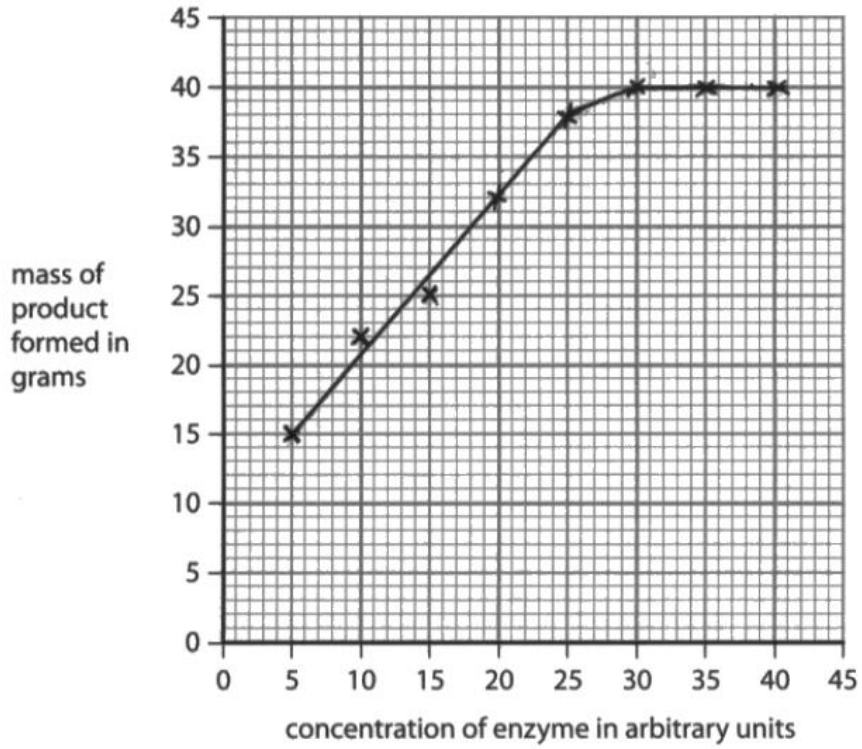
(a) Complete the graph by plotting the points and drawing a line to show the trend in the data.
The first three points have been plotted for you.

(2)



ResultsPlus
Examiner Comments

This response scores 1 mark for plotting all the points correctly. The candidate has not drawn a line to show the trend, so the second marking point cannot be awarded.



ResultsPlus
Examiner Comments

This answer was awarded the full 2 marks. The candidate has plotted the points accurately and has drawn a suitable line to show the trend in the data. Lines showing a steady increase that levelled off at 30 arbitrary units were accepted.

Question Number	Answer	Additional guidance	Mark
5(b)	Any two from: • mass of product formed increases as enzyme concentration increases (1) • then (the mass of product formed) remains the same (1) • 30 au/40 g is point where mass of product remains the same (1)	 accept then levels off (1)	**(2)** AO 3 1a AO 3 1b

Question 5 (b)

For this question, candidates had to describe the effect that enzyme concentration has on the mass of product formed. The first marking point was for a straightforward statement that the mass of product increases as enzyme concentration increases. Many candidates were successful and achieved this mark but did not gain further marks by describing that the mass of product stays the same, or levels off from 30 arbitrary units.

(b) Describe the effect that enzyme concentration has on the mass of product formed.

(2)

The higher the concentration of enzymes, the higher the mass. (positive correlation)

ResultsPlus
Examiner Comments

This answer scores 1 mark for describing the first part of the graph, (up to an enzyme concentration of 30 arbitrary units). The second and third marking points cannot be awarded as there is no reference to the line on the graph levelling off.

ResultsPlus
Examiner Tip

Always look at the number of marks available for a question and give a full description of the trend shown by a graph.

Question Number	Answer	Additional guidance	Mark
5(c)	• 5:15 (1) • 1:3	allow full marks for correct final answer with no working	**(2)** AO 2 1

Question 5 (c)

The maths skill of calculating a ratio was examined in this question. Candidates across the ability range found this question challenging, but when successful they usually gained both marks for giving the correct ratio of 1:3. Incorrect substitution (15:5) leading to an answer of 3:1 scored one mark for an error carried forward.

Question Number	Answer	Mark
5(d) (i)	D increase the substrate concentration **1. The only correct answer is D** ***A*** *is not correct because increasing the pH will not increase the mass of product formed in this investigation* ***B*** *is not correct because decreasing the temperature will not increase the mass of product formed in this investigation* ***C*** *is not correct because decreasing the enzyme concentration will not increase the mass of product formed in this investigation*	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
5(d) (ii)	Any three from: • 37°C is the optimum for this enzyme (1) • 80°C /it will **denature** the enzyme/pepsin (1) • change in the shape of the enzyme/active site (1) • No reaction will take place / no enzyme-substrate complexes formed / no product formed (1)	accept 37°C is best temperature for this enzyme (1) accept high temperatures will **denature** the enzyme accept substrate no longer fits active site (1)	**(3)** AO 2 1

Question 5 (d) (ii)

In this question, candidates were asked to explain why a temperature of 80°C was not used in the investigation with pepsin. Many candidates were able to state successfully that the enzyme would denature at 80°C and so gained marking point 2. Some candidates were then able to explain that the enzyme or its active site would change shape, thus scoring the third marking point. A common response for the fourth marking point was that no reaction would take place or that the substrate would no longer fit into the active site. Marking point 1 was gained less frequently, mainly because comments about the optimum temperature were vague. However, giving the idea that 37°C is the best temperature for pepsin scored the mark.

(ii) Explain why a temperature of 80°C was not used in this investigation.

(3)

Because that would be to high for the enzyme to work. Because it is using pepsin from the stomach it will work best at body temprature, 37°. If the temprature was 80°C the active site of the enzyme would change shape so that the substrate couldn't fit into it, it would become denatured.

ResultsPlus
Examiner Comments

This response was awarded the full 3 marks for giving a clear and concise explanation. All four marking points can actually be identified in the answer.

Question Number	Answer	Additional guidance	Mark
9(a)(i)	(2 x 5.0 x 2.0) + (2 x 5.0 x 2.0) + (2 x 2.0 x 2.0) or 20 + 20 + 8 (1) 48.0	Allow full marks for correct final answer accept 48	**(2)** AO 1 1

Question 9 (a) (i)

In this question, the formula for calculating surface area was given and candidates were asked to calculate the surface area of chip B. Many candidates completed the mathematical calculation successfully and were awarded the full 2 marks for the correct answer, 48 or 48.0. The most common error seen related to the values XY, XZ and YZ being added together rather than the correct process of multiplying the values. Occasionally, candidates calculated the surface area of chip A, which was already given in Figure 12.

9 (a) Figure 11 shows two potato chips.

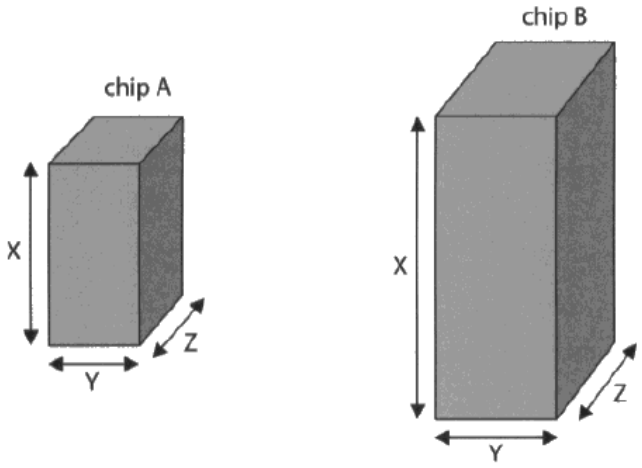


Figure 11

Figure 12 shows some information about each potato chip.

potato chip	length of X in cm	length of Y in cm	length of Z in cm	total surface area of four sides in cm^2	total surface area of top and bottom in cm^2	total surface area of chip in cm^2
A	3.0	1.5	1.5	18.0	4.5	22.5
B	5.0	2.0	2.0	?	?	?

Figure 12

(i) Calculate the total surface area of potato chip B using the formula,

Total surface area = 2XY + 2XZ + 2YZ

(2)

$(2\times5\times2)+(2\times5\times2)+(2\times2\times2)$

$=180$

total surface area = 180 cm^2

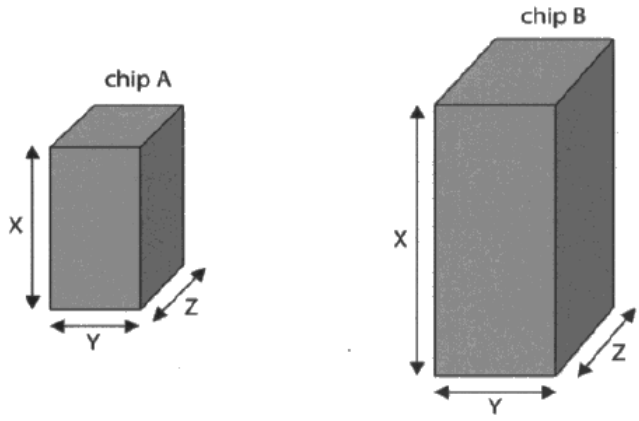
ResultsPlus
Examiner Comments

This answer scores 1 mark. The candidate has substituted into the formula correctly, but the evaluation is incorrect.

ResultsPlus
Examiner Tip

Always check your answers to maths questions.

9 (a) Figure 11 shows two potato chips.



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A	3.0	1.5	1.5	18.0	4.5	22.5
B	5.0	2.0	2.0	?	?	?

Figure 12

(i) Calculate the total surface area of potato chip B using the formula,

Total surface area = 2XY + 2XZ + 2YZ

(2)

4.5 4.5 2.25
2(3x1.5) + 2(3x1.5) + 2(1.5x1.5).

total surface area = 22.5 cm^2

ResultsPlus
Examiner Comments

This response does not score any marks. The candidate has calculated the surface area of potato chip A instead of potato chip B.

Question Number	Answer	Additional guidance	Mark
9(a)(ii)	• chip B has greater surface area (1) • therefore **more** water {absorbed / moved into the potato chip} (1)	accept chip B is bigger / has more cells	**(2)** AO 3 2a AO 3 2b

Question 9 (a) (ii)

This question required candidates to provide an explanation as to why potato chip B had a greater increase in mass. For marking point 1, candidates needed to give a comparative idea for chip B, for example, that it had a larger, greater, bigger or more surface area. Many candidates could do this successfully. The idea of potato chip B having a higher solute concentration or lower water potential than chip A was also accepted. Answers which suggested a larger surface area:volume ratio were not accepted, because this is incorrect.

For marking point 2, candidates needed to refer to the idea that more water is going into potato chip B. Responses which indicated that chip B soaked up more water were accepted. Just the idea of water entering by osmosis was insufficient, as this also occurs in chip A as well. Candidates were less successful in giving an appropriate explanation.

Question Number	Answer	Additional guidance	Mark
9(a)(iii)	An explanation that links the following: • (cells) lose water / become plasmolysed (1) followed by • (water moves out) by <u>osmosis</u> (1) • from a high concentration of water molecules (in the potato) to a low concentration of water molecules (in the solution) / through the partially permeable membrane (to the salt solution) (1)	accept get smaller/shrink/lose mass accept from low solute concentration to a high solute concentration accept from high to low water potential	**(3)** AO 1 1

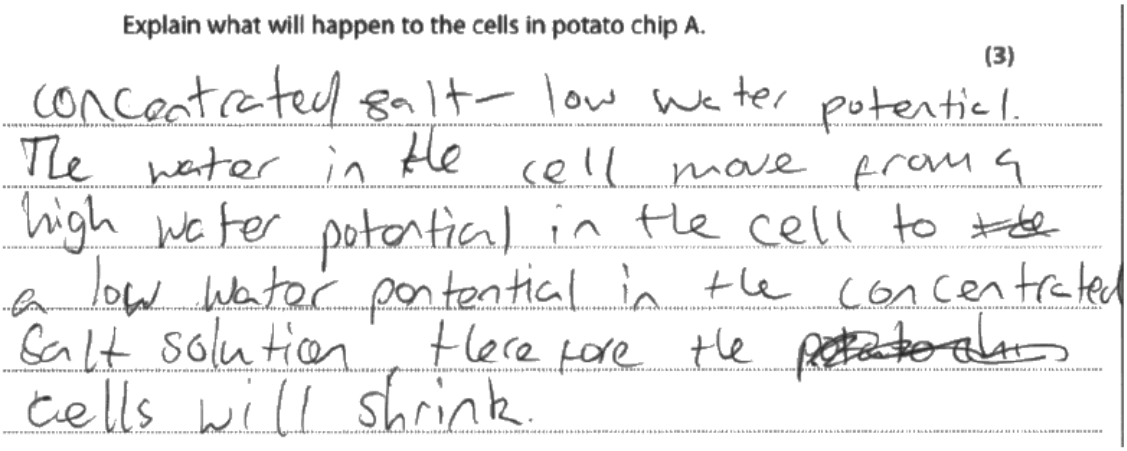
Question 9 (a) (iii)

In this question, candidates were required to explain what would happen to the cells of chip A if the chip was placed in a concentrated salt solution. This proved to be a very challenging question for many candidates. For marking point 1, candidates had to identify that the cells in chip A would lose water, become plasmolysed, get smaller, shrink or lose mass to gain marks on the linked explanation.

Marking point 2 was for osmosis; the use of the term 'diffusion' was ignored. Marking point 3 could be obtained by referring to the solute concentration gradient or the idea of water potential. Water concentration was accepted, as specific knowledge of water potential itself is not required, although candidates who used this concept were usually successful in obtaining full marks. Candidates who scored marks for this question were frequently successful in obtaining the full 3 marks.

Explain what will happen to the cells in potato chip A.

(3)



ResultsPlus
Examiner Comments

This answer scores 2 marks. There is a comment about cells shrinking for marking point 1 and a correct reference to water moving due to differences in water potential for marking point 3. Water movement by osmosis has not been mentioned, so marking point 2 has not been awarded.

ResultsPlus
Examiner Tip

Remember that water moves into and out of cells by osmosis.

Explain what will happen to the cells in potato chip A.

(3)

the Potato chip A will begin to lose mass due to the salt in the solution.

ResultsPlus
Examiner Comments

This response scores 1 mark for the idea that mass will be lost. The reference to salt solution is too vague to be creditworthy.

Question number	C.S. Question	Answer	Additional guidance	Mark
5(a)(i)	**3(a)(i)**	An answer including: • reference to enzyme activity (1) • (the enzyme activity) increases from pH 5.8 to pH 8 (1) • optimum (activity) at pH 8 (1) • (enzyme activity) decreases between pH 8 and pH 9.8 (1)	accept a range of pH 5.6 to 6 for pH 5.8 accept activity peaks at pH 8 accept reference to range of pH 9.6 to 10 for pH9.8	**(4)** **expert** AO3 1a b

Question 5 (a) (i)

This question asked candidates to describe the trend in the activity of trypsin at different pH values and to use data from the graph.

Most candidates could access the question and were often awarded a mark for referring to enzyme activity in the correct context and for identifying the optimum pH for trypsin. Two more marks were available for describing that enzyme activity increases from pH 5.8 to pH 8 and that enzyme activity decreases between pH 8 and pH 9.8. These marks were awarded less frequently, often because the values taken from the graph were incorrect.

5 (a) Figure 7 shows the activity of the enzymes pepsin and trypsin at different pH levels.

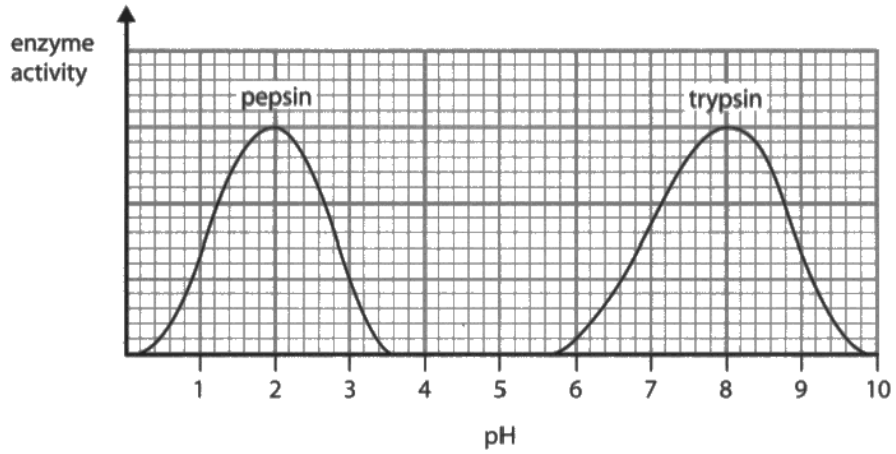


Figure 7

(i) Describe the trend in the graph for the enzyme **trypsin**.

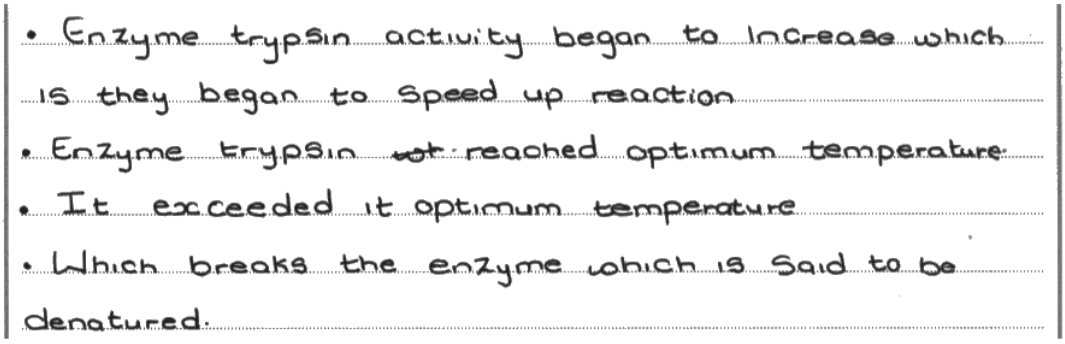
Use data from the graph to support your answer.

(4)

at 6 pH trypsins activity is only starting to rise by the smallest amount but as it gets to 7 it's starts to rise quicker until it hits 8 pH being it's optimum pH for the enzyme. Just as quick as the activity rised it begins to drop aswell and becomes flat at 10

ResultsPlus
Examiner Comments

This is a detailed description which scores full marks for the question. The candidate has referred to enzyme activity in the correct context. They have stated the pH ranges between which trypsin activity increases and then decreases. The optimum pH for trypsin has also been identified.



ResultsPlus
Examiner Comments

This response just scores 1 mark for the reference to enzyme activity. There are no other creditworthy points. The candidate has also confused pH and temperature when referring to the optimum.

ResultsPlus
Examiner Tip

Always check that you are referring to the correct quantities when using data from a graph. Read the axes carefully so that you link the correct independent and dependent variables together.

Question number	C.S. Question	Answer	Additional guidance	Mark
5(a)(ii)	**3(a)(ii)**	(pH) 2	accept (pH) two / 2 pH	**(1)** AO3 1a

Question 5 (a) (ii)

Most candidates could correctly state that the optimum pH for the enzyme pepsin is 2.

Question number	Answer	Mark
5(a)(iii)	Two from: • conditions in the stomach are pH 2 / acidic / low pH (1) • (The stomach secretes) hydrochloric acid (1)	**(2)** AO1

Question 5 (a) (iii)

In this question candidates had to describe the conditions in the stomach that allow pepsin to work effectively.

The idea that the stomach conditions are pH 2 or acidic scored 1 mark for many candidates. However, relatively few were awarded the second mark for stating that these conditions are due to hydrochloric acid in the stomach.

Question number	Answer	Mark
5(b)	B denatured **5b The only correct answer is B** ***A*** *is not correct because the enzyme is not specific when it changes shape* ***C*** *is not correct because the enzyme is not digested when it changes shape* ***D*** *is not correct because the enzyme is not dead when it changes shape*	**(1)** AO1 (1)

Question number	C.S. Question	Answer	Mark
5(c)	3(c)	amino acids	(1) AO1 1

Question 5 (c)

This question required candidates to state the products of protein digestion. The correct answer of amino acids was seen infrequently.

(c) State what is produced when proteins are digested.

(1)

glucose .

ResultsPlus
Examiner Comments

The correct answer to this question is amino acids, not glucose.

ResultsPlus
Examiner Tip

Check that you know what carbohydrates, proteins and lipids are broken down into when they are digested.

Question number	Answer	Additional guidance	Mark
6(b)(i)	acrosome	Reject achromosome / chromosome / head	(1) AO1 (1)

Question 6 (b) (i)

Only a small proportion of candidates could correctly name structure Z as the acrosome.

(b) Figure 9 shows two sperm cells.

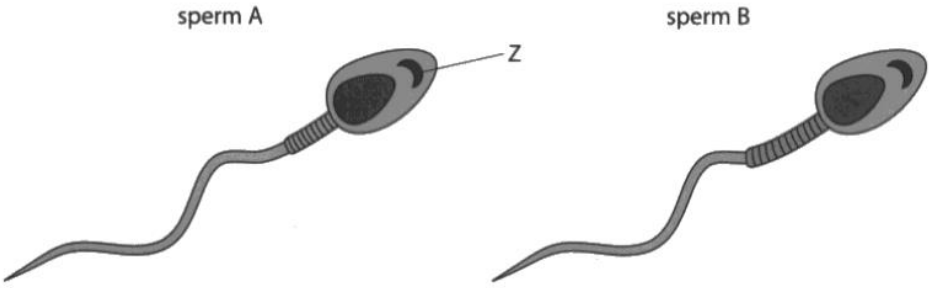


Figure 9

(i) Name structure Z.

(1)

Head of sperm cell

ResultsPlus
Examiner Comments

The correct answer for this question is acrosome. 'Head of sperm cell' is not creditworthy.

ResultsPlus
Examiner Tip

Make sure that you can identify the main parts of specialised cells, such as sperm cells, egg cells and ciliated epithelial cells.

Question number	Answer	Mark
6(b) (ii)	Any three from: • (middle section) contains mitochondria (1) • so has **more** mitochondria (in middle piece of sperm B) (1) • (sperm B can) release more energy / has a faster rate of respiration (1) • (sperm B) swims faster / greater distance (1)	**(3)** AO2 1

Question 6 (b) (ii)

The diagrams in the stem of the question showed two sperm cells with different size middle pieces. Candidates had to apply their knowledge of the structure of sperm cells to explain why one would be more likely to fertilise an egg than the other if they were both released at the same time. 1 mark was awarded for stating that the middle section contains mitochondria and a second mark for identifying that sperm B would have **more** mitochondria. Candidates who could give the function of mitochondria gained a third mark. Many candidates scored the final available marking point for stating that sperm B would be able to swim faster.

(ii) Sperm B has a larger middle section than sperm A.

Explain why sperm B will be more likely to fertilise an egg than sperm A if they were both released at the same time.

(3)

Because the middle section is where the mitochondria is stored* and if sperm B has more mitochondria then it will have more energy, therefore making it faster at travelling to the egg.

*[which produces energy]

ResultsPlus
Examiner Comments

This is a detailed explanation which scores full marks for the question. The candidate has explained that the middle section contains mitochondria, so sperm B will have more of them. There is a link between mitochondria and energy, and sperm B being able to travel to the egg faster.

ResultsPlus
Examiner Tip

Remember that energy is **released** as a result of respiration taking place in mitochondria.

Never say that energy is produced.

Question number	Answer	Mark
2(a)(i)	B cell wall **The only correct answer is B** ***A*** *is not correct because X is not the cell membrane* ***C*** *is not correct because X is not the cytoplasm* ***D*** *is not correct because X is not the nucleus*	**(1)** AO1 1

Question number	Answer	Mark
2(a)(ii)	(allows) movement / swim / motility	**(1)** AO1 1

Question number	Answer	Additional guidance	Mark
2(a)(iii)	• (bacteria) have no nucleus / have chromosomal DNA / have a cell wall	accept converse for all differences	**(1)** AO1 1

Question number	Answer	Mark
2(b)	C diffusion **The only correct answer is C** ***A*** *is not correct because oxygen does not move into and out of cells by transpiration* ***B*** *is not correct because oxygen does not move into and out of cells by active transport* ***D*** *is not correct because oxygen does not move into and out of cells by osmosis*	**(1)** AO1 1

Question number	Answer	Additional guidance	Mark
2(c)	Substitution 500 x 0.04 (1) Evaluation 20 (mm)	 award two marks for correct answer with no working	**(2)** AO2 2

Question 2

The majority of candidates could state the function of a flagellum, but only half of them could identify a difference, other than the presence or absence of a flagellum, between the bacterial cell and animal cell in Figure 4. It was pleasing to see that most candidates could use the data given to calculate the length of a magnified image. Some candidates may have scored one mark out of two if they had shown their working for the calculation.

Question number	Answer	Additional guidance	Mark
4(a)(i)	Substitution 3 ÷ 120 (1) 0.025 (mm)	 award two marks for correct answer with no working	**(2)** AO2 1

Question number	Answer	Additional guidance	Mark
4(a)(ii)	Repeat (the investigation)	accept compare with results from other groups	**(1)** AO3 3b

Question number	Answer	Additional guidance	Mark
4(b)	A logical plan including three from the following: • heat (hydrochloric) acid to different temperatures (1) • use same size agar jelly cubes (1) • use same volume/ concentration of acid (1) • for same amount of time (1) • measure clear distance (from outside of cube) at each temperature (1)	accept heat agar jelly cubes to different temperatures ignore amount of acid accept for 2 marks time how long for agar jelly to go clear (mp 4 and 5)	**(3)** AO3 3a

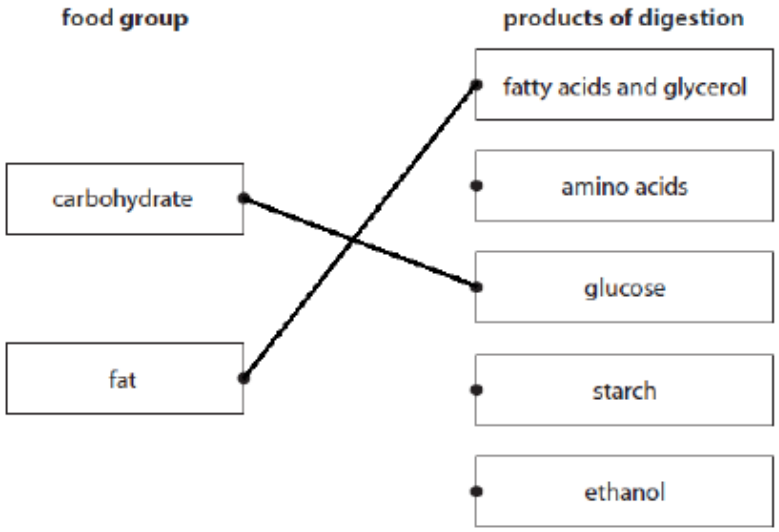
Question number	Answer	Mark
4(c)	A against a concentration gradient using energy **The only correct answer is A** ***B*** *is not correct because active transport is not down a concentration gradient using energy* ***C*** *is not correct because active transport is not against a concentration gradient without using energy* ***D*** *is not correct because active transport is not down a concentration gradient without using energy*	**(1)** **AO1 1**

Question 4

Approximately half of the candidates scored at least one mark for attempting to calculate the distance diffused by hydrochloric acid in one second for cube B. This question is not based on a core practical, but nevertheless, it is important that candidates are familiar with investigations such as this. The majority of candidates could give an improvement that should be made to confirm the results of the investigation. The ability of candidates to devise methods did not show through strongly in this question, with only half of them scoring marks. Candidates were expected to use information already provided in the question to devise a method to investigate how temperature affects the rate of diffusion. This question also showed the need for candidates to practise using data presented in different formats.

Question number	Answer	Additional guidance	Mark
6(a)(i)	Any two from: • mass of product increases up to 40ºC /300mg (1) • mass of product decreases after 40ºC /300mg (1) • mass of product decreases faster than it increases (1)	accept maximum mass is 300mg / 40ºC is the optimum temperature (1) accept increases then decreases for 1 mark	**(2)** AO2 2

Question number	Answer	Mark
6(a)(ii)	An explanation linking two from: • (maximum product at 40ºC) because the enzyme is at its optimum temperature (1) • (between 40ºC and 60ºC the amount of product decreases) because the enzyme is becoming less active/ is being denatured /at 60ºC the enzyme is denatured (1) • (because) the active site is changing shape / substrate can't bind to the active site / fewer enzyme-substrate complexes formed (1)	**(2)** AO2 1

Question number	Answer	Mark
6(b)(i)	Two lines drawn correctly as shown.  Reject more than one line from each food group	**(2)** AO1 1

Question number	Answer	Mark
6(b)(ii)	D lipase **The only correct answer is D** ***A*** *is not correct because carbohydrase does not break down fat* ***B*** *is not correct because amylase does not break down fat* ***C*** *is not correct because protease does not break down fat*	**(1)** AO1 1

Question number	Answer	Additional guidance	Mark
6(c)	An explanation linking: • (shape of) active site of enzyme (1) • not complementary to / will not fit substrate Q (1) • (therefore) the enzyme cannot cause the reaction to occur (so no product is formed) (1)	accept lock and key are not complementary/ enzyme and substrate don't fit together	(3) AO2 1

Question 6

This question was about enzymes. The majority of candidates showed that they could describe trends in graphs, with nearly half of them scoring full marks on the first part of the question. However, the ability of candidates to explain results (for a particular temperature range) was less successful. It is important that candidates are aware of the distinction between the command words describe and explain. The majority of candidates could identify the product(s) of digestion for at least one food, but this is a certainly an area that could be improved upon. The last part of this question allowed candidates to demonstrate their knowledge and understanding of enzyme action. Most candidates could explain at least one relevant point, such as one of the substrates not being complementary to the enzyme, but there were few full explanations scoring full marks.

Question number	Answer	Mark
9(b)(i)	chloroplast / chloroplasts accept phonetically correct misspellings	(1) AO1 1

Question number	Answer	Additional guidance	Mark
9(b)(ii)	(aerobic) respiration / release energy	ignore make / produce energy accept word equation for respiration accept to produce ATP	(1) AO1 1

Question 9

In this question, few candidates could describe the function of a meristem in the growth of a plant, but more than half could describe, at least in part, how a microscope slide of a sample of cells could be prepared. Knowledge and understanding of structures in eukaryotic cells was not strong, with fewer than half scoring marks on that part of the question. It was surprising that approximately 60% of candidates did not score marks on the extended open-response question on DNA structure and extraction. There was a small proportion of very detailed answers, with those candidates writing very detailed descriptions about both structure and extraction from plant cells.

Question number	Answer	Mark
6(a)	• a diagram of the cell that reflects its shape and some of the internal structures. (1) • with any **three** cell structures labelled from: nucleus / chloroplast / vacuole / cytoplasm / cell wall /cell membrane (3)	(4) AO1.2

Question 6 (a)

This item tested part of the core practical skill of drawing and interpreting an image as seen through a light microscope as outlined in specification point 1.6.

Almost all candidates could access the item with very few blank responses seen and just over half the candidates scored 3 or 4 marks.

The instruction clearly stated to draw **this** plant cell and to label **three** parts of **this** cell. To be awarded the drawing mark, the candidate had to make a reasonable attempt at drawing the shape of the cell with a complete cell wall, the nucleus in roughly the correct position and some of the chloroplasts correctly shown.

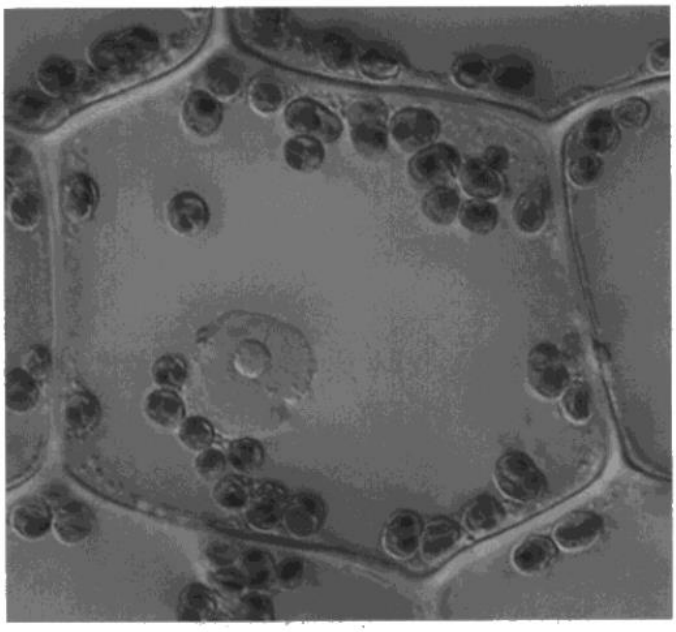
If the candidate's drawing did not gain this mark, then the 3 labelling marks could still be awarded.

If more than three parts of the image were labelled, then the list rule was applied with a significant number of candidates losing marks for incorrect labels being subtracted from those that were correct.

A small, but significant number of candidates drew and labelled a 'textbook' style diagram of a plant cell. These candidates were not awarded any marks as this item tested application of knowledge and not recall.

During examination preparation, candidates should be reminded to read the question carefully and follow the instructions in the stem of the questions.

6 Figure 10 shows a plant cell as seen under a light microscope.



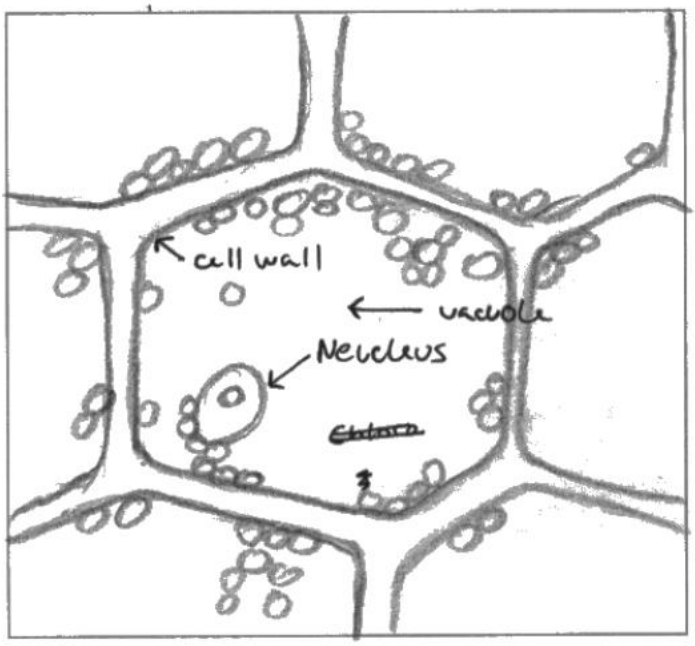
(Source: © HERVE CONGE, ISM/SCIENCE PHOTO LIBRARY)

Figure 10

(a) Draw this plant cell in the box below.

Label **three** parts of this cell.

(4)

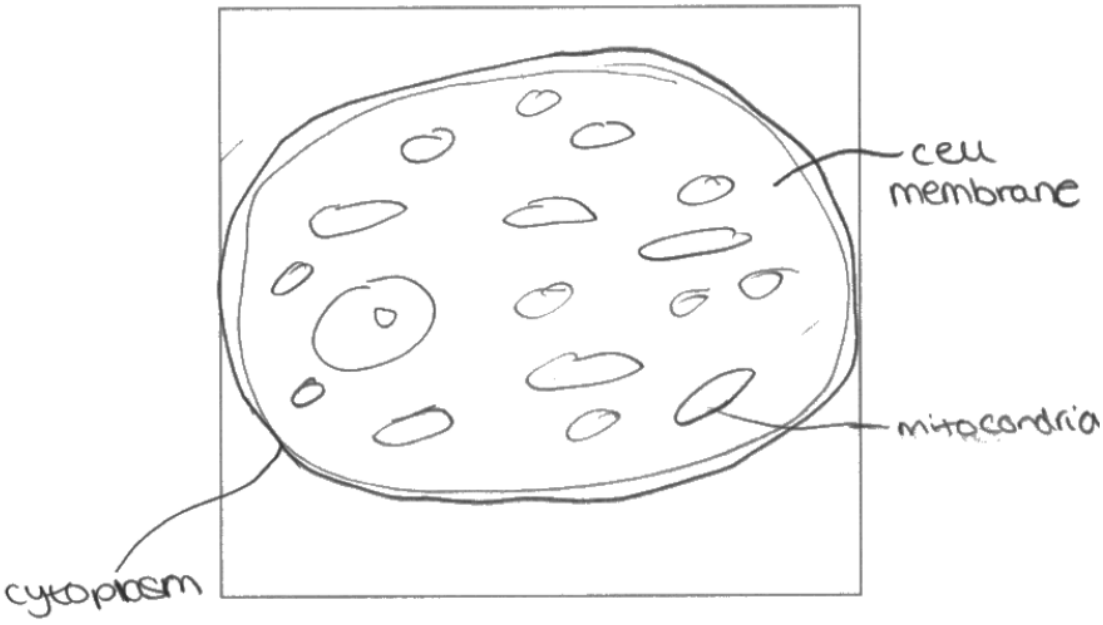


ResultsPlus
Examiner Comments

A clear 4 mark drawing of the plant cell shown in figure 10.

ResultsPlus
Examiner Tip

When asked to draw a microscopic diagram, make sure that it is roughly the correct shape and that details, here for example the chloroplasts are roughly in the right positions – eg that curve of chloroplasts just under the nucleus. If you are asked to label 3 parts of the cell just label 3 as this candidate has done.



ResultsPlus
Examiner Comments

A stylised / textbook type diagram, even with correct labels gets no marks as this is an application task not a recall question. In this case, all three labels are incorrect anyway, but even if they were correct they still would not have scored any marks.

ResultsPlus
Examiner Tip

If you are asked to draw the cell shown in the image then make sure that you at least draw that cell. Your diagram does not have to be perfect but at least do what you are instructed. Make sure that you get the shape roughly correct and some of the parts inside in the roughly correct place and roughly the right size.

Question number	Answer	Mark
6(b)	**A** respiration **The only correct answer is A** **B** *is not correct because the* ***to*** *make proteins Is not the function of mitochondria in a plant cell.* **C** *is not correct because the photosynthesis Is not the function of mitochondria in a plant cell* D *is not correct because the store water Is not the function of mitochondria in a plant cell.*	**(1)** **AO1.1**

Question number	Answer	Additional guidance	Mark
6(c)(i)	• Used as a control / to compare with the results of the other tubes		(1) AO1.2

Question 6 (c) (i)

Candidates find the idea of a control as part of an experiment hard. Although this was the easier of the two ways controls were used as part of questions in this examination paper, relatively few candidates scored the available mark. To score here, candidates had to say that the potato chips in the 0% sodium chloride solution were used to compare to see how much the potato chips in the other concentrations had changed. This item was left blank by a larger number of candidates than most other items and candidates found it hard to express what the role of the control was in an investigation. The most common error was to say to see how the chips changed in it.

(c) A student wanted to investigate the movement of water into and out of cells in potatoes.

The student had the equipment shown in Figure 11.

Figure 11

The test tubes in the rack contain different concentrations of sodium chloride solution.

The solutions were 0.1 M, 0.2 M, 0.3 M, 0.4 M and 0.5 M sodium chloride solution.

The test tube in the beaker contains distilled water.

There are three potato chips in each of the six test tubes.

(i) State why the test tube in the beaker only contains distilled water and three potato chips.

(1)

Because its our controlled one so we can compare it to the others.

ResultsPlus
Examiner Comments

A good 1 mark answer.

ResultsPlus
Examiner Tip

When setting up an investigation, we often set up one part of the equipment to use as a baseline. We then compare the results in the other parts of the investigation with this baseline. Make sure you know this use of a control.

Question number	Answer	Mark
6(c)(ii)	Any two variables from: • temperature (1) • age / variety of potato (1) • {size / volume / length / width / shape / mass / surface area} of chip (before investigation) (1) • volume of solution (1) • time left in solutions (1)	(2) AO1.2

Question 6 (c) (ii)

We insist that in experiments we refer to volume of liquids and so amount of sodium chloride solution was not credited here. This is true across all three of the sciences. This has been stated and stressed in past examinations and so it was disappointing that many candidates wrote amount of sodium chloride solution thus not gaining a mark. Even so, half of the candidates gained 1 mark with a further third gaining 2 marks. Some candidates stated that a variable to control was the concentration of sodium chloride which was the independent variable and therefore had to be different whilst common creditable responses included volume of sodium chloride, mass /size / length / surface area of potato chip at the start of the investigation (as mass was the dependent variable) and time the chips were left in the solution. Many candidates added that these should be kept the same which is true, but not required for the mark in this case due to the way the question was phrased.

(ii) State **two** variables that need to be controlled in this investigation.

(2)

1 Same amount of wate

2 Same amount of potatoe chips

ResultsPlus
Examiner Comments

This scores no marks as amount of water needs to be volume of solution and same amount of chips is not creditworthy as the investigation set up states that there are three chips in each tube.

ResultsPlus
Examiner Tip

Read the question carefully, underline key facts and then do not use parts that are stated as the same as something to control as it already has been.

1 The temperature of each test tube.

2 They all need to be left in for the ~~same~~ exact same amount of ~~time~~ time.

ResultsPlus
Examiner Comments

2 marks here for marking points one and five.

ResultsPlus
Examiner Tip

Make and learn a list of things that can affect an investigation and then write about two that are not already controlled or are the independent variable.

Question number	Answer	Mark
6(c)(iii)	An explanation including: • There is a higher concentration of sodium chloride outside (the cell) than inside / higher concentration of water molecules inside (the cell) than outside (1) • water moves out of {cells / chips} / into (sodium chloride) solution (1) • by osmosis (1)	(3) AO1.2

Question 6 (c) (iii)

Less than one third of candidates managed to score any marks with very few scoring all three here where candidates had to explain why the potato chips in 5% sodium chloride solution lost mass. Many candidates just talked about because there were different concentrations inside the chip to the solution but as they did not state the concentration of water could not be credited with a mark. Many of those that talked about water moving across the membrane but did not say out of the potato / into the solution to hit marking point two. The most common marking point seen was osmosis. Candidates need to be trained better into stating which way the water is moving and stating the concentration of either the water or the solute in their responses.

(iii) Explain why the chips in the 0.5 M sodium chloride solution lost mass.

(3)

They lost mass because the water moved out of the potato chips through osmosis because there was ~~more~~ a lower concentration outside.

ResultsPlus
Examiner Comments

2 marks here for water moving out of the potato and by stating that this was due to osmosis. Lower concentration is not creditable as it does not specify that the concentration referred to concentration of water.

(iii) Explain why the chips in the 0.5 M sodium chloride solution lost mass.

(3)

~~water could not defuse in and out of it due to the high concentration of sodium chloride.~~ The sodium chloride allowed reverse osmosis to happen. The liquid molecules travelled from the low concentration in the potato chip, to the high concentration of the sodium chloride solution. This ~~caused the potato~~ chip to loose mass.

(Total for Question 6 = 11 marks)

ResultsPlus
Examiner Comments

This is not very clearly written but worth 2 marks for osmosis (ignoring the reverse) and liquid molecules (as the only liquid there is water). We may be tempted to read into the relative concentrations that they are writing about from a low solute concentration to a high solute concentration. The problem with that is other candidates are talking about it in the same way and referring to from the high concentration in the chip to the low concentration in the sodium chloride solution and if we read into this response one way and read into the other the other way, then these candidates will get a mark for giving an opposite response.

ResultsPlus
Examiner Tip

When talking about water moving into / out of cells:

- state by osmosis
- state clearly which way way the water is moving
- state what concentrations you are talking about, eg from a **high** concentration of **water particles** to a **low** concentration of **water particles**.