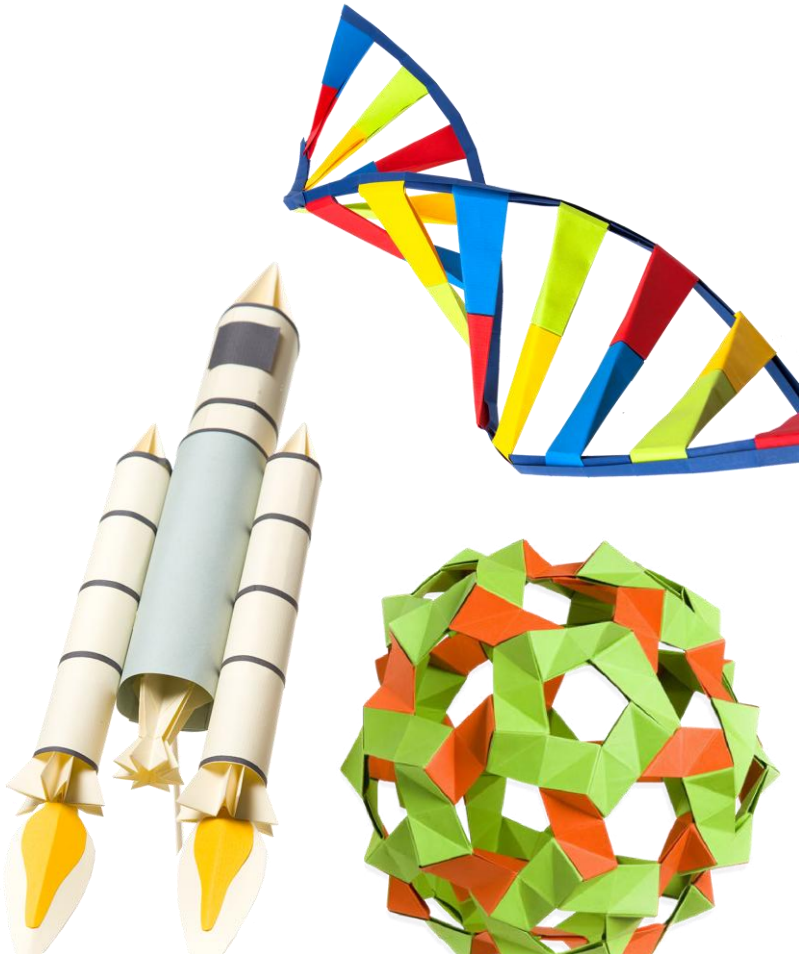
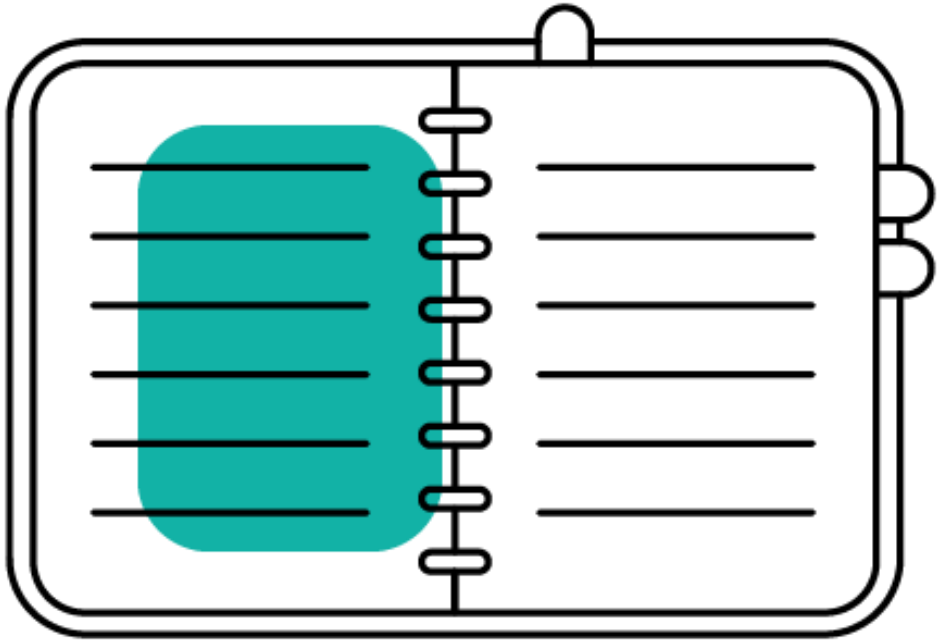
GCSE
Combined Science

Marked Exemplars from Summer 2024 (Paper 1)



Agenda

In this session we will focus on applying the mark schemes for 2024 Paper 1 CS Biology, Chemistry and Physics, F and H Tier.



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CS Biology Paper 1 F/H

A. CS B1F, q3a- Question

3 Scientists think that chickens were domesticated from red junglefowl thousands of years ago.

Figure 4 shows some information about these birds.

information	red junglefowl	domesticated chicken
photograph	 (Source: © Jamil Bin Mat Isa/ Shutterstock)	 (Source: © Tsekhmister/ Shutterstock)
mass of adult in kg	0.75 to 1.2	2.5 to 3.0
number of eggs laid per year	10 to 15	250 to 300

Figure 4

(a) Describe how selective breeding has produced chickens that lay large numbers of eggs.

(3)

CS Bio 1BF, q3a

Mark exemplar 1 & 2

CS B1F, q3a - Exemplar 1

(a) Describe how selective breeding has produced chickens that lay large numbers of eggs.

(3)

The ^ domesticated chickens are now much larger and and weigh twice as much as the red Junglefowl so they are able to lay more eggs

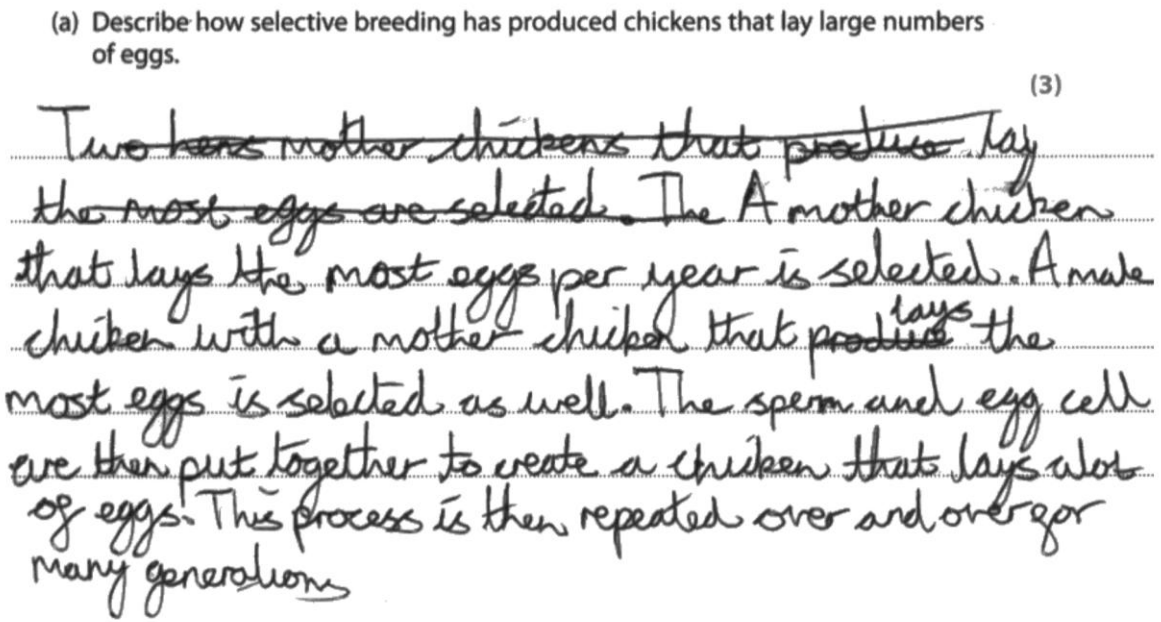
ResultsPlus
Examiner Comments

A not uncommonly seen response from this candidate who has basically rephrased the information rather than addressed the task to explain how the chickens who lay high numbers of eggs per year have been produced through selective breeding.

ResultsPlus
Examiner Tip

From the task set, this item is clearly about selective breeding. When finished, or at the end when you have finished the paper, revisit these more difficult items and ask yourself: have I answered the question set.

CS B1F, q3a - Exemplar 2



(a) Describe how selective breeding has produced chickens that lay large numbers of eggs.

(3)

~~Two hens~~ mother chickens that ~~produce~~ lay ~~the most eggs are selected~~. The A mother chicken that lays the most eggs per year is selected. A male chicken with a mother chicken that ~~produce~~ lays the most eggs is selected as well. The sperm and egg cell are then put together to create a chicken that lays alot of eggs. This process is then repeated over and over for many generations

ResultsPlus
Examiner Comments

An excellent response showing a good understanding of the process to produce offspring with the desired traits. This candidate also bred a male and a female chicken unlike the vast majority of candidates who bred chickens that laid lots of eggs with other chickens that laid lots of eggs.

ResultsPlus
Examiner Tip

When presented with a difficult concept / procedure, remember that there is large amount of information provided and to help make sense of the useful and relevant points, underline key words and information.

CS B1F, q3a - general comments

Question 3 (a)

This was a more testing question where candidates had to describe how selective breeding has produced modern day chickens that lay high numbers of eggs per year. What was not clear to many candidates was that the red jungle fowl were included in the stimulus material as modern day chickens are direct descendants of these smaller fowl that lay much fewer eggs per year.

Most candidates realised that the modern day chickens were a product of breeding but only 4 in 10 candidates could express that the chickens bred had to be selected, that those selected would be the ones that laid large number of eggs with the process being repeated over many generations. There was no mark awarded for just saying breed eg chickens and many candidates that scored just two marks often just sated breed these 'chickens / jungle fowl' without the concept of repeating (over many generations).

B. CS B1F, q6dii – Question

*(ii) Beriberi can affect reflexes.

Figure 10 shows a reflex arc.

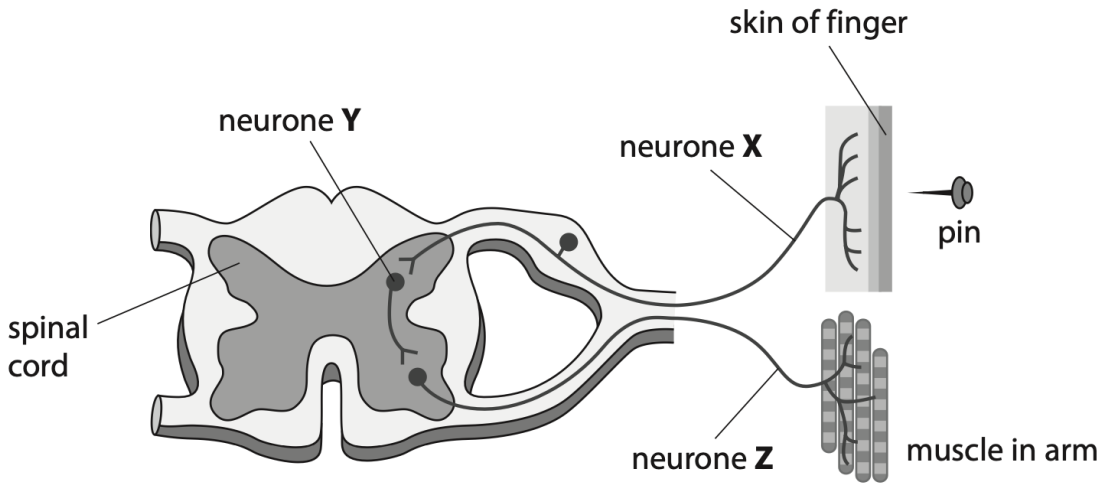


Figure 10

When the skin is pricked by a pin, electrical impulses travel through a reflex arc.

Describe the path taken by electrical impulses from the skin to the muscles in the arm.

Include the names of neurones X, Y and Z in your answer.

(6)

Mark exemplar 1 & 2

Mark Scheme – Indicative content

Question number	Indicative content	Mark
6 *(c)	**AO1 6 marks** **Roots** • water enters the roots • into root hair cells • which have a projection / large surface area • by osmosis • from a dilute solution in the soil to a more concentrated solution in the root cells. **Stem/trunk** • through xylem • which are long / thin / hollow / lignified / dead cells • because water is being pulled up • because of transpiration **Leaves** water moves into the leaves • by osmosis • because the leaf cell contents are more concentrated than in the xylem • water evaporates / water moves out of the leaves • through the stomata • (into the air) by diffusion • reference to transpiration	(6)

Mark scheme – Level Descriptors

Level	Mark	Descriptor
	0	• no rewardable material.
Level 1	1-2	• demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • presents an explanation with some structure and coherence.
Level 2	3-4	• demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and /or developed. • presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5-6	• demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • presents an explanation that has a well-developed structure which is clear, coherent and logical.

Mark scheme – Additional guidance

Level	Mark	Additional guidance	General additional guidance The level is driven by the areas covered in the response. The mark within the level is determined by the detail.
	0	No rewardable material.	
Level 1	1-2	The answer refers to part of the route taken by water through the plant / tree The response includes a basic explanation of how water moves through the plant	<u>Possible candidate responses</u> • water leaves the plant through the leaves • water leaves the plant via evaporation from the leaves
Level 2	3-4	The answer refers to more than one part of the route taken by water through the plant / tree The response includes an explanation of how water is moved into the roots, through the plant or through the leaves	<u>Possible candidate responses</u> • water moves into the root and up the stem • water moves into the root via osmosis and up the stem
Level 3	5-6	The answer is detailed and refers to water moving into the roots, through the stem / branches and out of the leaves The response includes a detailed explanation of how water is moved into the roots, through the plant or out of the leaves	<u>Possible candidate responses</u> • water moves into the root. Water then moves up the stem in the xylem out of the leaves. • water moves into the root. Water then moves up the stem in the xylem to the leaves where it is lost to the air via transpiration

CS B1F, q6dii – Exemplar 1

ResultsPlus
Examiner Comments

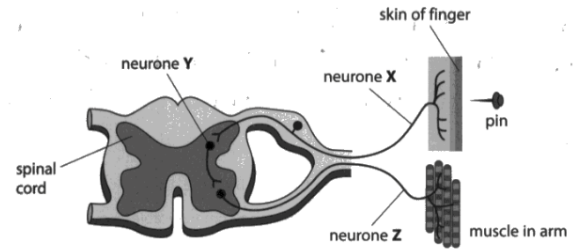
This response scores just two marks which is a pity as the information supplied is good. However, the stem of the question tells the candidate to reference / name neurones X, Y and Z and as they have not done so, they have not fulfilled the requirements and so cannot access higher than Level 1 marks.

ResultsPlus
Examiner Tip

The last instruction of the stem of the question states 'Include the name of neurones X, Y and Z in your answer'. Ensure that you fulfil all the instructions given, or you will limit the marks awarded for your response.

*(ii) Beriberi can affect reflexes.

Figure 10 shows a reflex arc.



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Describe the path taken by electrical impulses from the skin to the muscles in the arm.

Include the names of neurones X, Y and Z in your answer.

(6)

fis First the skin is pricked then the the reflex arc sends an electrical signal ~~in~~the covered in myelin sheath to speed up the transmission and to hinder any damage to the impulse, then it arrives at the synapse and a chemical is released to let the impulse jump across the function and then the electrical impulse travels through the myelin sheath again ~~the~~ in till it reaches the muscles in the arm and the impulse tells the muscles to in the

arm to move causing the finger to move away from the pin to get the finger away from the danger, this reflex arc also passes through the spinal cord

CS Bio 1BF, q6dii

CS B1F, q6dii – Exemplar 2

First of all the pin is a stimulus to the skin the pin sends electrical impulses to the pain receptors. After this the impulse travels to the thing called the Sensory neurone ^ the electrical impulses then travels to the relay neurone, via a Synapse. This neurone is located in the spinal cord. After the electrical impulse has gone through the spinal cord is reaches the motor neurone, via another synapse. The electrical impulses finally reach the effector when the muscle contracts because of the reflex being a automatic, fast response to the stimulus.

ResultsPlus
Examiner Comments

A good answer to this question that fulfils all the requirements including naming neurones X, Y and Z as well as including correct references to eg synapses.

CS Bio 1BF, q6dii

CS B1F, q6dii – General comments

Question 6 (d)(ii)

It was disappointing that with all the scaffolding supplied in this item so few candidates, over one third, scored no marks and only approximately one in ten candidates managed to access Level 3 of this six mark EOR task.

The diagram in Figure 10 showed a pin pricking an arm and the three neurones labelled neurone X, neurone Y and neurone Z. Referencing the impulse travelling down neurones X, Y and Z would give access to Level 2 and with an extra piece of detail, correct reference to the spinal cord or crossing a synapse with named neurones, X = a sensory neurone, Y = a relay neurone and Z = a sensory neurone for example would access four, five or six marks, depending on the amount of extra detail / number of named neurones.

C. CS 1BF, q5a – Question

5 A student investigated the effect of temperature on the rate of reaction of the enzyme pepsin.

Figure 7 shows the data collected.

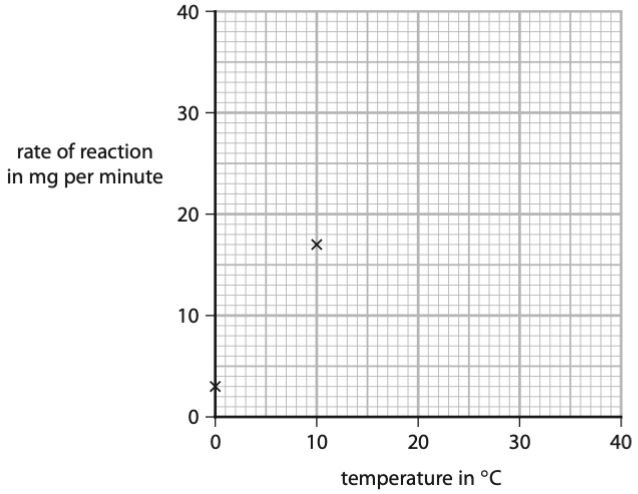
temperature in °C	rate of reaction in mg per minute
0	3.0
10	17.0
20	26.0
30	32.0
40	34.0

Figure 7

(a) Complete the graph by plotting the results shown in Figure 7 and drawing a line of best fit.

The first two points have been plotted for you.

(2)



Mark exemplar 1

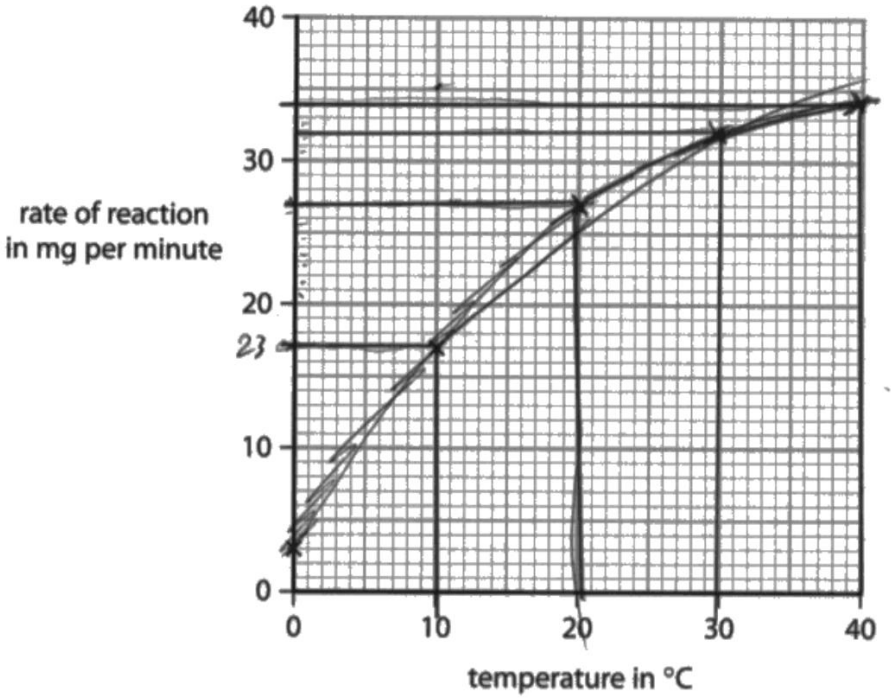
CS Bio 1BF, q5a

CS 1BF, q5a – Exemplar 1

(a) Complete the graph by plotting the results shown in Figure 7 and drawing a line of best fit.

The first two points have been plotted for you.

(2)



ResultsPlus
Examiner Comments

Plotting point is awarded here, however, there are multiple lines drawn so MP1 is not awarded.

ResultsPlus
Examiner Tip

If the instruction says draw **a line** OR **one line** ensure that you do not draw multiple lines.

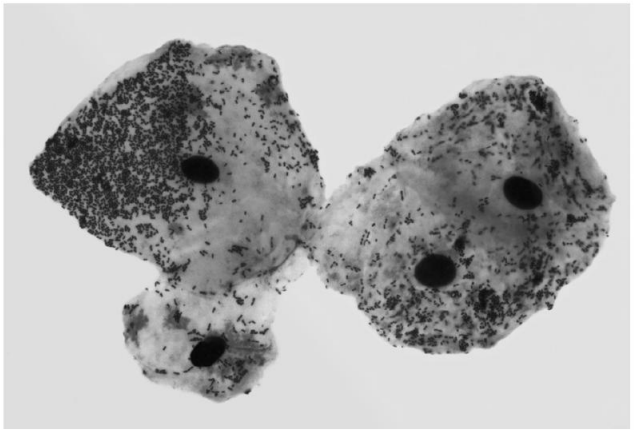
CS 1BF, q5a – General comments

Question 5 (a)

The vast majority of candidates scored the plotting mark with those that did not score MP1 plotting the points in a straight line or plotting the last point at 35^{o}C instead of 40^{o}C. Significantly fewer candidates were able to draw a suitable line of best fit for their plotted data, with many drawing a straight line of best fit which could be awarded if it was felt to be reasonably placed or a line that joined the points 'dot to dot'.

D. CS 1BH, q3aii – Question

(ii) A light microscope was used to obtain an image similar to the one shown in Figure 3.



(Source: © STEVE GSCHMEISSNER/SCIENCE PHOTO LIBRARY)

Figure 3

Describe how the student used the light microscope to view these cells at a magnification of ×400.

(3)

Mark exemplar 1 & 2

CS 1BH, q3aii – Exemplar 1

Describe how the student used the light microscope to view these cells at a magnification of ×400.

(3)

A student has placed the cells onto a microscope slide and placed some solution onto the slide before placing the cells onto the slide and then they would place a cover slip over the cells and place it onto the stand. The student then looks through the eye peice then when the magnification is on the lowest one magnification and the student then slowly builds up magnification while looking through the eye peice.

ResultsPlus
Examiner Comments

This is awarded 1 mark for starting with the lowest objective lens. There are no marks for the preparation of the slide as the question is about the use of the microscope. Slowly building up the magnification is not enough for focusing.

ResultsPlus
Examiner Tip

Read the question carefully – this is about microscope use not slide preparation.

CS 1BH, q3aii – Exemplar 2

Describe how the student used the light microscope to view these cells at a magnification of ×400.

(3)

the student would take the swab and put it onto a slip that has been cleaned with water, the student would then add a stain onto the cells so properly see them and then add a coverslip on top of the cells. they would then turn on the microscopes light and use the lowest objective lens to focus and magnify to the cells initially and then increase the magnification by switching to the other lenses.

ResultsPlus
Examiner Comments

This response is awarded 2 marks. Starting with the lowest objective lens is the first marking point. The candidate has mentioned focusing so can be awarded a further mark. Any mention of focus can be awarded a mark as this shows knowledge of microscope use.

CS 1BH, q3aii – General comments

Question 3 (a)(ii)

One of the core practicals for Topic 1 is the use of a microscope and this question required detail on how to view cells with a magnification of x400. This question was generally well-answered and candidates who correctly named both lenses usually obtained 2 marks. Candidates who didn't name a lens were able to obtain 1 mark for using the lowest power lens or focusing the microscope. It was possible to gain marks for different magnification combinations which totalled x400 with x20 and x20 the most commonly seen alternatives.

E. CS B1H, q6ai – Question

6 (a) When one cell goes through the stages of the cell cycle, two cells are produced.

Figure 7 shows the three stages of the cell cycle.

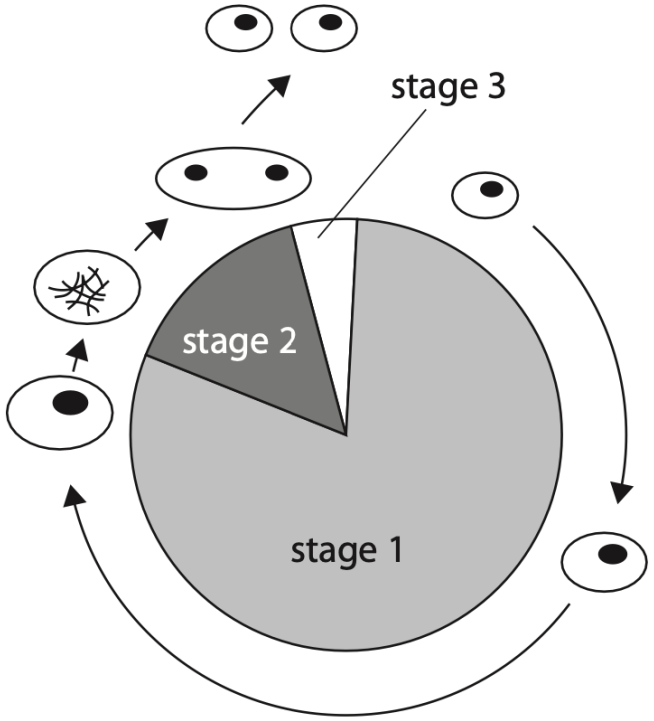


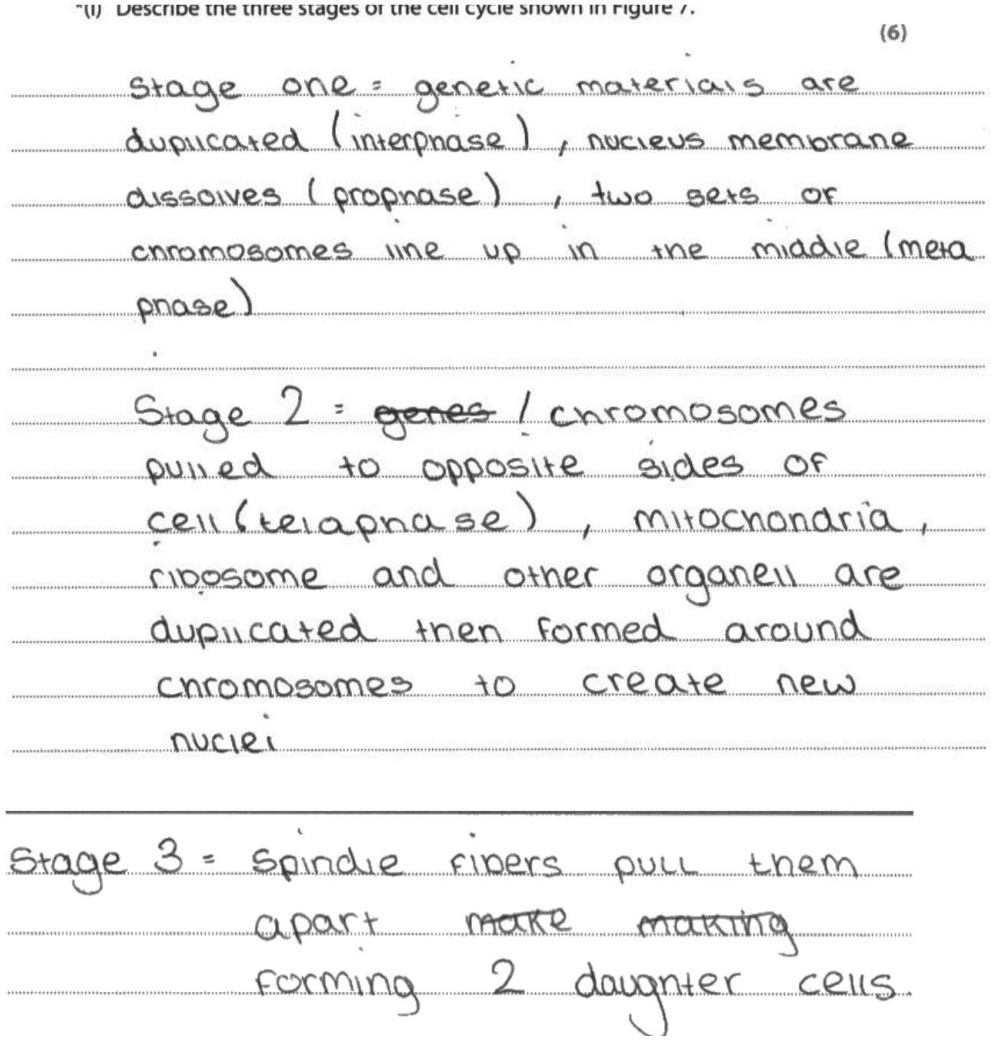
Figure 7

*(i) Describe the three stages of the cell cycle shown in Figure 7.

(6)

Mark exemplar 1

CS B1H, q6ai – Exemplar 1



*(i) Describe the three stages of the cell cycle shown in Figure 7.

(6)

Stage one = genetic materials are duplicated (interphase), nucleus membrane dissolves (prophase), two sets of chromosomes line up in the middle (metaphase)

Stage 2 = ~~genes~~ / chromosomes pulled to opposite sides of cell (telophase), mitochondria, ribosome and other organell are duplicated then formed around chromosomes to create new nuclei

Stage 3 = spindle fibers pull them apart ~~make~~ ~~making~~ forming 2 daughter cells.

ResultsPlus
Examiner Comments

The driver for this question is the description of the stage and to put this response at the top of the band they should have linked the description to the name of the stage. You will find quite a few muddled responses like this one but examiners always mark positively, so we disregard the incorrect information and mark the correct information. A muddled response cannot get to Level 3. This candidate has a description of interphase – genetic material being duplicated – which gets them into Level 1. They also have a description of mitosis albeit a partial description which they have incorrectly linked to telophase but the naming of the steps in mitosis is not required in Level 2, the rest they have incorrectly put into stage one. This means they have a partial description of two stages so can be put into Level 2. They have only named mitosis at the top and not interphase so cannot go to the top of the level. They are therefore awarded 3 marks.

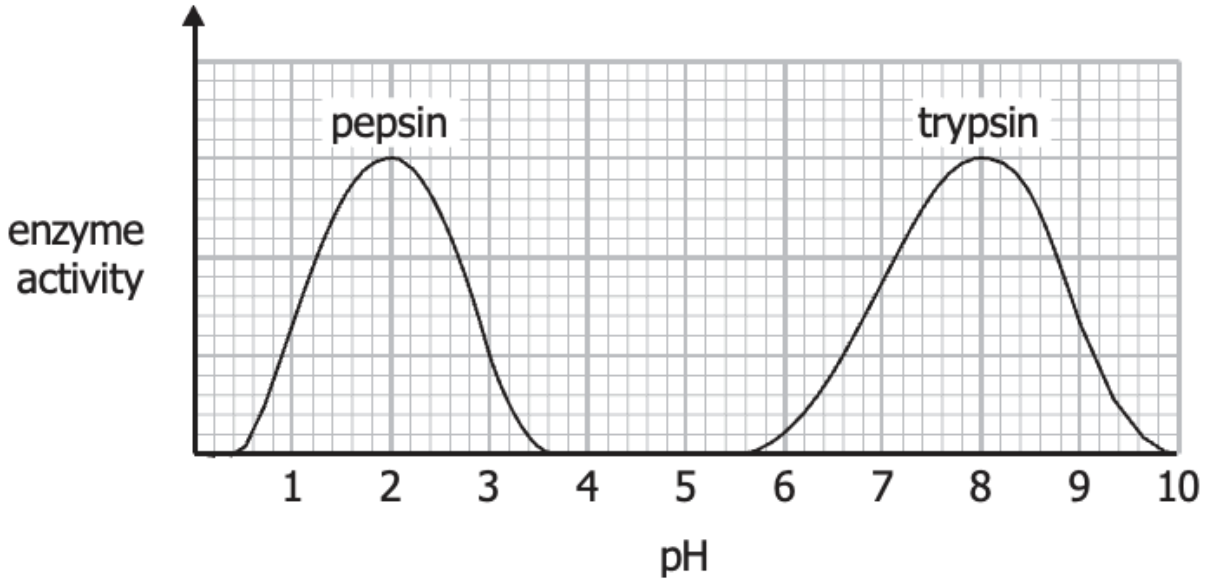
CS B1H, q6ai – General comments

Question 6 (a)(i)

This was the extended open-response question of the paper. Candidates were given a diagram of the stages of the cell cycle and asked to describe the three stages. These items are marked using a level based mark scheme and not points based. To gain Level 1, only one stage of the cell cycle or some of the processes within a stage were needed. If there was linkage between a process at that stage and the name of the stage, the top of the level was awarded. For Level 2, candidates needed to describe processes within two stages of the cell cycle. If this was linked to the names of the stages of the cell cycle the top of the level was awarded. Level 2 was also awarded for a detailed description of mitosis in the absence of processes within interphase or cytokinesis. Many candidates gave very detailed and accurate descriptions and gained Level 3 by describing all three stages of the cell cycle including a complete description of mitosis. The top of Level 3 was awarded frequently, where all three stages of the cell cycle and the steps of mitosis were named. There were a number of responses that included steps of mitosis in stage 1 or stage 3 of the cell cycle, and these were limited to Level 2.

F. CS B1F, q5bii/ B1H, q1aii - Question

Figure 8 shows the results of an investigation into the activity of pepsin and trypsin at different pH levels.



(ii) Describe the trend in the graph for the enzyme pepsin.

Use data from the graph to support your answer.

(3)

Mark exemplar 1 & 2

CS 1BF, q5 bii
CS 1BH, q1aii

CS B1F, q5bii – Exemplar 1

(ii) Describe the trend in the graph for the enzyme pepsin.

Use data from the graph to support your answer.

(3)

- The optimum pH of pepsin was 2.
- The enzyme activity increased from pH's 0.2 to 2, which it then decreased from 2 to 3.6

ResultsPlus
Examiner Comments

A clear three mark response with the trend described and supported by salient data taken from the graph.

ResultsPlus
Examiner Tip

This item requires the candidate to describe how enzyme activity is affected by pH and so the easy part is to write that activity increases and then decreases. However this candidate has noted that data needs to be used to support the answer and so has stated the pH for key points from the graph as well as including the technical term 'optimum' to gain the maximum marks available.

CS B1H, q1aii – Exemplar 2

The enzyme pepsin has an optimum pH of 2 and denatures at a pH of 3.4. It also works at a pH of 0

ResultsPlus
Examiner Comments

Optimum pH of 2 is MP3. There is no reference to increase and decrease so no further marks can be awarded. There is no mark for enzyme denaturing as this is a describe question. 1 mark awarded.

ResultsPlus
Examiner Tip

If the question asks you to describe a graph it is the trends of the graph that are needed. Always quote data to achieve the maximum mark.

CS B1F, q5bii/ 1H q1bii – General comments

Question 5 (b)(ii)

Candidates were required to interpret the data presented in graphical form for enzyme activity for pepsin. There were three marks available here and candidates were told to use data from the graph to support your answer. The number of candidates scoring, one, two, three or four marks were roughly evenly spread with slightly less scoring two marks.

For a basic Level 1 mark, most candidates stated that activity increased and then decreased which only gained the increased mark as the decreased mark had to be linked to after pH2 (the optimum pH).

Many candidates stated 'optimum' for pH2 which gained credit, with many of those candidates that scored all three marks available simply stating that the enzyme activity increased to the optimum pH of 2 and then decreased. Many candidates also stated to pH 3.5/3.6.

Question 1 (a)(ii)

This question asked for a description of the trend from the graph for the enzyme pepsin. Marks were awarded for the idea the activity increased up to pH2, that pH2 was the optimum and at a pH higher than this, the activity decreased again. Nearly all candidates identified pH2 as the optimum or the most effective pH. Candidates did not always gain full marks when they tried to explain the trend as they often did not give a sufficient description of the trend increasing and then decreasing. Very few candidates described the trend for trypsin indicating that they had read the question correctly.

CS Bio 1BF, q5 bii
CS Bio 1BH, q1 aii

CS Chemistry Paper 1 F/H

A. CS C1F, q5biii/ C1H, q1iii – Question

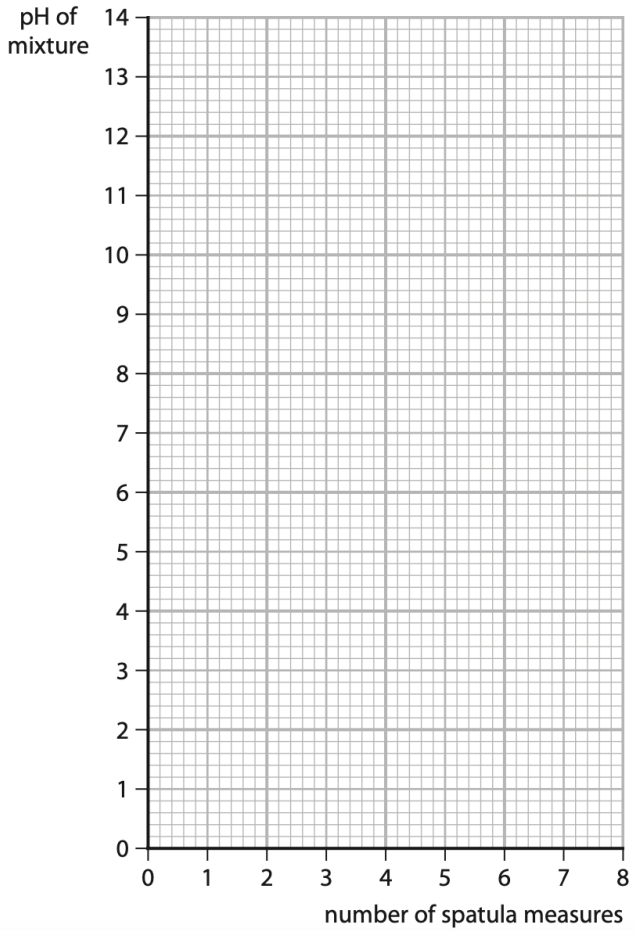
(iii) Figure 7 shows the student's results.

number of spatula measures of barium hydroxide	pH of mixture
0	1
1	1
2	1
3	1
4	3
5	8
6	12
7	13
8	13

Figure 7

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)

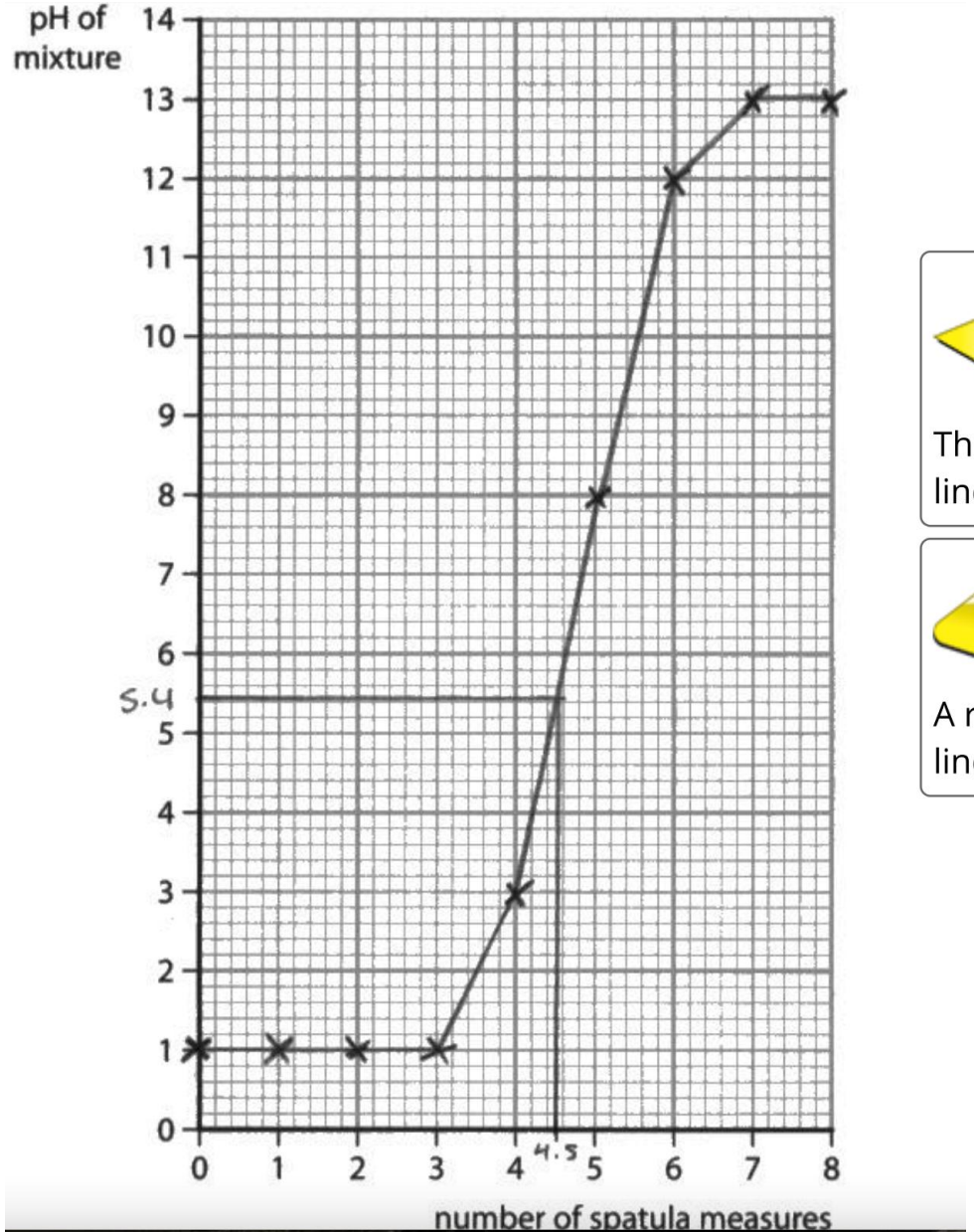


Mark exemplar 1 & 2

CS 1CF, Q5biii

CS 1CH, Q1biii

CS C1F, q5biii – Exemplar 1



CS 1CF, Q5biii

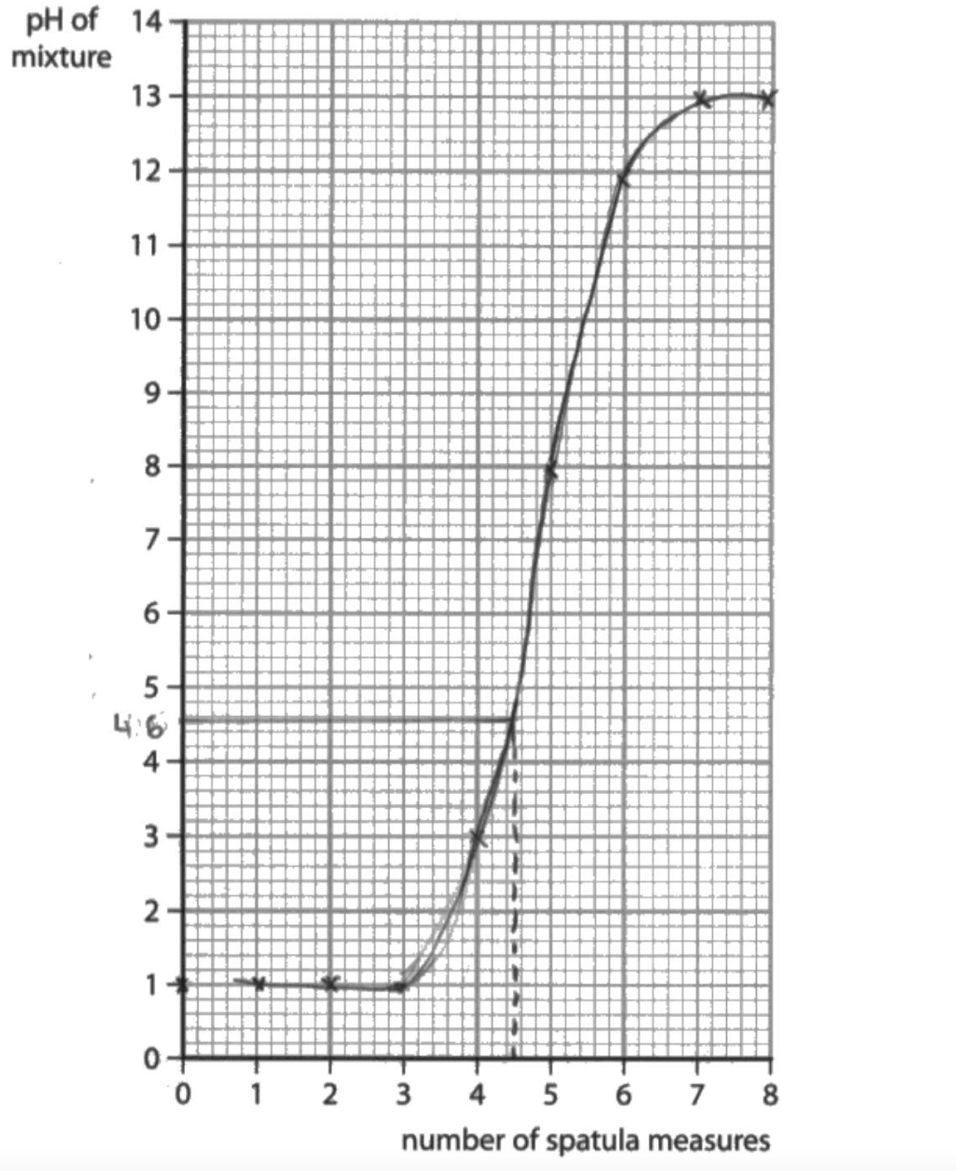
ResultsPlus
Examiner Comments

There is no smooth curve as the points have been joined with straight lines using a ruler. However the pH reading using this graph is correct.

ResultsPlus
Examiner Tip

A ruler should only be used to join points if the data indicates that the line of best fit is a straight line rather than a curve.

CS C1H, q1biii – Exemplar 2



CS 1CH, Q1biii

ResultsPlus
Examiner Comments

When drawing a curve, draw a single line on your graph. Here, this is not the case, and also the line does not start at the first plotted point.

CS C1F, q5biii/ C1H, q1iii– General comments

Question 5 (b)(iii-iv)

This item required candidates to draw a pH curve from a table of data and use this curve to determine the pH of the solution when 4.5 spatulas of barium hydroxide have been added. This should have been familiar as it is almost identical to the neutralisation core practical in the specification, and most responses scored some marks.

The most common errors were not in plotting the data points on the grid, but in drawing the curve onto the data points. Many responses showed dot to dot straight lines, drawn with a ruler while others showed thick curves with multiple lines rather than a single S-shaped curve. There were also a significant number of responses that had no curve at all on the data plots, which also meant that graph could not be used to determine the pH at 4.5 spatulas of barium hydroxide.

Unfortunately many of the readings of the pH were out of tolerance and did not gain the mark. This was usually due to careless plotting and reading, using a pen or blunt pencil to draw the lines or poor quality of the original curve on the graph.

Question 1 (b)(iii-iv)

On the whole the graph was well drawn and the majority of candidates scored well for accurate plotting and a smooth S-shaped curve. There were a few (non-scoring) bar-charts, and it was unfortunate that some candidates either drew no line at all, drew multiple lines or just drew from dot to dot. The prediction of the pH for 4.5 spatulas was in most cases spot on, or close enough. Those that lost the mark here tended to have non-vertical lines on their working out which yielded an inaccurate answer.

CS 1CF, Q5biii

CS 1CH, Q1biii

B. CS 1CF, q.6c – Question

*(c) A student has three solids, **A**, **B** and **C**.

The solids are sodium carbonate, powdered zinc and copper oxide, but the student does not know which solid is which.

The student reacted each solid with dilute sulfuric acid.

Figure 9 shows the student's observations and the results of tests on any gases produced.

	observations and results		
	reaction with dilute sulfuric acid	**gas bubbled through limewater**	**gas tested with a lit splint**
solid **A**	bubbles seen colourless solution formed	no change	squeaky pop
solid **B**	blue solution formed some black solid remains at bottom of test tube	no gas produced	no gas produced
solid **C**	bubbles seen colourless solution formed	limewater turned cloudy	puts out lit splint

Figure 9

Use the observations and results in Figure 9 to identify which solid is which.

Your answer should include

- how each test result helps you to identify the solid
- word equations to support your answer.

(6)

Mark exemplar 1 & 2

CS 1CF, Q6c

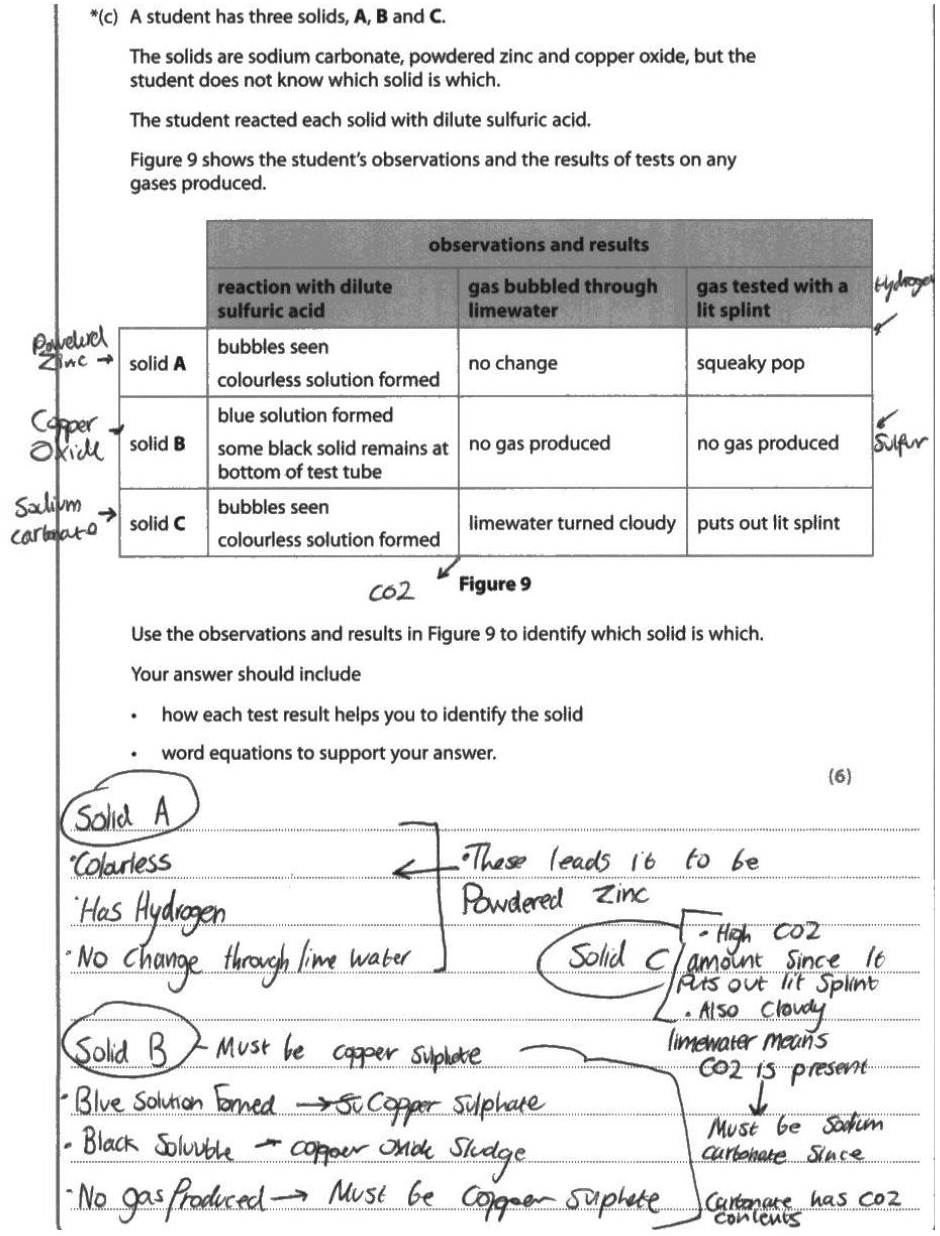
CS 1CF, q.6c – Exemplar 1

This is an example of a level 3 response.

If the response had only included the information written around the table then that alone would have been enough to award four marks.

All three solids are correctly identified in the table, as is the test for hydrogen.

The candidate has then given more information to support their conclusion including that limewater is used to test for carbon dioxide, the blue solution is copper solid and the black solid is leftover copper oxide. Although there are no equations in the answer there is enough correct detail for full marks to be awarded.



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solid **B**	blue solution formed some black solid remains at bottom of test tube	no gas produced	no gas produced
solid **C**	bubbles seen colourless solution formed	limewater turned cloudy	puts out lit splint

Figure 9

Use the observations and results in Figure 9 to identify which solid is which.

Your answer should include

- how each test result helps you to identify the solid
- word equations to support your answer.

(6)

Solid A
- Colourless
- Has Hydrogen
- No change through lime water

These leads it to be Powdered Zinc

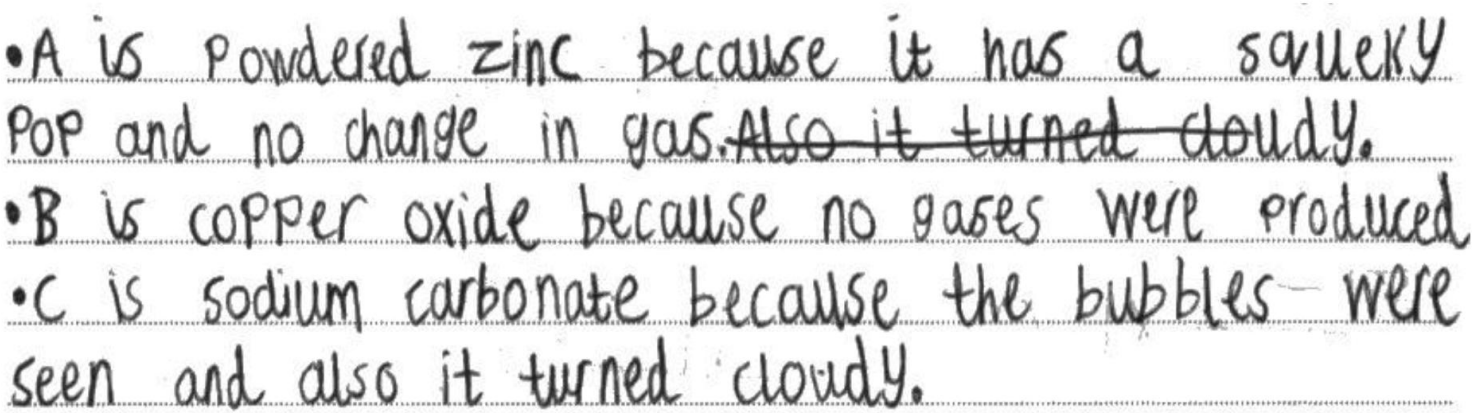
Solid C
- High CO2 amount since it puts out lit splint
- Also cloudy limewater means CO2 is present

Must be Sodium Carbonate since Carbonate has CO2 contents

Solid B – Must be copper sulphate
- Blue solution formed → Copper Sulphate
- Black Soluble → copper oxide sludge
- No gas Produced → Must be Copper Sulphate

CS 1CF, Q6c

CS 1CF, q.6c – Exemplar 2



ResultsPlus
Examiner Comments

All three solids have been correctly identified, but there is no link to the observations given in the table. The candidate has simply copied out the results for each of the tests.

ResultsPlus
Examiner Tip

There is no credit for repeating information from the question – it needs to be linked to the answer.

CS 1CF, q.6c – General comments

Question 6 (c)

The six mark question on the paper gave information about the reaction of different solids with sulfuric acid and asked candidates to identify the solids and explain their choices. It was intended that the information given would help with answering the question, but the majority of candidates still found this to be a challenging question and seemed to score some marks through luck or very basic knowledge rather than being able to use the data to inform their conclusions. As always a large proportion of responses to this question were simply left blank.

Candidates were often able to identify the gas tests for hydrogen and carbon dioxide, but were not able to successfully use this to identify the correct solid with many candidates stating that Solid A was hydrogen and Solid C was carbon dioxide. The solid that was most commonly identified correctly was C as sodium carbonate but again, this wasn't always well linked with the data from the table.

Solid B was often incorrectly identified as leftover powdered zinc even though the preparation of copper sulfate crystals using copper oxide is one of the core practical activities.

Very few responses attempted any form of equation at all, and a lot of candidates simply wrote out information from the table.

C. CS C1F, q4b – Question

(b) Sodium hydroxide solution and copper sulfate solution were reacted together completely.

The result was a mixture of a precipitate of copper hydroxide in a solution of sodium sulfate.

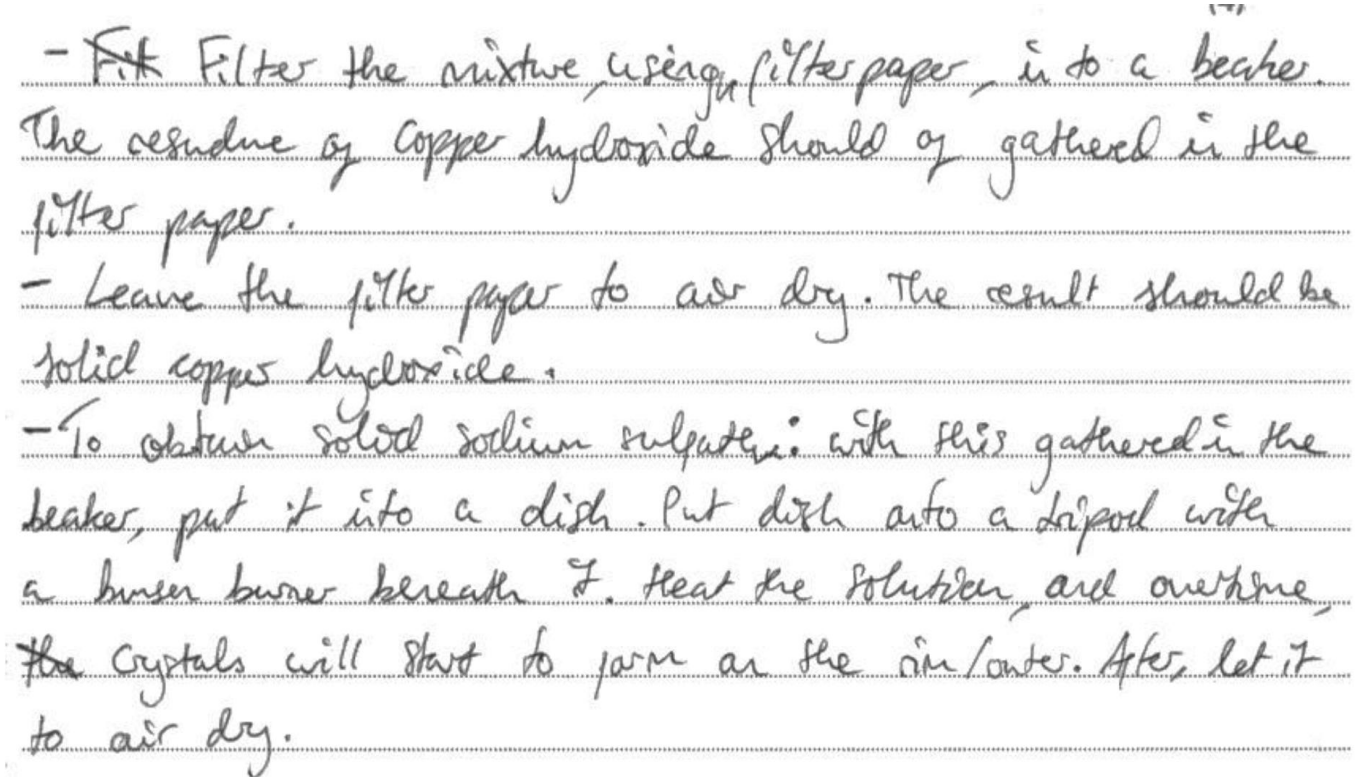
Describe how to obtain

- a pure sample of solid copper hydroxide from the mixture
- a pure sample of solid sodium sulfate from the mixture.

(4)

Mark exemplar 1 & 2

CS C1F, q4b – Exemplar 1



- ~~Fit~~ Filter the mixture using filter paper into a beaker. The residue of copper hydroxide should of gathered in the filter paper.
- Leave the filter paper to air dry. The result should be solid copper hydroxide.
- To obtain solid sodium sulphate: with this gathered in the beaker, put it into a dish. Put dish onto a tripod with a bunsen burner beneath it. Heat the solution and overtime, ~~the~~ crystals will start to form on the surface. After, let it to air dry.

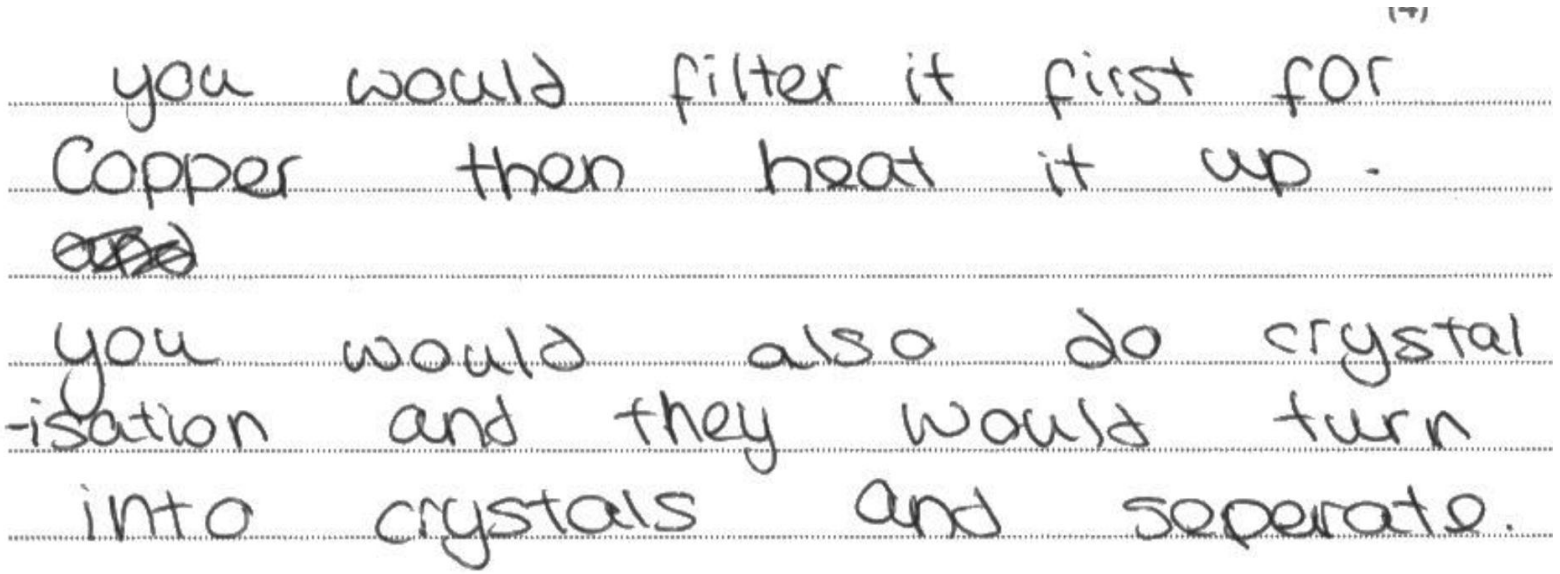
ResultsPlus
Examiner Comments

This response is given in bullet points and it is very clear when the candidate is referring to the precipitate, the solution and the mixture.

ResultsPlus
Examiner Tip

Bullet point answers are a good way to make points clearly.

CS C1F, q4b – Exemplar 2


you would filter it first for Copper then heat it up.

you would also do crystal -isation and they would turn into crystals and seperate.

This response scored 1 mark, for filtering the mixture.

ResultsPlus
Examiner Comments

The mention of crystallisation did not score because the response does not make it clear that it is the solution that is crystallised.

CS C1F, q4b – General comments

Question 4 (b)

This question was very poorly attempted with the majority of responses left completely blank. When responses were attempted it was very obvious that candidates did not understand what the question was asking them to do.

The correct response required candidates to separate a precipitate from a solution and leave it to dry, as well as crystallising the filtered solution. Many responses suggested electrolysis, fractional distillation or simply heating the mixture. There was no credit for heating the mixture with a bunsen burner as this would cause copper hydroxide to decompose.

Where marks were scored this was usually for mention of filtration, followed by the idea of crystallising the sodium sulfate solution. Very few people mentioned the idea of washing the precipitate to make it pure.

D. CS C1F, q6b – Question

(b) Calculate the percentage by mass of sodium in sodium carbonate, Na_2CO_3.

$$\text{percentage by mass of element} = \frac{\text{total relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

(relative atomic masses: C = 12, O = 16, Na = 23)

(3)

.....

.....

.....

.....

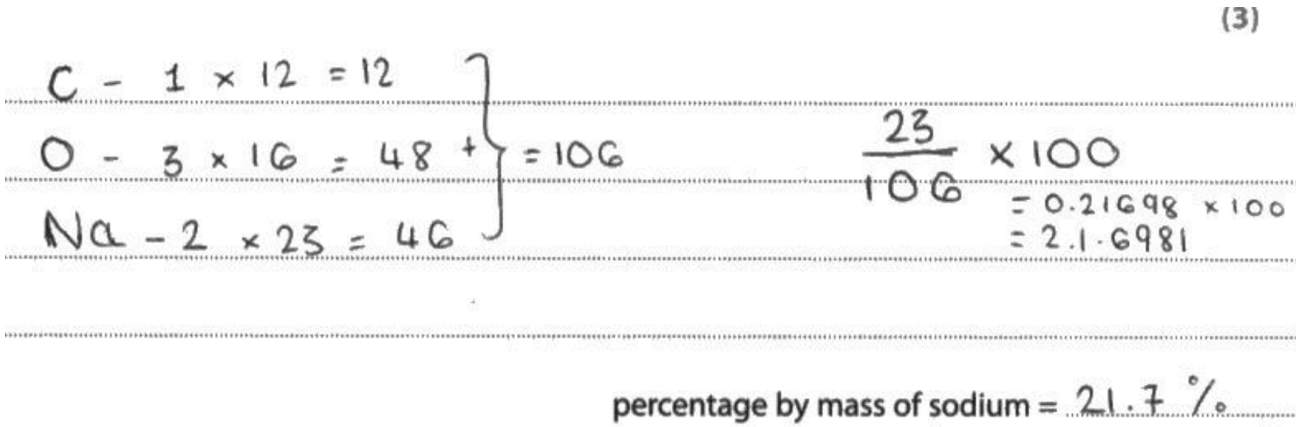
percentage by mass of sodium = ...

Mark exemplar 1

CS 1CF, Q6b

CS C1F, q6b – Exemplar 1

(3)



ResultsPlus
Examiner Comments

The candidate has forgotten to put the mass of two sodium atoms into the calculation and used the mass of one sodium atom. This can be clearly seen as the response shows all working out for the calculation. The final calculated answer is correct, and correctly rounded, using the incorrect number in the sum and so two marks can be awarded.

ResultsPlus
Examiner Tip

Marks may be awarded for processes even if the final answer is incorrect, as long as working out is clearly shown.

CS C1F, q6b – General comments

Question 6 (b)

This year some of the calculation questions included the formula to assist the candidates with answering the question.

Unfortunately this item proved to be challenging to most candidates and scored very poorly overall. The most commonly awarded mark was for the correct calculation of the relative formula mass of 106 for sodium carbonate, although this was often incorrectly calculated as 51 or 130.

E. CS C1H, q6c – Question

(c) Iron is more reactive than copper.

Iron will displace copper from copper nitrate solution.
Two possible balanced equations for the reaction are

Equation **1** $Fe + Cu(NO_3)_2 \rightarrow Fe(NO_3)_2 + Cu$

Equation **2** $2Fe + 3Cu(NO_3)_2 \rightarrow 2Fe(NO_3)_3 + 3Cu$

It was found that 2.24 g of iron reacted with excess copper nitrate solution to form 3.81 g of copper.

Carry out a calculation, using the information above, to show which equation represents the reaction taking place.

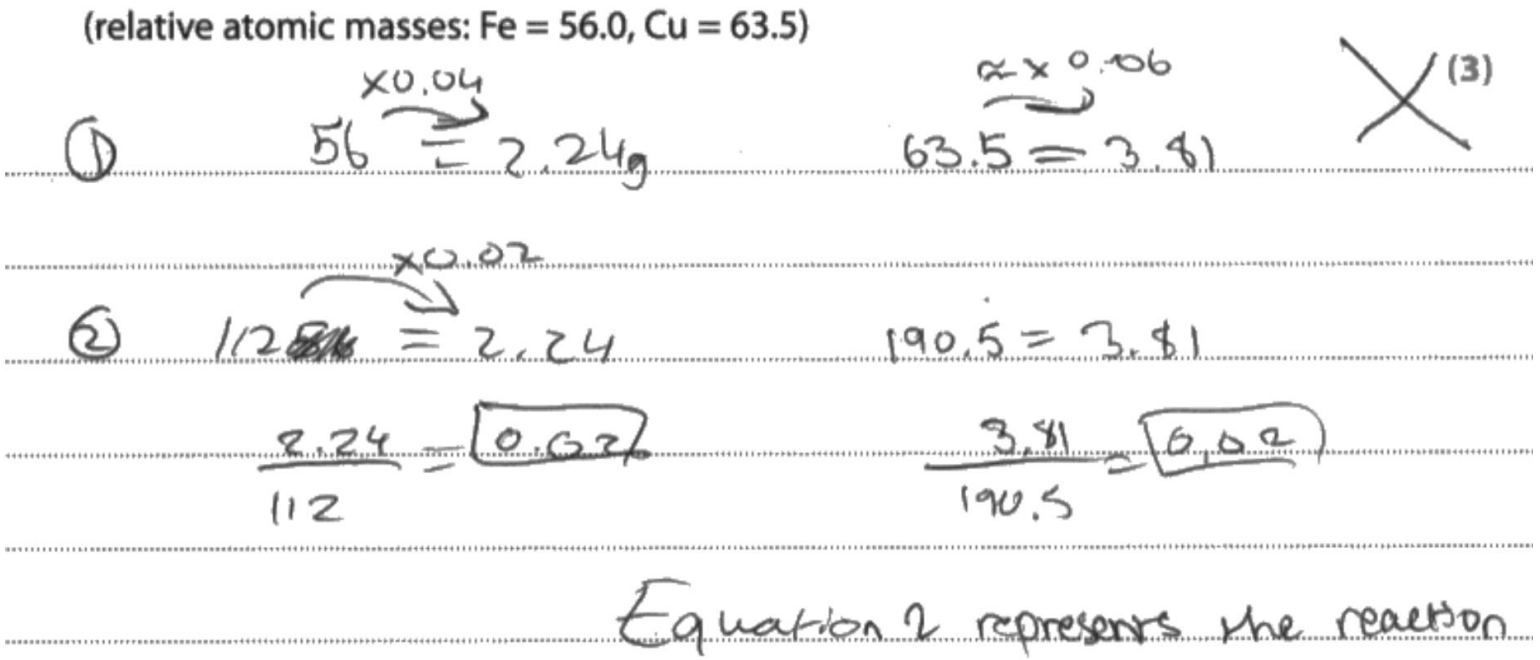
(relative atomic masses: Fe = 56.0, Cu = 63.5)

(3)

Mark exemplar 1

CS 1CH, Q6c

CS C1H, q6c – Exemplar 1



ResultsPlus
Examiner Comments

This is an unusual method, but scientifically valid, and was fully credited.

CS C1H, q6c – General comments

Question 6 (c)

Many candidates calculated the number of moles of iron and copper correctly. Surprisingly, there were a few who did all the hard work on moles and the ratio of 2:3 but then failed to actually state which equation was correct. Some could not proceed because they tried to calculate moles with an inverted fraction. A few others tried to turn the ratio into an empirical formula. Others tried to prove it by balancing the equations instead. There were also many responses involving random combinations of the numbers given. Some appeared to guess equation 2 – with no justification this scored 0 marks.

F. CS 1CF, q.2ci – Question

(c) A student was asked to distil a sample of tap water.
Figure 4 shows the apparatus the student used.

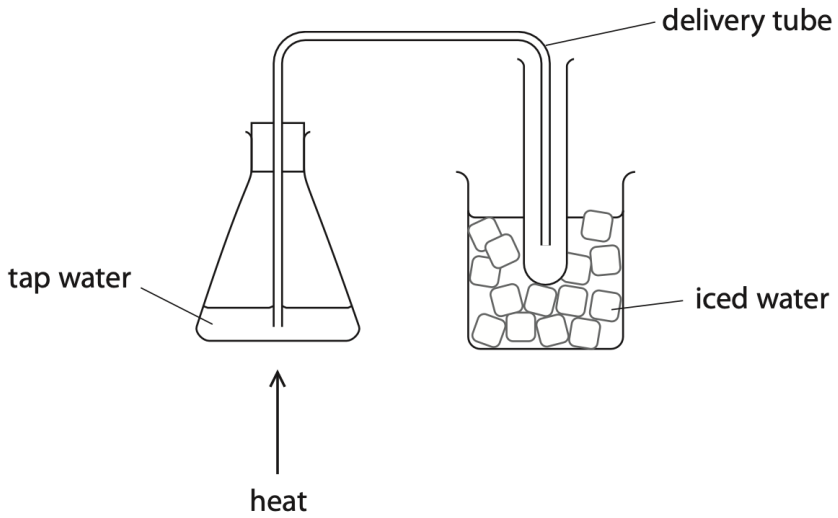


Figure 4

(i) The student made an error when setting up the apparatus in Figure 4.

This error meant that pure water could **not** be collected in the test tube.

Explain what the student needs to change so that pure water can be collected in the test tube.

(2)

Mark exemplar 1 & 2

CS 1CF, q.2ci – Exemplar 1

(2)

A condensor. This collects the condensation of the tap water so pure water can be collected.

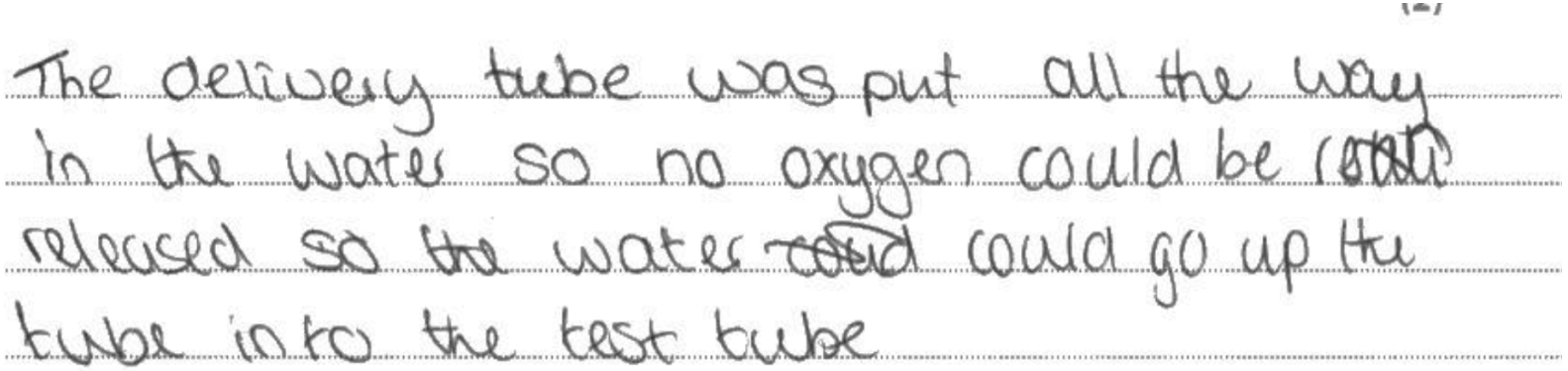
This is an example of a common response that did not score any marks, suggesting that a condenser would somehow turn tap water into pure water. It is not clear whether or not this response recognises that the condensation would be pure water, even if the error had been correctly identified.

ResultsPlus
Examiner Comments

Many responses did not seem to recognise that the iced water was added as an alternative to a condenser.

CS 1CF, Q2ci

CS 1CF, q.2ci – Exemplar 2



ResultsPlus
Examiner Comments

This response scored one mark for correctly identifying the error in the set up of the equipment.

However, there appears to be some misunderstanding with the purpose of the experiment as the response suggests that moving the tube would allow the water itself to move into the delivery tube rather than the water vapour.

CS 1CF, q.2ci – General comments

Question 2 (c)(i)

This question tested the practical knowledge of the candidates and highlighted an apparent lack of practical skills and application in chemistry.

Many answers stated that the set up needed a condenser which suggested that candidates had seen some set up of distillation, but unfortunately not the one given in the question.

Other responses did not seem to understand the question and indicated that using tap water or ice would not allow pure water to be collected.

When candidates did identify that the error was the delivery tube being in the solution, the idea of moving the tube up was the most common mark given. Very few candidates were able to explain why this would allow the experiment to work with some responses suggesting that water needed to go through the delivery tube rather than steam or water vapour.

CS Physics Paper 1 F/H

A. CS P1F, q2aiii – Question

(iii) Calculate the distance travelled between when the driver applies the brakes and when the car comes to rest in Figure 3.

Use the equation

distance = area under the sloping line of the graph in Figure 3

(3)

Figure 3 shows the velocity/time graph for the car from the time when the driver sees the obstacle.

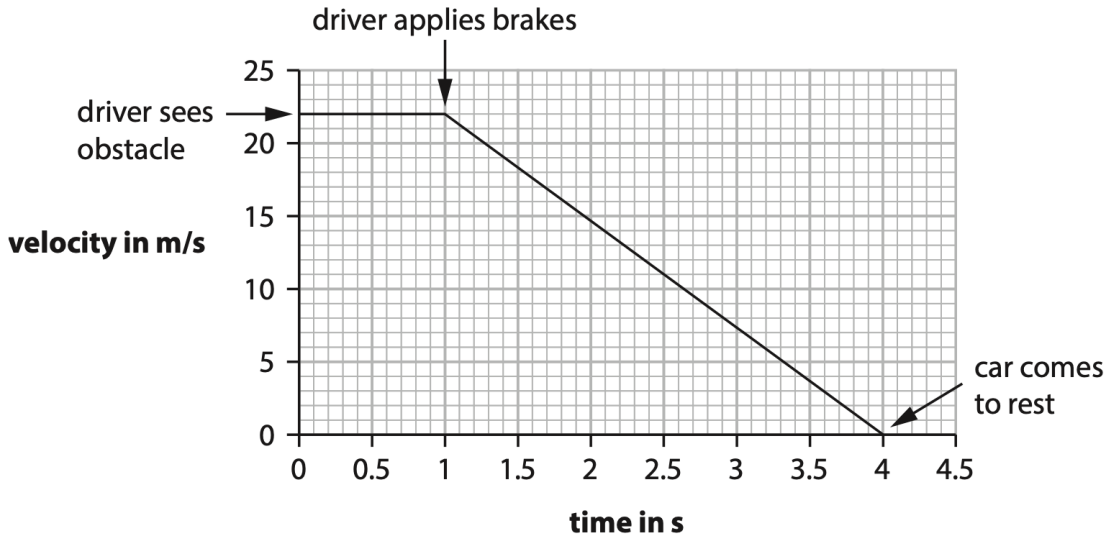


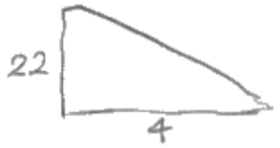
Figure 3

Mark exemplar 1 & 2

CS 1PF, Q2aiii

CS P1F, q2aiii – Exemplar 1

(3)



22 × 4

$\times \begin{matrix} 22 \\ 4 \end{matrix}$

88 $\times \frac{1}{2} =$ 44

distance = 44 m

ResultsPlus
Examiner Comments

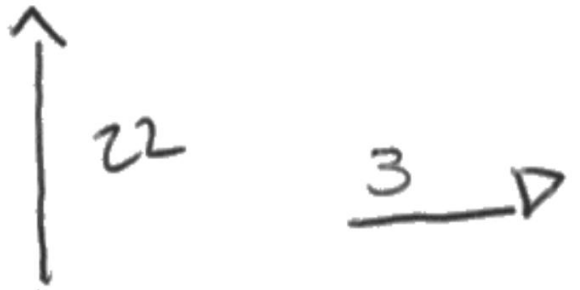
This response calculates the area under a sloping part of the graph, using the correct formula for the area of a triangle.

Unfortunately, the time value used was incorrect. It should be 3s, not 4s.

2 marks scored.

CS P1F, q2aiii – Exemplar 2

(3)



$\frac{22 \times 3}{2} = 33$

distance = 33 m

ResultsPlus
Examiner Comments

In this response, it is clear that the correct data points have been used and the correct distance calculated.

3 marks scored.

CS P1F, q2aiii – General comments

Question 2 (a)(iii)

This was a difficult calculation, involving finding the distance travelled from a velocity/time graph.

The equation ''distance travelled = area under the sloping line of the graph'' was given in the question.

Many candidates were able to score at least 1 of the 3 marks available but few went on to score all 3 marks.

B. CS P1H, q6c– Question

*(c) Figure 9 shows two trolleys, **P** and **Q**, moving at the same speed, v, directly towards each other.

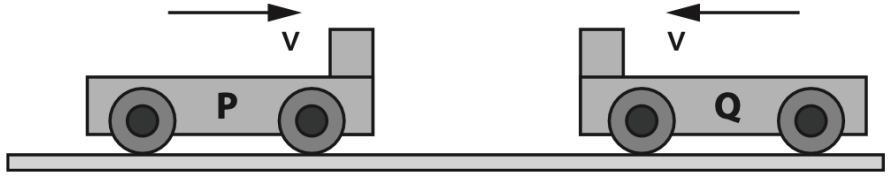


Figure 9

The trolleys have the same mass.

When the trolleys collide, they stick together and stop.

Explain how momentum and energy are both conserved in this collision.

(6)

Mark exemplar 1 & 2

CS P1H, q6c– Exemplar 1

(6)

- energy is neither created or destroyed but rather transferred.
- Newton's third law states that two forces exerted on eachother are equal and opposite.
- Trolleys P and Q are going in opposite directions as eachother but have the same mass so they abide this law.
- momentum = mass x velocity
- if the trollys are moving at the same speed and are at equal mass the resultant force will be 0 therefore they stop. Kinetic energy has also reached 0.
- energy must be conserved if both trolleys are the same mass and same speed and ending up with the same result.

(Total for Question 6 = 11 marks)

ResultsPlus
Examiner Comments

This is a level 1 answer awarded 2 marks.

There are recognitions that the values of kinetic energy and momentum of each trolley are equal (in size). A basic statement of the law of conservation of energy is given, but it is not really applied.

There aren't even any level 2 limited descriptions of either conservation of energy or of momentum.

The candidate unhelpfully attempts an explanation in terms of Newton's third law.

The equal and opposite notion was often transferred in students' minds to kinetic energies and momenta.

CS 1PH, Q6c

CS P1H, q6c– Exemplar 2

Each holley has the same amount of kinetic energy before the collision as ~~kinetic~~ kinetic energy = mass × ½ × (velocity)² as the masses and velocities are the same (except the velocity of one is negative because it is in the opposite direction). When they collide, no overall force is exerted on either holley as the forces are balanced and by the end, the momentum equals zero - this is the same as before the ~~collision~~ collision, so we can say that momentum has been conserved. Energy is also not destroyed in any ways, only transferred from one store to another. ~~So the~~ The kinetic energy of each holley before the collision transfers to the thermal energy store when they collide and stick together, so the energy does not dissipate elsewhere and it is also conserved.

CS 1PH, Q6c

ResultsPlus
Examiner Comments

This answer recognises that the total momentum before and after are both zero, understanding that velocities may be regarded as positive and negative. They also understand energy conservation via conversion from kinetic to thermal. Well worth 6 marks

This standard of answer was rarely seen.

CS P1H, q6c– General comments

Question 6 (c)

This 6 marker on a momentum conservation (practical) proved to be very difficult for candidates to achieve level 2 or greater.

Misunderstandings abounded in candidates' answers including an idea that kinetic energies could cancel each other out.

Three exemplar answers worth 6 marks each are given in the hope of pointing students forwards to what can be achieved.

C. CS P1H, q 5di – Question

(d) The teacher now investigates the absorption of beta radiation by different thicknesses of aluminium.

The apparatus available is

- a source of beta radiation
- a Geiger–Müller (G-M) tube and counter
- 10 pieces of aluminium, each 0.5 mm thick
- a metre rule.

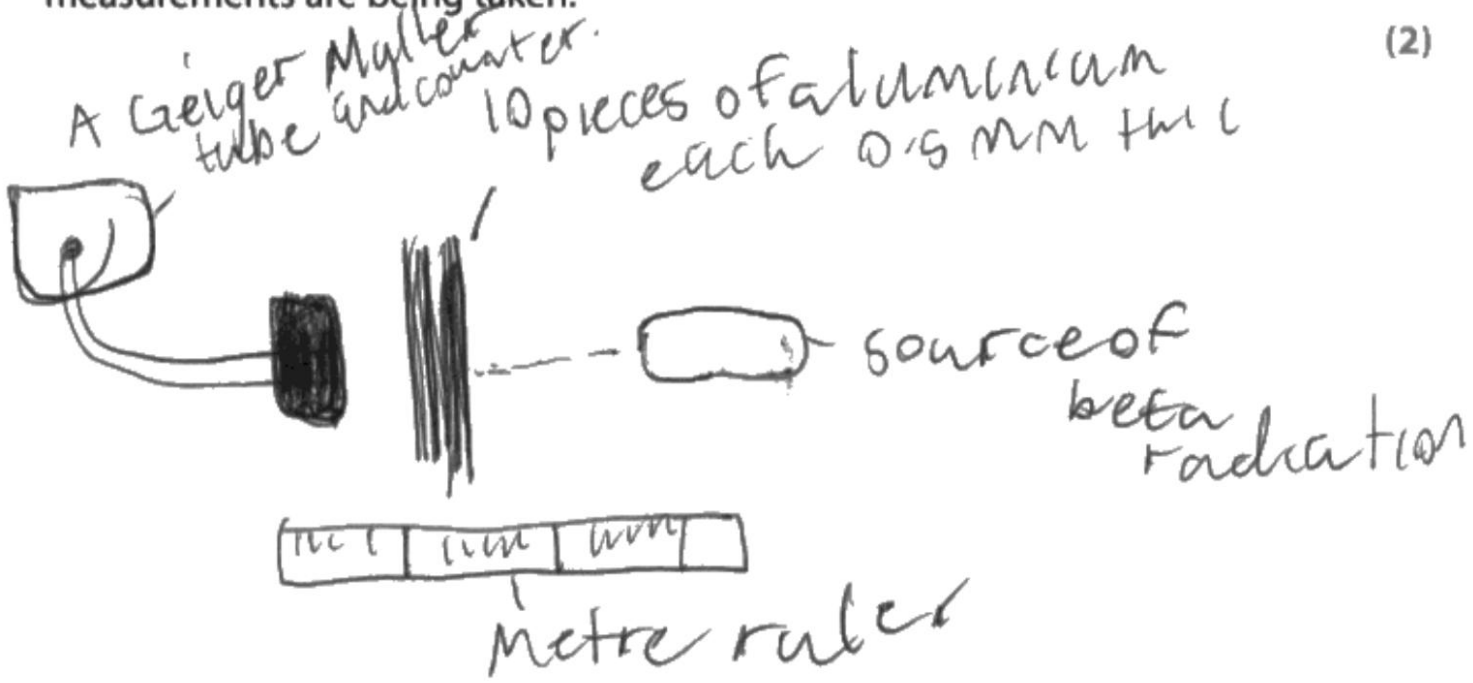
(i) Sketch a labelled diagram showing the positions of the apparatus when the measurements are being taken.

(2)

Mark exemplar 1

CS P1H, q 5di – Exemplar 1

(i) Sketch a labelled diagram showing the positions of the apparatus when the measurements are being taken. (2)



ResultsPlus
Examiner Comments

Full marks achieved with the aluminium sheets between the source and the GM tube.

CS P1H, q 5di – General comments

Question 5 (d)(i)

This was of variable attainment.

A good number got full marks (2).

Many scoring 1 out of 2 had 3 items labelled including the GM tube, but then positioned the aluminium inappropriately.

D. CS 1PF, q5ciii / 1PH, q1ciii – Question

(c) Figure 10 is a diagram that represents energy changes from P to Q.

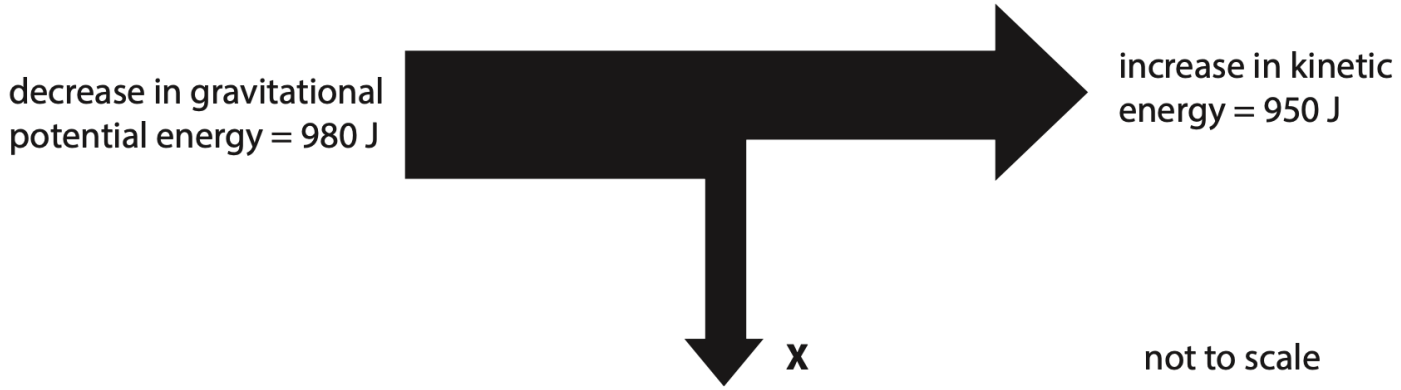


Figure 10

(iii) Calculate the efficiency of the system represented in Figure 10.

(2)

Mark exemplar 1 & 2

CS 1PF, Q5ciii
CS 1PH, Q1ciii

CS 1PF, q5ciii – Exemplar 1

(iii) Calculate the efficiency of the system represented in Figure 10.

(2)

Essiciency = useful / total

$\frac{950}{980} = 0.969$

efficiency = 0.969

ResultsPlus
Examiner Comments

An answer that rounds to 0.97 so scores 2 marks.

CS 1PH, q1ciii – Exemplar 2

(iii) Calculate the efficiency of the system represented in Figure 2.

(2)

Efficiency = useful energy / total energy

$\frac{950}{980} =$

efficiency = $\frac{95}{98}$

(Total for Question 1 = 9 marks)

ResultsPlus
Examiner Comments

One mark out of two is scored for the initial substitution.

ResultsPlus
Examiner Tip

Leaving the answer in fractional form, where the answer required is a decimal, sells yourself short in a physics exam.

CS 1PH, Q1ciii

CS 1PF, q5ciii / 1PH, q1ciii – General comments

Question 5 (c)(iii)

In this efficiency calculation, examiners accepted answers that rounded to 0.97 or to 97%.

Answers that rounded to 97 (without the % sign) scored only 1 mark.

The majority of candidates scored zero for this calculation. Of those who scored, the majority scored both marks.

Question 1 (c)(iii)

This question required a straightforward calculation of efficiency from values in the energy diagram.

Most students obtained full marks on this item.

CS 1PF, Q5ciii
CS 1PH, Q1ciii

E. CS 1PF, q6bi – Question

(b) A motorcycle is travelling at a velocity of 6.2 m/s.

The motorcycle accelerates at 2.5 m/s^2 until its velocity is 10 m/s.

(i) Calculate the time taken for this acceleration.

Use the equation

$$\text{time taken} = \frac{\text{change in velocity}}{\text{acceleration}}$$

(2)

time taken = ... s

Mark exemplar 1 & 2

CS 1PF, q6bi – Exemplar 1

Use the equation

$$\text{time taken} = \frac{\text{change in velocity}}{\text{acceleration}}$$

(2)

$10 - 6.2 = 3.8$ $\quad \frac{3.8}{2.5} = 1.52\text{s}$

time taken = 1.52 s

ResultsPlus
Examiner Comments

This shows the calculation of the change in velocity, the substitution and the correct final answer.

2 marks scored.

CS 1PF, q6bi – Exemplar 2

Use the equation

$$\text{time taken} = \frac{\text{change in velocity}}{\text{acceleration}}$$

(2)

$$\text{time} = \frac{3.8}{2.5} = 1.28$$

time taken = 1.28 s

ResultsPlus
Examiner Comments

This response shows the correct change in velocity and the correct substitution into the equation but the evaluation is not correct.

1 mark scored.

CS 1PF, q6bi – General comments

Question 6 (b)(i)

Here candidates had to find the time taken for an acceleration.

The equation was given but the correct change in velocity had to be obtained to gain any marks for the final calculation.

Most of the candidates who scored, scored 2 marks.

Use the equation

$$\text{time taken} = \frac{\text{change in velocity}}{\text{acceleration}}$$

(2)

F. CS 1PF, q3ei – Question

(e) Ripples travel out from the centre of a small circular pond to its edge.

(i) Describe how a student could determine the wave speed of the ripples.

(3)

.....

.....

.....

.....

.....

.....

Mark exemplar 1

CS 1PF, q3ei – Exemplar 1

(3)

A student could determine the wave speed by measuring the distance from the edge of the pond to the centre and time with a stopwatch how fast it takes the ripples to reach the edge finaly divide the distance by the time to get the wave speed

ResultsPlus
Examiner Comments

This is a clear, well-structured description that scores all 3 marks.

CS 1PF, q3ei – General comments

Question 3 (e)(i)

Here candidates had to describe a method to determine the wave speed of ripples on a pond, a slightly unusual situation.

Examiners were looking for:

use of the equation speed = distance/time

measurement of a relevant time

measurement of a specified distance.

Most scored at least 1 of the 3 marks available but the 'distance' mark was scored by only a few.

Examiner Reports

Find the reports

You can find the full examiners reports for the 2024 series by following this link:

https://qualifications.pearson.com/en/qualifications/edexcel-gcses/sciences-2016.html

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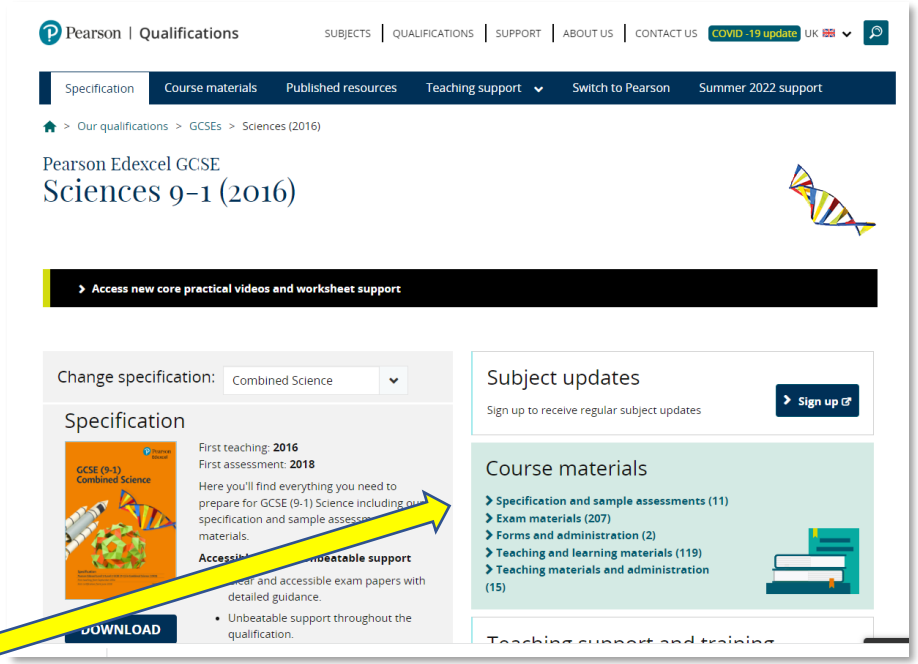
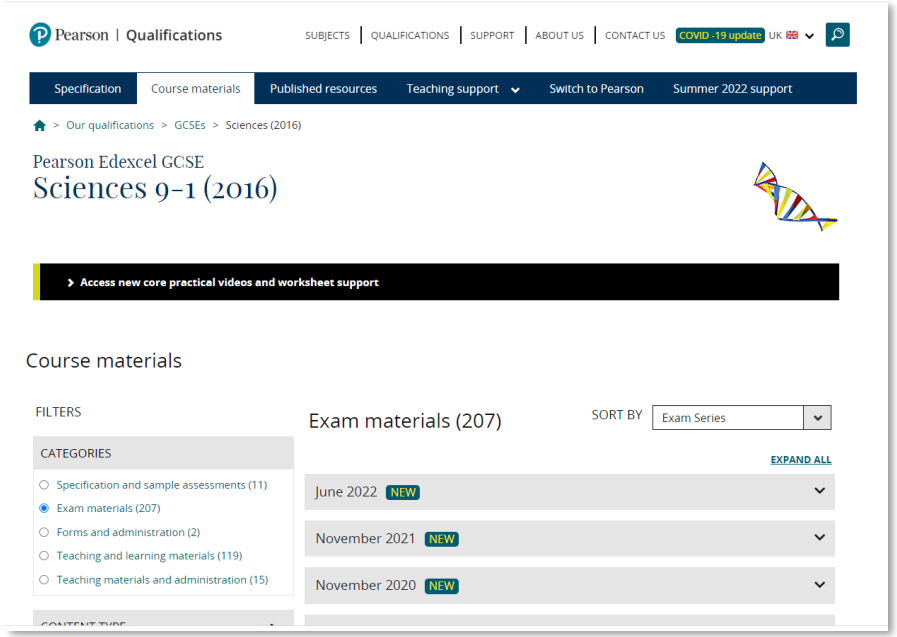
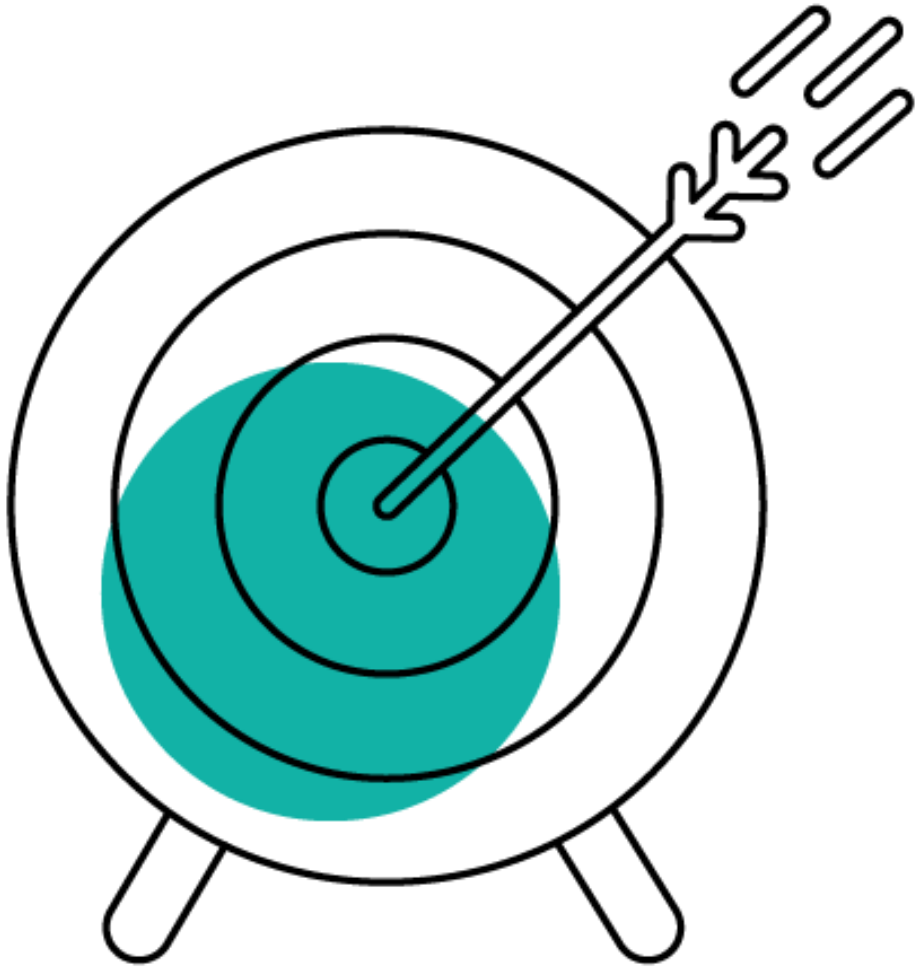




Summary and next steps

In this session we focused on applying the mark schemes for 2024 CS Paper 1 Biology, Chemistry and Physics, F and H Tier



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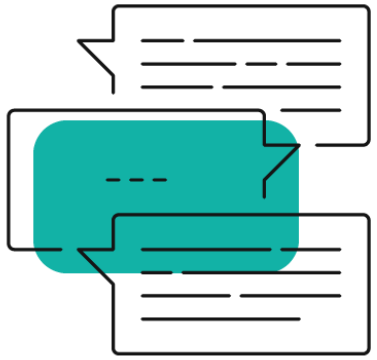

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