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GCSE Science 2011 (Biology, Chemistry, Physics)
Feedback on June 2012 (Unit 1)

Presenter: Richard Shewry

Introduction to the Assessment

Unit B1: Influences on life

Unit C1: Chemistry in our world

Unit P1: Universal physics

Unit SCA: Science Controlled Assessment

AO1: Recall, select and communicate their knowledge and understanding of Science

AO2: Apply skills, knowledge and understanding of science in practical and other contexts

AO3: Analyse and evaluate evidence, make reasoned judgements and draw conclusions based on evidence

Unit 1 is externally assessed by a one hour examination worth 60 marks, at either Foundation or Higher Tier, for each Unit, plus the Controlled Assessment

Candidates who did well
Student Response

(ii) Describe the nerve pathway a nerve impulse will take from where it is received to where it will cause a response to take place.

(3)

the stimulus will detect the reflex which will then send the impulse to the sensory neurone and then to the central nervous system which is the spine and the brain, which the impulse then goes to the relay neurone to the motor neurone and then to the effector which is the muscle.

(Total for Question 2 = 8 marks)

5Bi1F Question 2 (b) (ii)

Why Candidates did well
Summary

This item focuses upon specification point 2.21 and is one of the questions worth three marks.

If a candidate was aware of the use of neurones in a nerve pathway, then they performed well on this question.

If a candidate named all three neurones in the correct context and order, then they could score all three marks here very simply. This candidate has scored well with maximum marks awarded. They have actually made comments on five of the marking points, and only left any reference to a synapse out.

Candidates who did well
Student Response

(ii) Sparrowhawks are birds that are predators of the Mistle Thrush.

The diagram shows the energy values in the food chain for these organisms.

Calculate the percentage of energy that was passed from the mistletoe plant to the Mistle Thrush.

(2)

answer = 20 %

5Bi1F Question 3 (b) (ii)

Why Candidates did well
Summary

This item focuses upon specification point 3.17 and asked candidate to use mathematics to secure 2 marks.

It was very clear from the food chain and the question stem which numbers were required for the calculation and it was disappointing to see so many candidates using other numbers.

It is clear that percentage calculations are an area where candidates need practice. 2 marks were awarded here for the correct answer. However, it is good practice for candidates to show their working in calculation questions.

Candidates who did well
Student Response

*(iii) A father with the genotype **DD** and a mother with the genotype **dd** for sickle cell disease had a number of children.

Explain why none of their children will have sickle cell disease.
Use a Punnett square or genetic diagram to help your explanation.

(6)

	D	D
d	Dd	Dd
d	Dd	Dd

~~Ans~~ Each ~~and~~ child will recieve a gene from each parent. As the father has the dominant non sickle cell alleles, this will always be passed on to the child along with the mothers ressesive gene. This will make the children heterozygous, with different alleles. Although the children will be carriers of sickle cell, they will never suffer from it.

5Bi1F Question 5 (b) (iii)

Why Candidates did well
Summary

This item focuses upon specification points 1.23 and 1.24 and asks candidates to draw and analyse a genetic cross between a mother with sickle cell disease and a father who is homozygous dominant for the disease.

Candidates scored well on the Punnett Square they were asked to supply, but the explanations that followed were somewhat weaker.

To secure the higher mark of each band, a candidate had to communicate their answer with the use of good grammar and spelling.

Candidates who did well
Student Response

(b) Receptor cells in the skin detect temperature changes in the external environment.

Explain how this information is transmitted to the brain.

(4)

receptors in the dermis ~~of~~ detect low temperature and send it to the dendrites the dendrites then take the impulses to the dendron and then to the axon. The axon will transfer the impulses to the axon endings and eventually the neurotransmitters will diffuse across the synapse to the receptor cells in the dendrites of the relay neurone in the CNS which will ~~take~~ transmit the impulses to the brain.

5Bi1H Question 5 (b)

Why Candidates did well
Summary

This question is another good discriminator for the higher grades. Candidates needed to focus on the question rather than write generally about nerve pathways.

Only a small number of candidates gained all 4 marks but nearly half of the candidates managed to get 2 or more marks.

This answer shows good scientific understanding of the nervous system and explains in detail how the message is sent from the skin to the brain. 4 marks here for an excellent response.

Candidates who did well
Student Response

*(c) In the UK, the external temperature can drop below 0 °C.

Explain how the human body maintains a stable internal temperature when the external temperature is 0 °C.

(6)

At 0°c the body keeps its self warm by shivering, this causes friction between the skin generating heat. Vasoconstriction is also used, this narrows the pores upon the skin causing less heat to escape the body, the hairreceptor muscles cause bodily hair to stand on end, this helps to insulate the body. Also when the body gets cold the first things to be cool to the touch are the hands / feet, this helps to contain a warm core temperature.

5Bi1H Question 5 (c)

Why Candidates did well
Summary

This was a very typical response to the question with a simple explanation of two methods of raising body temperature.

The answer flows well, and there is very good evidence that the candidate clearly understands the mechanisms of thermoregulation. This candidate has gained 4 marks here and has produced a well rounded answer.

To increase the marks, another method of thermoregulation should be mentioned with a little more detail on at least one of the methods.

Candidates who did well
Student Response

(i) Chlorine gas was collected in one of the test tubes.

Describe a test to show the gas is chlorine.

(2)

To show if a gas is chlorine you get a damp blue litmus paper and put it over the month of a test tube with chlorine, if the litmus paper turns white, then the gas is chlorine.

5Ci1F Question 3 (d) (i)

Why Candidates did well
Summary

Many candidates knew the test for chlorine and described it very well, although some ignored the question and described electrolysis.

A surprising number of candidates described the limewater test for carbon dioxide here, or used a splint to test for hydrogen or oxygen.

This is a very good answer as it describes how to do the test and the result of the test.

Candidates who did well
Student Response

*(d) Waste is often disposed of by putting it in landfill sites, by burning or by recycling.

Discuss the advantages and disadvantages of each disposal method, and explain which disposal method should be used for plastic bottles.

(6)

Putting it in landfill sites is good because its quick and easy but it takes up alot of space. Burning is good because dosn't take alot of space but it produces harmful gases. Recycling is good because we get to use them again but it costs money. I think we should use recycling because it makes them renewable and it's better for the environment.

(Total for Question 6 = 12 marks)

5Ci1F Question 6 (d)

Why Candidates did well
Summary

There were some excellent answers seen to this question.

The most common errors included writing vague advantages or disadvantages, such as, burning releases gases (without stating that these gases could be harmful or toxic), and not explaining which method of disposal would be best for plastic bottles.

This is a good level 3 answer as the candidate has discussed all three methods of disposal and explained which is best for plastic bottles.

Candidates who did well
Student Response

(d) Anna finds a leaflet about how the device works.

- A cat approaches the device.
- Heat from the cat is emitted as infrared rays.
- The device detects these infrared rays.
- Then the device emits ultrasound waves.
- These waves scare the cat away.

(i) The speed of the ultrasound waves is 340 m/s.
The ultrasound takes 0.047 s to reach the cat.

Calculate the distance between the device and the cat.

distance (m) = wave speed (m/s) × time (s)

(2)

340
×0.047
2380
13600
5980

distance = 5980 m

5Ph1F Question 1 (d) (i)

Why Candidates did well
Summary

This candidate scored one mark for correct substitution into the equation.

The majority of candidates gave the correct answer with no working shown.

Candidates who did well
Student Response

(c) State **two** uses of gamma radiation.

(2)

gamma radiation is used to cure cancer (kill cancer cells) and to steralize food or medical equipment.

5Ph1F Question 2 (c)

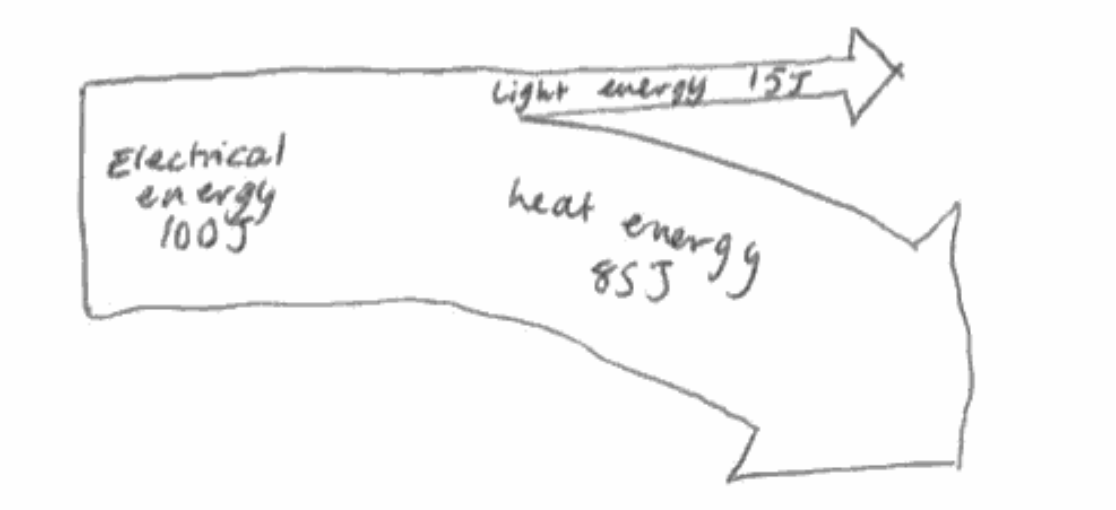
Why Candidates did well
Summary

Most candidates were able to give one correct use of gamma radiation but there was still confusion between the uses of gamma with other types of radiation.

The main correct uses quoted were sterilisation of food or medical equipment and detection or treatment of cancers.

This answer contained all the information necessary to get two marks.

Candidates who did well
Student Response



5Ph1H Question 2 (a) (ii)

Why Candidates did well
Summary

Candidates were not necessarily expected to draw a Sankey diagram, although most did. Any diagram that clearly showed the fate of the energy involved was accepted.

Most diagrams gained full credit, but some candidates showed unacceptable imprecision in their choice of terms (e.g. ‘efficient’ energy), use of units or mental arithmetic.

Many candidates drew a good Sankey diagram with correct labelling.

Candidates who did well
Student Response

Elephant A emits an infrasound call.
When elephant B hears the infrasound, it calls back.
Elephant A hears the answering call from elephant B.
The speed of infrasound is 340 m/s.

(i) Show that the minimum time for elephant A to call and hear an answer from elephant B is about 15 s.

(3)

speed = $\frac{\text{distance}}{\text{time}}$

time = $\frac{\text{distance}}{\text{speed}}$

$t = \frac{2500}{340}$

$t = 7.352941176$
(one way)

(there and back)

$7.35\ldots \times 2 = 14.70588235$
rounds up to approx.

time = 15 secs

5Ph1H Question 3 (c) (i)

Why Candidates did well
Summary

This was an excellent response to the question. The candidate showed full working and made the effort to annotate their work.

Some allowance was made for candidates who found it hard to transpose an equation correctly. Provided that their working showed clearly that they were using the equation sensibly to test the data, then at least some of the marks were available.

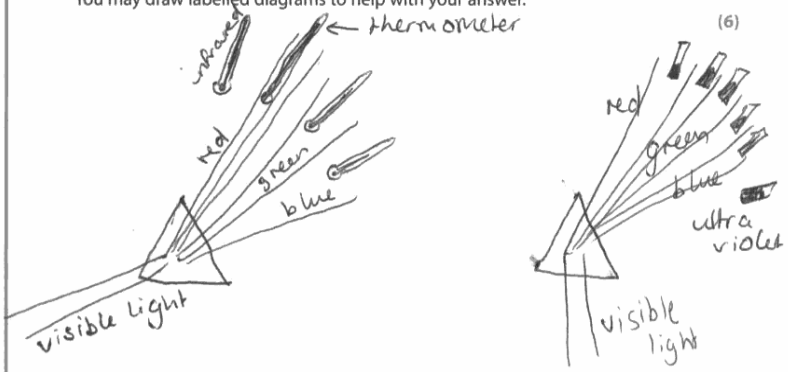
Many candidates omitted to take the return journey into account, but still gained some credit for showing some appropriate working.

Candidates who did well
Student Response

*(c) Herschel discovered invisible rays beyond one end of the visible spectrum.
Ritter discovered invisible rays beyond the other end of the visible spectrum.

Compare and contrast the two experiments leading to these discoveries.
You may draw labelled diagrams to help with your answer.

(6)



Herschel discovered infrared rays in 1800. He was measuring the temperatures in each colour of visible light. When he discovered it was hottest towards the red end of the spectrum, he measured the temperature just past it. Here it was the hottest of all, Herschel had discovered infrared. Ritter discovered ultraviolet soon after in 1801, he was seeing how fast each of the colours of light changed silver chloride black. ~~after~~ After discovering it changed fastest towards the blue end of the spectrum he ~~measu~~ tried just passed it, and it changed black the fastest of all. This was ultra violet.

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

5Ph1H Question 6 (c)

Why Candidates did well
Summary

The candidate included good descriptions of both experiments.

To gain full marks points of both similarity and difference and linked ideas were expected.

Candidates who gave detailed descriptions of both experiments usually managed to achieve this and reached Level three. This was a Level 3 response and the examiner gave six marks.

Candidates who did not do so well
Student Response

(ii) Describe the nerve pathway a nerve impulse will take from where it is received to where it will cause a response to take place.

(3)

First the stimulus is picked up by the ~~rece~~ receptor cells wich sends a nervous impulse to the spinal cord, triggering a reaction that send impulses along axons back to whatever the result of the stimulus is.

5Bi1F Question 2 (b) (ii)

Why Candidates did not do so well
Summary

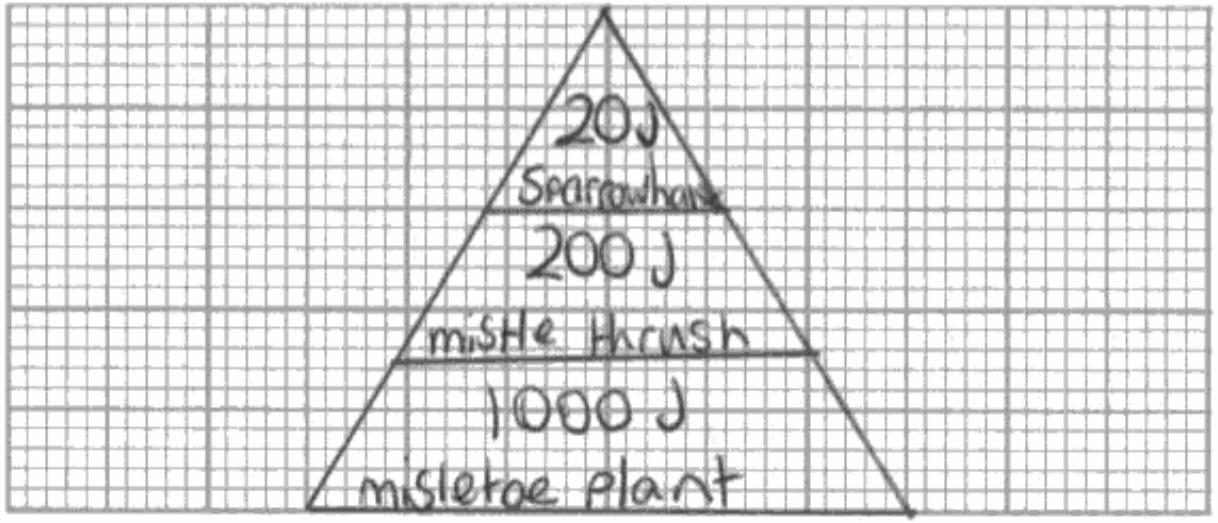
This candidate has been able to score 1 mark, as they have mentioned the use of the spinal cord (mp2).

Unfortunately they have not stated the use of any specific neurones or the use of the muscles as an effector.

Candidates who did not do so well
Student Response

(iii) Draw a pyramid of energy for this food chain.

(2)



5BI1F Question 3 (b) (iii)

Why Candidates did not do so well
Summary

This item focuses upon specification point 3.18 and asks candidates to draw a pyramid of biomass for the numbers provided in each trophic level.

This candidate has scored 1 mark for a triangular pyramid being drawn, which is acceptable.

The candidate did not score the second mark, as it is clear that the triangular format cannot show proportionality with the biomass figures.

Candidates who did not do so well
Student Response

(a) (i) Describe the trend in blood glucose concentration for this seven-hour period.

(2)

There ~~#o~~ is no trend in the concertration, as they is no pattern between the concertrations. But it shows that the level can only be between 76 and 130 mg per 100 cm³ of blood glucose concertration.

5BI1H Question 3 (a) (i)

Why Candidates did not do so well
Summary

The question required candidates to identify what the trend in blood glucose was. In order to do this they had to link the increase with a time when that increase occurred, or do the same for a decrease in blood glucose levels.

This candidate is not describing the trend in the glucose concentration.

To gain the marks they have to mention increasing or decreasing the concentration and the time period during which this occurs.

Candidates who did not do so well
Student Response

(b) Receptor cells in the skin detect temperature changes in the external environment.

Explain how this information is transmitted to the brain.

(4)

when you detect a stimulus sensory neurones pass on to the motor neurones. The information is sent to the brain.

You can detect the temperature change and you pull off.

***5BI1H** Question 5 (b)*

Why Candidates did not do so well
Summary

The question was specifically about how the information was sent to the brain, and therefore needed a focused response. Only a small number of candidates gained all 4 marks but nearly half of the candidates managed to get 2 or more marks.

This response gained 1 mark due to the reference to sensory neurones. Note that the question asks for how the information is transmitted to the brain. In this case the motorneurones are not involved. The candidate here has explained a voluntary response rather than answering the question set.

Candidates who did not do so well
Student Response

(iii) Incomplete combustion occurs when propane burns with insufficient oxygen available for complete combustion.

Explain a problem caused by the products of this incomplete combustion.

(2)

Incomplete combustion could cause a ~~pla~~ problem if ~~there~~ is insufficient oxygen because you are burning it and making it pollute the air.

5Ch1F Question 4 (a) (iii)

Why Candidates did not do so well
Summary

This was a fairly common type of answer in which the candidate has written generally about pollution and does not score any marks.

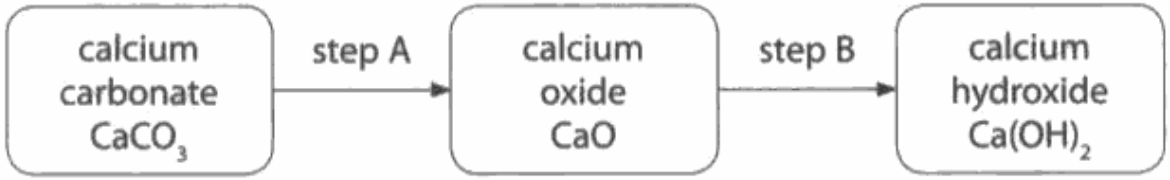
A surprisingly large number of candidates were unfamiliar with incomplete combustion.

Those who had learnt about it invariably wrote about the formation of toxic carbon monoxide.

Candidates who did not do so well
Student Response

(c) Limestone contains calcium carbonate.

Calcium carbonate can be converted into calcium oxide.
Calcium oxide can then be converted into calcium hydroxide.



(i) A lump of calcium carbonate is heated to convert it into calcium oxide in step A.

Explain why the mass of calcium oxide formed is less than the original mass of calcium carbonate.

(2)

because its been heated so the mass has reduced because some gases have evaporated into the atmosphere

5Ch1F Question 5 (c) (i)

Why Candidates did not do so well
Summary

This is quite a good response as the candidate has realised that the decrease in mass is due to a gas escaping.

To score 2 marks, the candidate would need to identify the gas as carbon dioxide.

The majority of candidates had forgotten that metal carbonates undergo thermal decomposition to leave metal oxides and release carbon dioxide gas.

Candidates who did not do so well
Student Response

(ii) Describe what you would observe when water is added, one drop at a time, to cold calcium oxide (**step B**).

(2)

As you keep adding water to cold calcium oxide, the substance would start to become cloudy and milky. This is because it is now Calcium Hydroxide which is also known as limewater.

5Ch1H Question 4 (b) (ii)

Why Candidates did not do so well
Summary

Only a quarter of the candidates scored a mark. Most candidates were failing to describe an observation. Of those that did, a relatively few were able to go on and give a second correct observation for the second mark.

Where correct responses were seen, the main answers given were ‘fizzing’ and/or ‘heating up’, although occasionally references to ‘steam’ or the idea of solid crumbling were seen.

Candidates who did not do so well
Student Response

(i) Write the balanced equation for the overall reaction that takes place when the hydrogen reacts with oxygen in the fuel cell.

(3)

$2H_2 + O_2 \longrightarrow 2H_2O$ + Energy

5Ch1H Question 6 (c) (i)

Why Candidates did not do so well
Summary

The majority just scored 1 mark, usually awarded for the correct reactants. Fewer candidates achieved the mark for the correct products.

The most common error here was failure to include H_2O as a product of the reaction.

Many candidates lost marks for not representing the formulae correctly – the main mistake being on the carbon dioxide, by either using a lower case O for the oxygen, or not using a subscript '2', or for adding incorrect balancing.

Candidates who did not do so well
Student Response

(iii) Write the balanced equation for the reaction of calcium hydroxide with carbon dioxide (**step C**).

(2)

$Ca(OH)_2 + CO^2 \rightarrow CaCO_3$

5Ch1H Question 4 (b) (iii)

Why Candidates did not do so well
Summary

Despite seeing a few flawless responses, most candidates could only give the correct formula of the product, namely water, scoring just one mark.

Usually, if marks were gained, it was either one or three marks. Many candidates remembered the formula for water, and then just put H_2 and O on the reactants side so that they balanced. Many were unable to write the correct formulae of either the oxygen or hydrogen molecules for the reactant mark, often **4H + O_2** was seen.

Products of HO_2 were seen quite regularly, as were word equations rather than symbols.

Candidates who did not do so well
Student Response

(b) Use words from the box to complete the table.

(3)

atom	energy	molecule
particle	source	wave

radiation	type	transfer
alpha	particle	energy
beta	particle	energy
gamma	wave	energy

5Ph1F Question 2 (b)

Why Candidates did not do so well
Summary

Surprisingly few candidates managed to get the three answers correct although the fact that ionising radiations include alpha and beta particles and gamma rays and that they all transfer energy was directly taken from the specification.

This was one of the few examples which gave three correct answers.

Candidates who did not do so well
Student Response

When the television is switched to standby, the power consumption falls to 0.5 W.

(ii) The cost of electricity is 26p per kW h.

Show that the cost of leaving the television on standby for 48 hours is less than 1p.

(3)

26 ÷ 48 = 0.5416.

5Ph1F Question 4 (c) (ii)

Why Candidates did not do so well
Summary

The required equation was given in the formulae section at the front of the paper and candidates should have been encouraged to use this throughout the course.

The need to change watts to kilowatts should also be apparent from the equation as the cost is given per kilowatt-hour.

This question was either answered poorly or not attempted.

Candidates who did not do so well
Student Response

(d) The telescope is used to look at the planet Venus.
Assume that the distance from Venus to the Earth is 39 000 000 km.
The speed of light is 300 000 000 m/s.

Calculate the time it takes for light to travel from Venus to the Earth.

(3)

speed = distance x time

speed ÷ distance = time

300 000 000 ÷ 39 000 000 = 7.69

time = 8 s

5Ph1H Question 1 (d)

Why Candidates did not do so well
Summary

This response showed an incorrect choice of equation. However the substitution (allowing for powers of ten) was correct on the basis of this initial error. Thus the candidate received one mark for a correct ‘substitution’.

There was no mark for the evaluation as that was bound to yield an incorrect result.

Candidates who did not do so well
Student Response

*(c) There is a plan to replace the existing transmission line from the windfarm with one at the higher potential difference of 400 kV.

The new transmission line will cross more than 200 km of mountains.
The cables will hang 50 m above the ground from 600 new, taller pylons.
Eventually, about 1000 of the old, shorter pylons will be removed.

5Ph1H Question 5 (c)

Discuss the advantages and disadvantages of this plan.

(6)

A disadvantage of this plan would be that the initial cost would be expensive. An advantage would be that it would ~~n't~~ be as dangerous because they would be higher up than before, a disadvantage would be that it would be an eyesaw and destroy the landscape. An advantage would be that more power would be able to get to more houses and buisness.

Why Candidates did not do so well
Summary

This response gave some basic ideas, but these were not linked to form any kind of argument. The candidate made simple points about cost and visual pollution.

The quality of written communication was appropriate to the level.

This was a Level 1 response and the examiner gave two marks.

Common Issues 5BI1H

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Candidates should:

- have a clear understanding of the two genetic diseases listed in the specification. These are sickle cell disease and cystic fibrosis.
- work on their maths skills, particularly when calculating percentages or reading off graphical data. This is a skill in itself, and is awarded marks accordingly.
- ensure that they have a detailed understanding of the higher tier topics, as these tend to be the areas where the higher marks are allocated, and are often discriminators for the higher grades.

Common Issues 5BI1H

Candidates should:

- look to the number of marks allocated to the question, and answer the question with the relevant number of points. If the question is allocated 3 marks, then the candidate needs to make 3 separate points.

- work on the way in which they answer the 6 mark questions. If the question is based around a graph, then information from the graph should be quoted alongside an explanation of the answer, to gain full marks.

Common Issues 5CH1F

Candidates should:

- Read all the information in each question carefully, and use it to help them to answer the question.
- Not rewrite the question in their answer.
- Learn the meanings of the key scientific words and phrases.
- Learn the tests for the gases in the specification, including the correct observation for each test.

Common Issues 5CH1F continued

Candidates should:

- Practice analysing data from tables and comparing two or more items.
- Practice writing word equations for the reactions in the specification.
- Revise fuels, particularly fossil fuels and biofuels.
- Revise the thermal decomposition of calcium carbonate and the action of water on calcium oxide.

Common Issues 5CH1H

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Candidates should:

- Learn to write and balance equations, using correct symbols for the elements and compounds found within the specification.
- Learn to distinguish between atoms and molecules, and not to confuse the two in the situations encountered in the course.
- Learn the meanings of the specific terms used in the course, e.g. reduction and oxidation.
- Revise the experiments carried out during the course.
- Practice answering the 6-mark questions.

Common Issues 5PH1F

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Candidates should:

- Use scientific terms in explanations.
- Use the formulae section at the front of the examination paper throughout the course so that they become familiar with finding the correct equation to use.
- Learn to read diagrams correctly; this is particularly important when light rays are being used.

Common Issues 5PH1F continued

Candidates should:

- Draw labelled diagrams to add value and enhance a written explanation.
- Have a calculator to use as this is an essential requirement for this examination.
- Use scientific terms with precision in order to gain maximum marks.
- Learn processes and practice explaining phenomena prior to sitting the examination.

Common Issues 5PH1H

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Candidates should:

- Make sure that they have a sound knowledge of the fundamental ideas in all six topics.
- Get used to the idea of applying their knowledge to new situations.
- Show their working at each stage of a calculation.
- Use the available time effectively by writing answers appropriate to the command words such as state, describe, explain.
- Read the question carefully and underline or highlight the key words, for example in question 5 (a): ‘State one disadvantage of using the wind...’.

Statistics

If you would like to know more about examination statistics, you may find these links of interest to you.

Examination Results Statistics

www.edexcel.com/iwantto/Pages/stats.aspx

Results statistics summarise the overall grade outcomes of candidates sitting Edexcel examinations.

Grade Boundaries

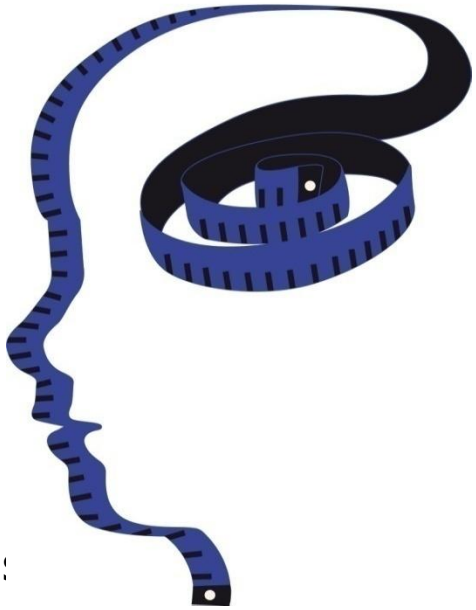
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

This page shows the minimum marks needed to achieve a certain grade for all UK and international examinations.

Statistics continued

ResultsPlus

www.edexcel.com/resultsplus



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- see your students' scores for every exam question

- understand how your students' performance compares national averages

Any questions?

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Thank you for taking part in this training

Please complete our online evaluation form.

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