L2 Lead Examiner Report 1903

March 2019

L2 Qualification in Applied Science

Unit 1: Principles of Science

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Grade Boundaries

What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade, at Distinction, Merit and Pass.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the external assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark is for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each assessment, because then it would not take accessibility into account.

Grade boundaries for this, and all other papers, are on the website via this link:

http://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

Unit name of number of unit.

Grade	Unclassified	Level 1 Pass	Level 2		
			Pass	Merit	Distinction
Boundary Mark	**0**	13	22	31	40

To be completed by VQ Assessment

Introduction to the Overall Performance of the Unit

Learners that did well in this summer series, were able to apply their scientific knowledge to the scenarios posed in the questions. They used good scientific language and were able to apply concepts and key terms. The best learners were able use the correct terms in the correct places, write chemical formula, understand chemical reactions and rearrange equations in physics, they were able to use standard form correctly.

Individual Questions

Question 1

In question 1 (a), a good proportion of learners were able to state the type of energy stored in the battery of the rechargeable drill as chemical energy to gain the mark. A common misconception seen was the energy was stored as electrical energy, this did not score.

The battery in the rechargeable drill is charged using electricity.

(a) State the form of energy stored in the battery of the rechargeable drill.

(1)

electrical energy

In part (b) of question 1, it was pleasing to see that the majority of learners were able to apply their knowledge of forms of energy and were able to recognise the useful form of energy produced by the motor in the drill as kinetic energy.

In some cases, the spelling was not correct but as the meaning was clear a mark was still awarded.

(b) The battery powers the motor to turn the drill bit.

State the useful form of energy produced by the motor.

(1)

Kenetic

Question 1c was well answered by the majority with most recognizing that either thermal or sound energy was wasted by the motor to gain the mark.

(c) State **one** form of energy that is wasted by the motor.

(1)

thermal energy

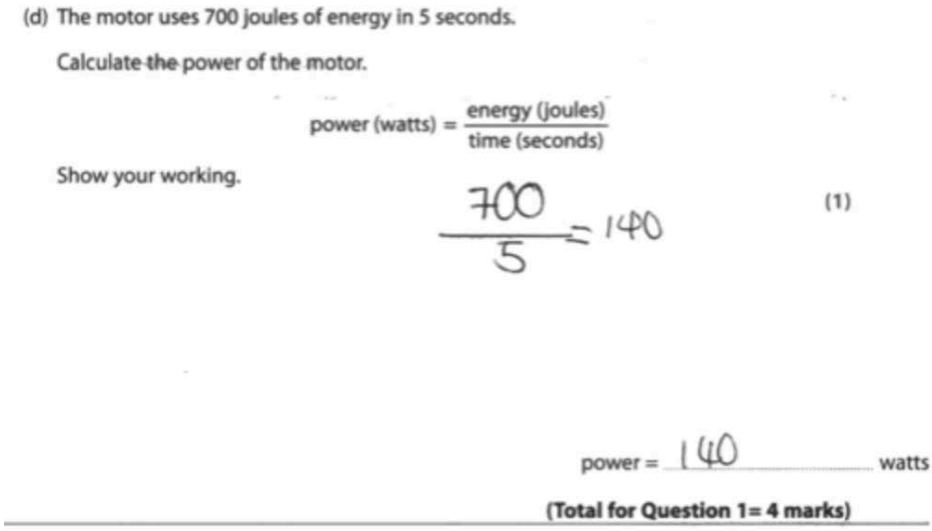
Learners that did not score, often stated again that electrical energy was wasted by the motor, this did not score a mark

(c) State **one** form of energy that is wasted by the motor.

(1)

electrical

The final part of question 1, part (d), asked learners to calculate the power of the motor. This was completed well by most learners with a good proportion gaining the mark.



(d) The motor uses 700 joules of energy in 5 seconds.

Calculate the power of the motor.

$$\text{power (watts)} = \frac{\text{energy (joules)}}{\text{time (seconds)}}$$

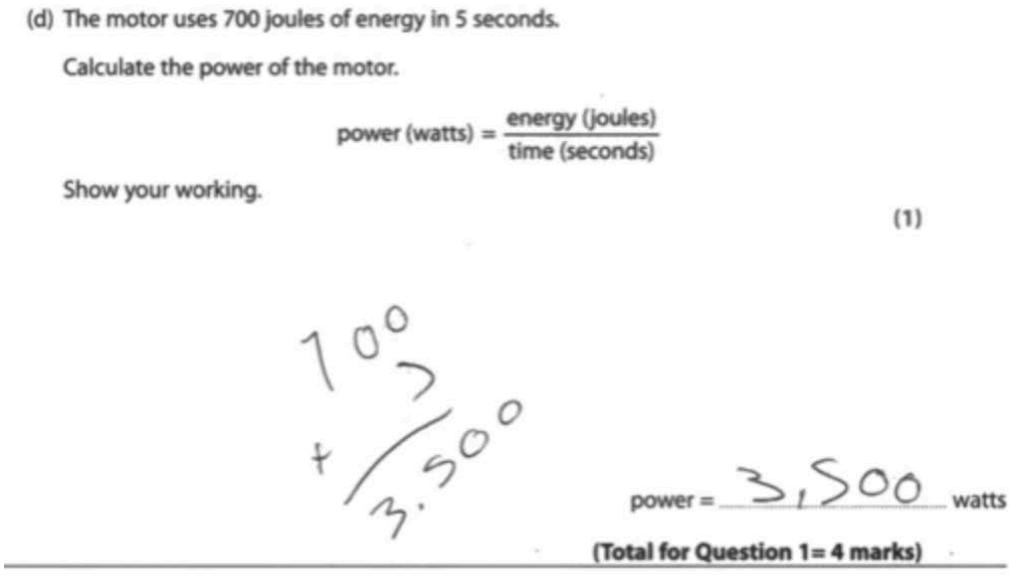
Show your working.

$\frac{700}{5} = 140$ (1)

power = 140 watts

(Total for Question 1= 4 marks)

Where learners lost marks, it was often as they tried to rearrange the equation and therefore multiplied the number given rather than dividing them. This gained no credit.



(d) The motor uses 700 joules of energy in 5 seconds.

Calculate the power of the motor.

$$\text{power (watts)} = \frac{\text{energy (joules)}}{\text{time (seconds)}}$$

Show your working.

(1)

700 × 5 = 3,500

power = 3,500 watts

(Total for Question 1= 4 marks)

Question 2

Question 2 of the physics section mostly well answered by learners, a good number of learners were able to name the type of radiation used to the picture of part of a human hand in part (a)(i) as X-rays to gain the mark.

(i) Name the type of electromagnetic radiation used to take this image.

(1)

x-ray

In part (a)(ii), many were able to state one other type of electromagnetic radiation used to make images of the human body to gain the mark. In some cases, learners did not read the question carefully and gave the name of a machine that is used to take images of the human body rather than the type of electromagnetic radiation used, as in this example, this did not gain the mark.

(ii) State **one** other type of electromagnetic radiation that is used to make images of the human body.

(1)

MRI Scan

A good proportion of learners were able to state the type of electromagnetic radiation used to detect forged bank notes as ultra violet light in part (b).

(b) State the type of electromagnetic radiation that is used to detect forged banknotes.

(1)

ultraviolet

In part (c)(i), learners found it harder to state another use of microwaves other than their use in a microwave oven. Many repeated the stem again and stated that microwave radiation is used to heat food or words to that effect.

(c) (i) Microwaves are used in microwave ovens.

State **one** other use of microwave radiation.

(1)

heating things up

Another common misconception seen was that microwaves are used in tanning beds.

(c) (i) Microwaves are used in microwave ovens.

State **one** other use of microwave radiation.

(1)

Tanning beds

Or that microwaves are used in remote controls. Confusing microwaves in this case, with infra red.

(c) (i) Microwaves are used in microwave ovens.

State **one** other use of microwave radiation.

(1)

Tv control

Learners found Question 2 part (c)(ii) much more difficult. Few learners recognized that cells contained water and that the microwaves heat this water. Those that did score, usually did so for stating that the cells heat up, which was allowed.

Weaker answers simply stated that you would burn yourself, which was not sufficient for the mark.

(ii) Explain why excessive exposure to microwaves is harmful to human body cells.

(2)

Burn yourself.

(Total for Question 2 = 6 marks)

Another common answer that did not score was that microwaves cause cancer.

(ii) Explain why excessive exposure to microwaves is harmful to human body cells.

(2)

microwave radiation could cause skin cancer

(Total for Question 2 = 6 marks)

Question 3

In question 3(a), the majority of learners were able to state what is meant by a renewable fuel to gain the mark.

3 Solar energy is a renewable energy source.

(a) State what is meant by the term **renewable energy source**.

(1)

a renewable energy source is a source of energy that is not finite and does not run out.

Part (b) was also well answered, with many being able to name a non-renewable fuel. Coal was a common response that gained the mark.

(b) Name a **non-renewable source** of energy.

(1)

~~gas~~ coal

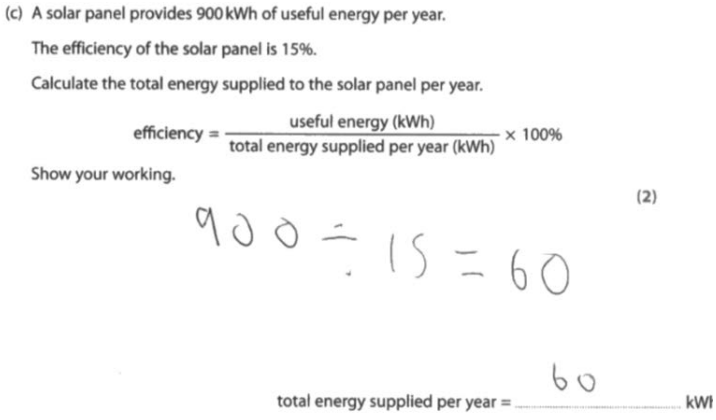
However in some cases, learners did not read the question carefully and instead of naming a non-renewable source of energy tried to give a definition, this did not score.

(b) Name a **non-renewable source** of energy.

(1)

Cannot be replaced / reused

In the first calculation on the paper, many learners were able to score at least 1 mark for dividing the numbers or substituting the numbers.



(c) A solar panel provides 900 kWh of useful energy per year.

The efficiency of the solar panel is 15%.

Calculate the total energy supplied to the solar panel per year.

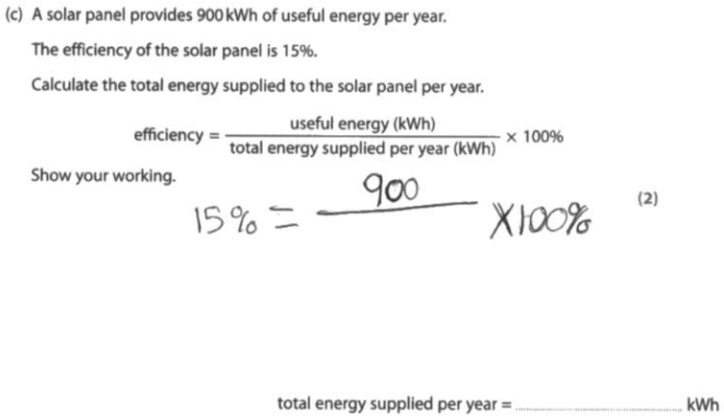
$$\text{efficiency} = \frac{\text{useful energy (kWh)}}{\text{total energy supplied per year (kWh)}} \times 100\%$$

Show your working.

(2)

900 ÷ 15 = 60

total energy supplied per year = 60 kWh



(c) A solar panel provides 900 kWh of useful energy per year.

The efficiency of the solar panel is 15%.

Calculate the total energy supplied to the solar panel per year.

$$\text{efficiency} = \frac{\text{useful energy (kWh)}}{\text{total energy supplied per year (kWh)}} \times 100\%$$

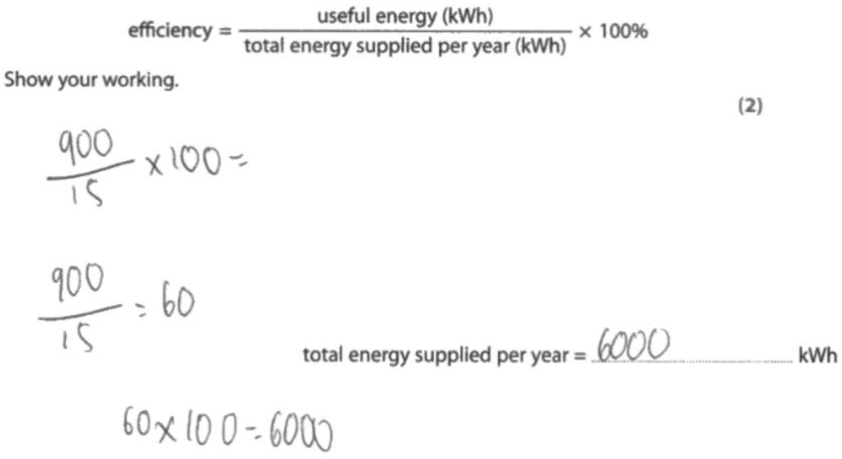
Show your working.

(2)

$15\% = \frac{900}{\quad} \times 100\%$

total energy supplied per year = ... kWh

Those that did score full marks, often set their answers out very clearly showing their working. Showing working clearly is a skill that should be taught in centers to learners to show their thought process and so if the final answer is not shown, part marks as above can gain credit.



$$\text{efficiency} = \frac{\text{useful energy (kWh)}}{\text{total energy supplied per year (kWh)}} \times 100\%$$

Show your working.

(2)

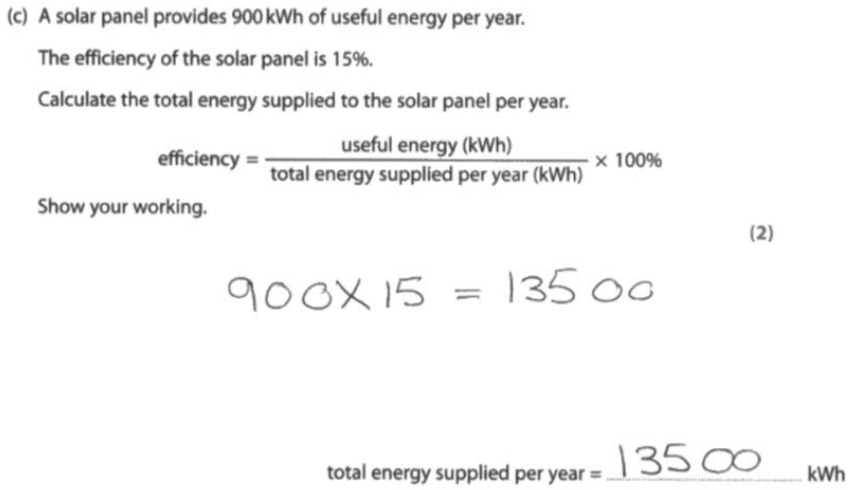
$\frac{900}{15} \times 100 =$

$\frac{900}{15} = 60$

total energy supplied per year = 6000 kWh

$60 \times 100 = 6000$

Where learners did not score, it was often as they had multiplied rather than divided the numbers.



(c) A solar panel provides 900 kWh of useful energy per year.

The efficiency of the solar panel is 15%.

Calculate the total energy supplied to the solar panel per year.

$$\text{efficiency} = \frac{\text{useful energy (kWh)}}{\text{total energy supplied per year (kWh)}} \times 100\%$$

Show your working.

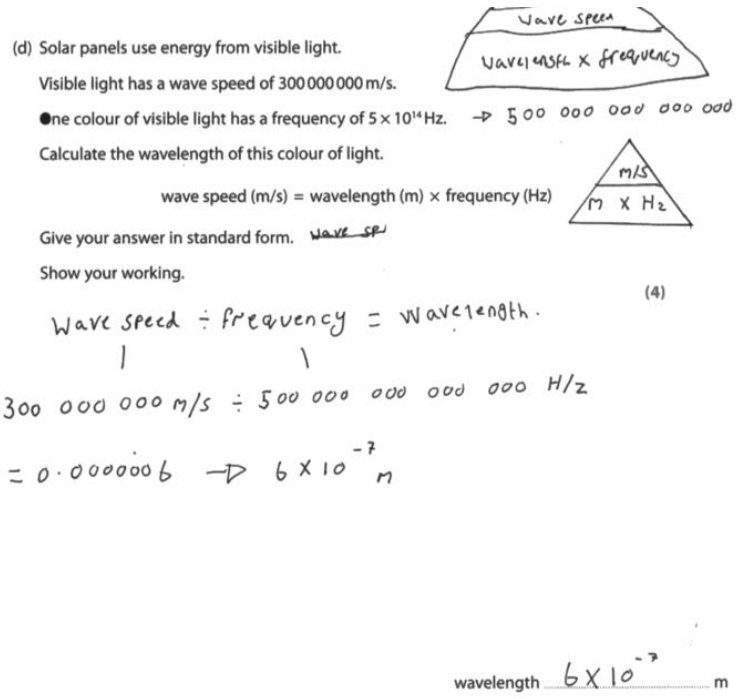
(2)

900 X 15 = 13500

total energy supplied per year = 13500 kWh

Learners found the second calculation in part (d) much more testing, but it was pleasing to see a good proportion of learners scoring across the range of marks available.

As in the previous calculation, learners that worked methodically and set out their working well, often gained full marks as in this example.



(d) Solar panels use energy from visible light.

Visible light has a wave speed of 300 000 000 m/s.

One colour of visible light has a frequency of 5×10^{14} Hz. → 500 000 000 000 000

Calculate the wavelength of this colour of light.

wave speed (m/s) = wavelength (m) × frequency (Hz)

Give your answer in standard form. wave sp

Show your working.

(4)

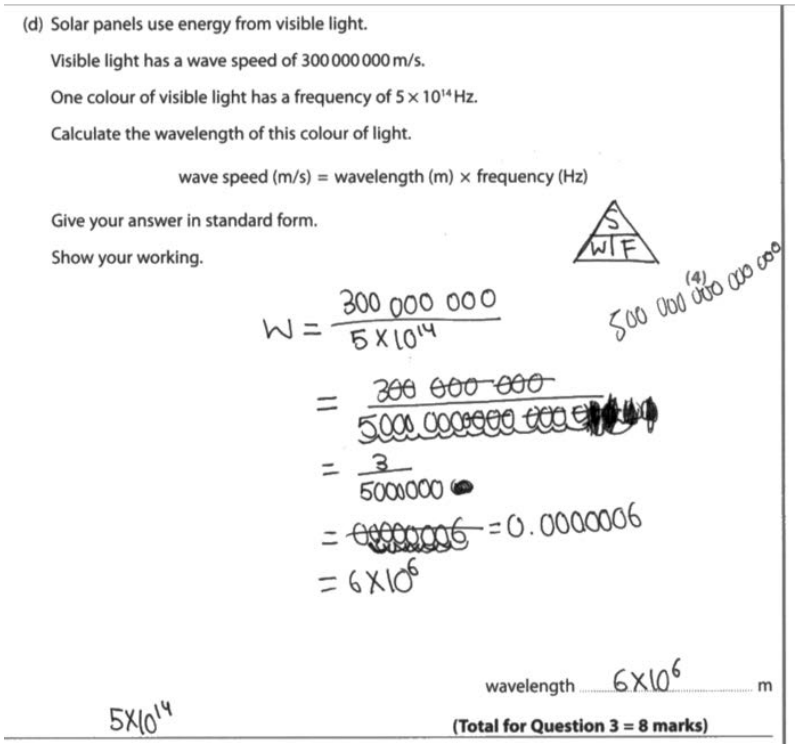
Wave speed ÷ frequency = wavelength.

300 000 000 m/s ÷ 500 000 000 000 000 Hz

= 0.0000006 → 6×10^{-7} m

wavelength 6×10^{-7} m

In this next example, the learner has calculated the wavelength correctly but then has just missed the standard form mark to gain 3 marks.



(d) Solar panels use energy from visible light.

Visible light has a wave speed of 300 000 000 m/s.

One colour of visible light has a frequency of 5×10^{14} Hz.

Calculate the wavelength of this colour of light.

wave speed (m/s) = wavelength (m) × frequency (Hz)

Give your answer in standard form.

Show your working.

S / W | F

$W = \frac{300\,000\,000}{5 \times 10^{14}}$

$= \frac{300\,000\,000}{500\,000\,000\,000\,000}$

$= \frac{3}{5000000}$

$= 0.0000006 = 0.0000006$

$= 6 \times 10^{6}$

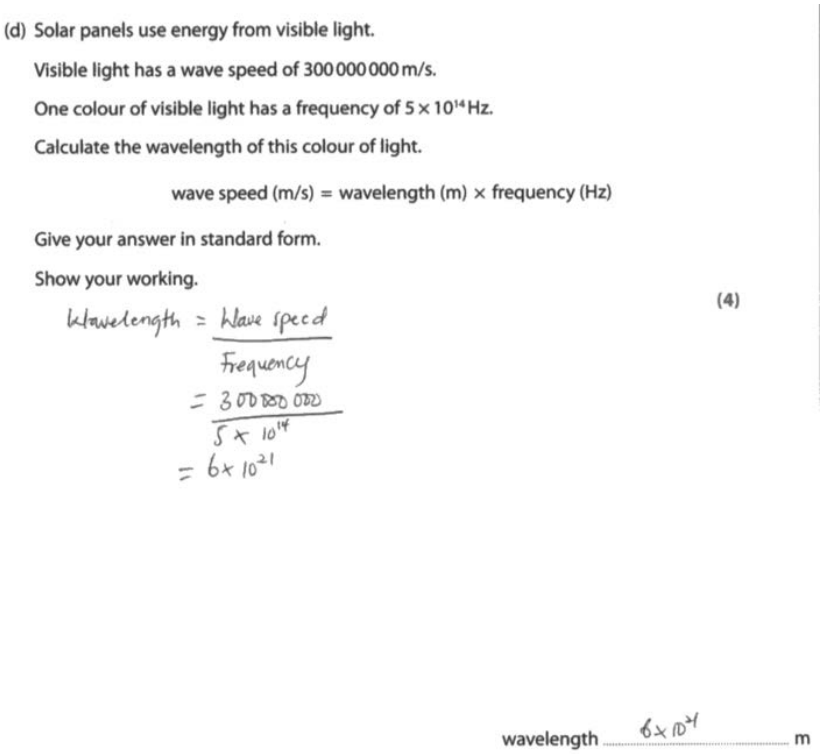
500 000 000 000 000 (4)

5×10^{14}

wavelength 6×10^{6} m

(Total for Question 3 = 8 marks)

A common, two mark, response was where learners had rearranged the equation correctly, substituted but were not able then to evaluate these numbers correctly.



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One colour of visible light has a frequency of 5×10^{14} Hz.

Calculate the wavelength of this colour of light.

wave speed (m/s) = wavelength (m) × frequency (Hz)

Give your answer in standard form.

Show your working.

(4)

$\text{wavelength} = \frac{\text{wave speed}}{\text{frequency}}$

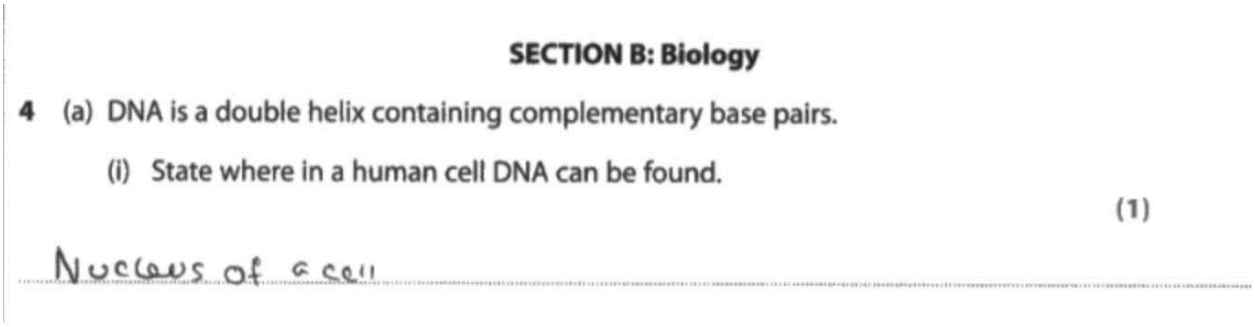
$= \frac{300\,000\,000}{5 \times 10^{14}}$

$= 6 \times 10^{21}$

wavelength 6×10^{21} m

Question 4

Learners answered the first question in the biology section well, with most being able to state that human DNA can be found in the nucleus of the cell.



SECTION B: Biology

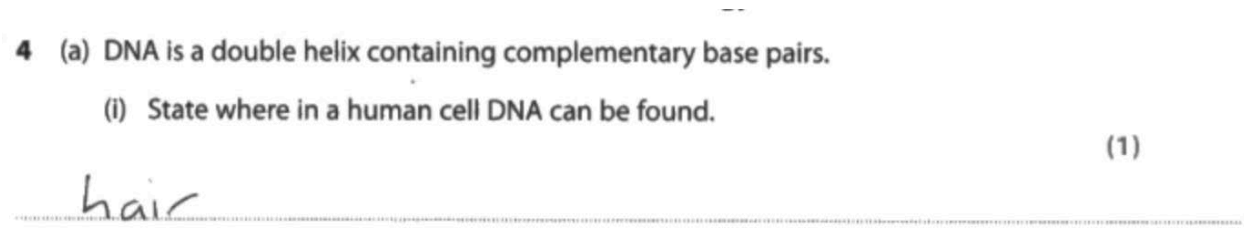
4 (a) DNA is a double helix containing complementary base pairs.

(i) State where in a human cell DNA can be found.

(1)

Nucleus of a cell

Learners that did not score, often did not read the question carefully and just stated where DNA could be found, rather than where in a cell it could be found. Therefore giving and answer of hair, saliva or cheek swab. This was not accepted.



4 (a) DNA is a double helix containing complementary base pairs.

(i) State where in a human cell DNA can be found.

(1)

hair

Part (b)(i) and (ii) of question 4 was also in the main, well answered. The majority of learners were able to complete the Punnett square correctly to gain both marks. These learners were then able to carry on and state the correct percentage chance that the offspring could inherit Huntington's disease as in the example. If learners got part (b)(i) incorrect, error carried forward was allowed for part (b)(ii)

(b) Huntington's disease is caused by a dominant allele, H.

The diagram shows an incomplete Punnett square for the inheritance of Huntington's disease.

		mother	
		H	h
father	h	Hh	hh
	h	Hh	hh

(i) Complete the Punnett square to show the genotypes of the offspring.

(2)

(ii) State the percentage chance that the offspring could inherit Huntington's disease.

(1)

50 %

Most were also able to state what is meant by the term homozygous.

(iii) The father is homozygous for the recessive allele.

State what is meant by the term **homozygous**.

(1)

Homozygous means that both of the allele's are the same

(Total for Question 4 = 6 marks)

Some learners thought that homozygous meant that a person was a carrier of a disease.

(iii) The father is homozygous for the recessive allele.

State what is meant by the term **homozygous**.

(1)

The Dad is a carrier of the recessive allele

(Total for Question 4 = 6 marks)

Question 5

In the second question of the biology section, learners found it quite hard to name the gas produced in photosynthesis as oxygen to gain the mark. Whilst the spelling here is not quite right, the meaning of the word is clear and the mark was awarded.

(b) Name the gas produced during photosynthesis.

(1)

Oxygen

Whilst it was clear learners knew the process, many seemed to confuse the reactants with the products of the process and give carbon dioxide as the answer.

(b) Name the gas produced during photosynthesis.

(1)

Carbon dioxide

Part (c)(i) was, in general, well answered with the majority understanding that as well as the uptake of water, roots also have the function of anchoring a plant or taking in minerals or nutrients for the plants.

(c) Water used in photosynthesis is taken up by the roots of a plant.

(i) State **one** other function of the roots of a plant.

(1)

Take in minerals and anthor the plant into the soil.

In some cases, learners did not read the question carefully and restated the stem, that the function of roots is to take up water. Learners should be taught to read the question carefully and not repeat the stem of the answer as this will gain no credit.

(c) Water used in photosynthesis is taken up by the roots of a plant.

(i) State **one** other function of the roots of a plant.

(1)

Absorbs water to help make a plant grow.

In part (c)(ii) many learners were able to show a good understanding of why the roots of most plants do not contain chlorophyll to gain the mark.

(ii) State why the roots of most plants do not contain chlorophyll.

(1)

Because roots are in the ground they don't get much sun light meaning they have no need as chlorophylls are used in photosynthesis.

Some learners just stated that the roots would not be exposed to the sunlight, which was sufficient to gain the mark.

(ii) State why the roots of most plants do not contain chlorophyll.

(1)

Because it wouldn't be exposed to sunlight

Learners found part (ii) more difficult. The more able learners however, were able to explain that water is transported by transpiration through the xylem.

(iii) Explain how water is transported from the root to the leaf of a plant.

(2)

The process is called transpiration the xylem can transport water and minerals to the rest of the plant

(Total for Question 5 = 6 marks)

In some cases, learners thought that the water was transported through the phloem. Whist this is incorrect the idea that the process is called transpiration still gained credit and this answer gained one mark overall.

(iii) Explain how water is transported from the root to the leaf of a plant.

(2)

The water is absorbed by the roots, and it then travels through the Phloem to the leaves. The Process is called Transpiration.

(Total for Question 5 = 6 marks)

Question 6

Question 6 was the first of the two six-mark questions, with a points based mark scheme.

In general learners performed well, with many gaining some credit and more able learners scoring the full six marks available, as in this example. The learner has given a concise and precise answer, using the correct scientific terms and covering six mark points and more.

Explain how hormones help to maintain blood glucose concentrations.

You should include in your answer what happens:

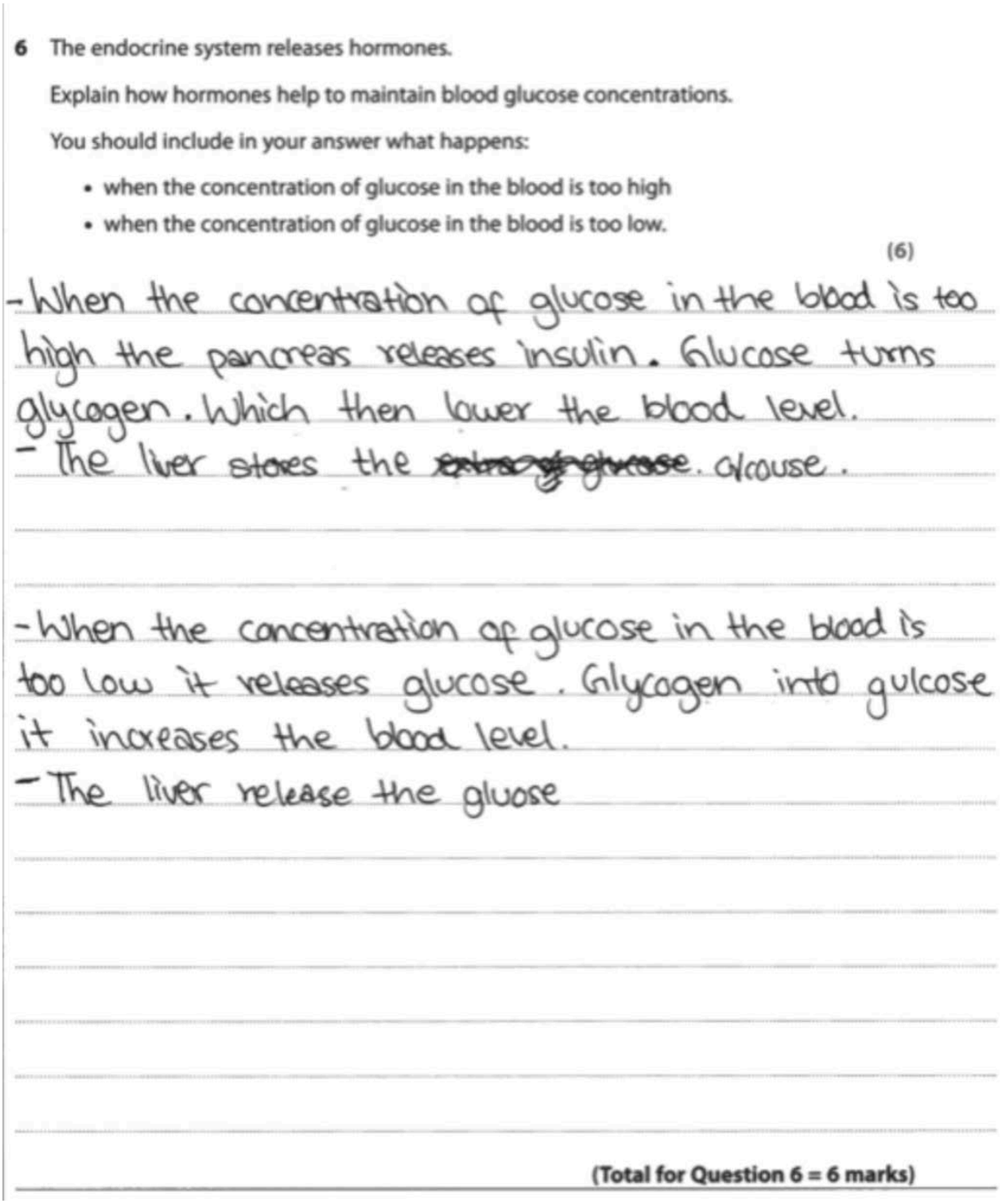
- when the concentration of glucose in the blood is too high
- when the concentration of glucose in the blood is too low.

(6)

When the glucose level in the body is too high, the pancreas gland called pancreas releases hormone called insulin, which turns the glucose into glycogen and stores it towards the liver. When the glucose level is too low, then the pancreas releases hormone called glucagon, which turns the glucose to glycagen into glucose again and releases it from the liver towards the blood stream. Normally, the glucose level gets too low from exercising, and it would get too high from lack of exercises.

(Total for Question 6 = 6 marks)

In this next example, the learner scores 4 marks. They state that when the concentration of glucose is too high, the pancreas releases insulin and that glucose turns into glycogen, this gains three marks. They state that the liver stores the glucose, this was not sufficient for the liver storing glycogen mark. They then state that when the concentration of glucose is too low 'it' releases glucose. They state that 'glycogen into glucose' this was considered just sufficient for the which turns glycogen into glucose mark. They state that the liver releases the glucose which is incorrect and gains no further credit and the four marks are awarded.



6 The endocrine system releases hormones.

Explain how hormones help to maintain blood glucose concentrations.

You should include in your answer what happens:

- when the concentration of glucose in the blood is too high
- when the concentration of glucose in the blood is too low.

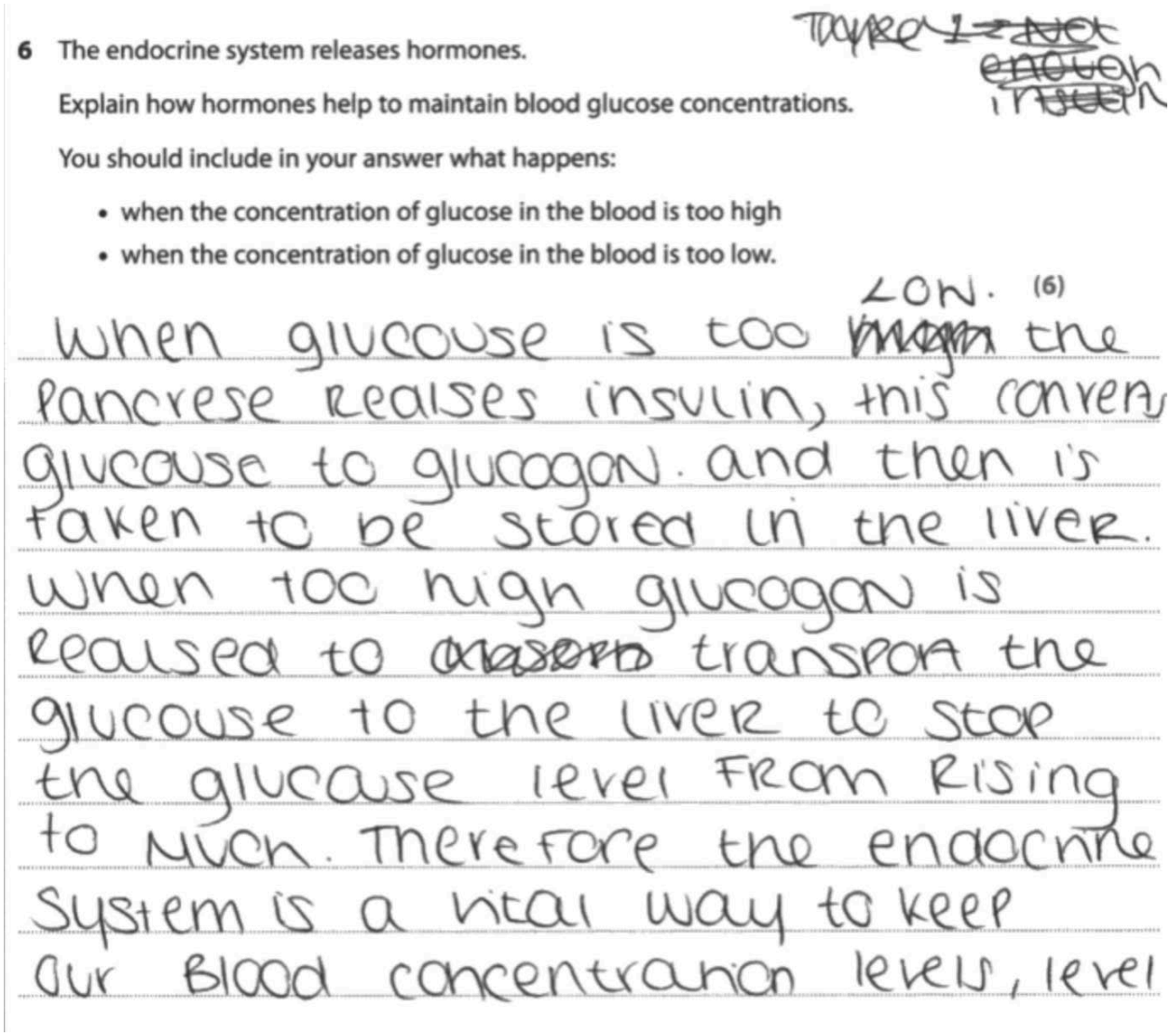
(6)

- When the concentration of glucose in the blood is too high the pancreas releases insulin. Glucose turns glycogen. Which then lower the blood level.
- The liver stores the ~~extra of glucose~~ glucose.

- When the concentration of glucose in the blood is too low it releases glucose. Glycogen into glucose it increases the blood level.
- The liver release the gluose

(Total for Question 6 = 6 marks)

In this example, the learner has made a few incorrect comments. As no other marks had been scored, a mark was allowed as an error carried forward for the idea that a hormone, insulin, has been released from the pancreas even though it is in the incorrect context.



6 The endocrine system releases hormones.

Explain how hormones help to maintain blood glucose concentrations.

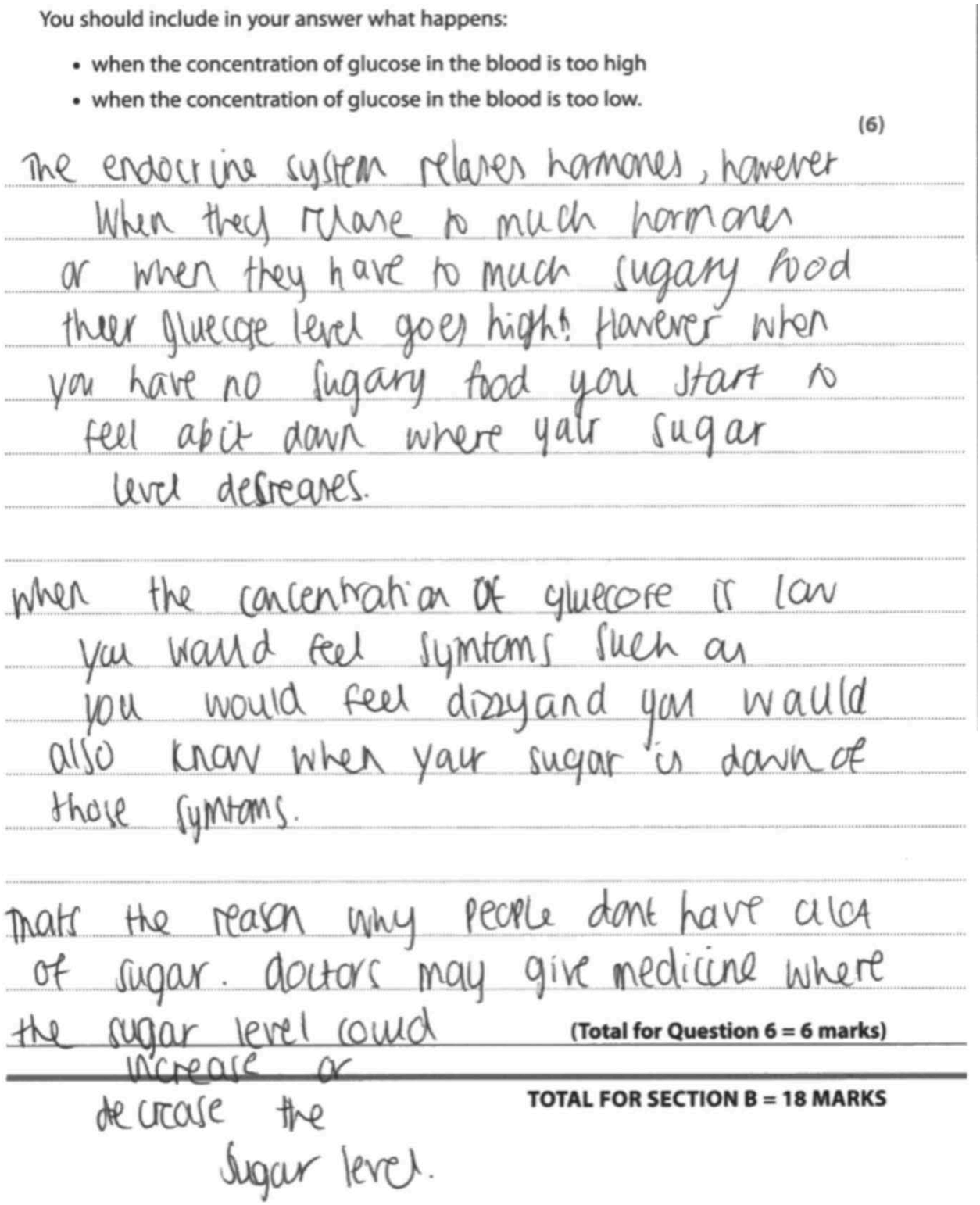
You should include in your answer what happens:

- when the concentration of glucose in the blood is too high
- when the concentration of glucose in the blood is too low.

LOW. (6)

When glucose is too ~~high~~ the pancrese realses insulin, this convers glucose to glucogon. and then is taken to be stored in the liver. when too high glucogon is reaused to ~~transport~~ transport the glucouse to the liver to stop the glucause level from Rising to much. Therefore the endocrine System is a vital way to keep our Blood concentration levels, level

Where learners scored no marks, it was often as they discussed the effects of diabetes and high and low blood sugar rather than explaining how the hormones maintain the blood glucose concentrations.



You should include in your answer what happens:

- when the concentration of glucose in the blood is too high
- when the concentration of glucose in the blood is too low.

(6)

The endocrine system relases hormones, however When they relase to much hormones or when they have to much sugary food theer gluecose level goes high! Haverer when you have no sugary food you start to feel abit dawn where yair sugar level desreases.

when the concentration of gluecose is law you wauld feel symtoms such as you would feel dizzy and yau wauld also knaw when yair sugar is dawn of those symtoms.

thats the reason why people dont have alot of sugar. doctors may give medicine where the sugar level could increase or decrease the sugar level.

(Total for Question 6 = 6 marks)

TOTAL FOR SECTION B = 18 MARKS

Question 7

In the first question of the chemistry section, question 7, learners generally performed well, with the majority scoring two or three marks. As in this fully correct answer.

7 Fluorine atoms contain the particles: electrons, neutrons and protons.

(a) Underline **one** answer in each box to show the correct position in the atom and the relative charge of each particle.

The position of the proton has been completed for you.

(3)

particle	position	relative charge
proton	nucleus / in shells	−1 / 0 / +1
neutron	nucleus / in shells	−1 / 0 / +1
electron	nucleus / in shells	−1 / 0 / +1

In some cases, learners lost out on marks as they only completed the position column of the table rather that the position and relative charge columns.

7 Fluorine atoms contain the particles: electrons, neutrons and protons.

(a) Underline **one** answer in each box to show the correct position in the atom and the relative charge of each particle.

The position of the proton has been completed for you.

(3)

particle	position	relative charge
proton	nucleus / in shells	−1 / 0 / +1
neutron	nucleus / in shells	−1 / 0 / +1
electron	nucleus / in shells	−1 / 0 / +1

Learners also performed well in part (b) with most understanding that the group number of fluorine is 7.

(b) An atom of fluorine has the electronic configuration 2.7.

State the group number of fluorine in the periodic table.

(1)

7

The most common incorrect answer seen was where learners confused the group and period and stated that fluorine was in group 2.

(b) An atom of fluorine has the electronic configuration 2.7.

State the group number of fluorine in the periodic table.

(1)

2

Question 8

In question 8. Many learners were able to state the correct colour of litmus when sulfuric acid is added to gain the mark.

8 A student has a sample of sulfuric acid.

(a) (i) The student adds a drop of the sulfuric acid onto a piece of litmus paper.

State the colour of the litmus paper after the acid has been added.

(1)

red

Where learners did not gain the mark, it was often as they confused acid and alkali and gave an answer of blue.

8 A student has a sample of sulfuric acid.

(a) (i) The student adds a drop of the sulfuric acid onto a piece of litmus paper.

State the colour of the litmus paper after the acid has been added.

(1)

blue

In part (b)(i) of question 8, learners found it hard complete the chemical equation for the reaction. With only the more able learners being able to score the full two marks available as in this example. Products were allowed in any order.

(i) Complete the chemical equation for the reaction. (2)

$Na_2CO_3 + H_2SO_4 \rightarrow Na_2SO_4 +$ H_2O $+$ CO_2

In some cases, learners knew some of the atoms involved, but were not able to write them using the correct scientific conventions and so did not gain the marks.

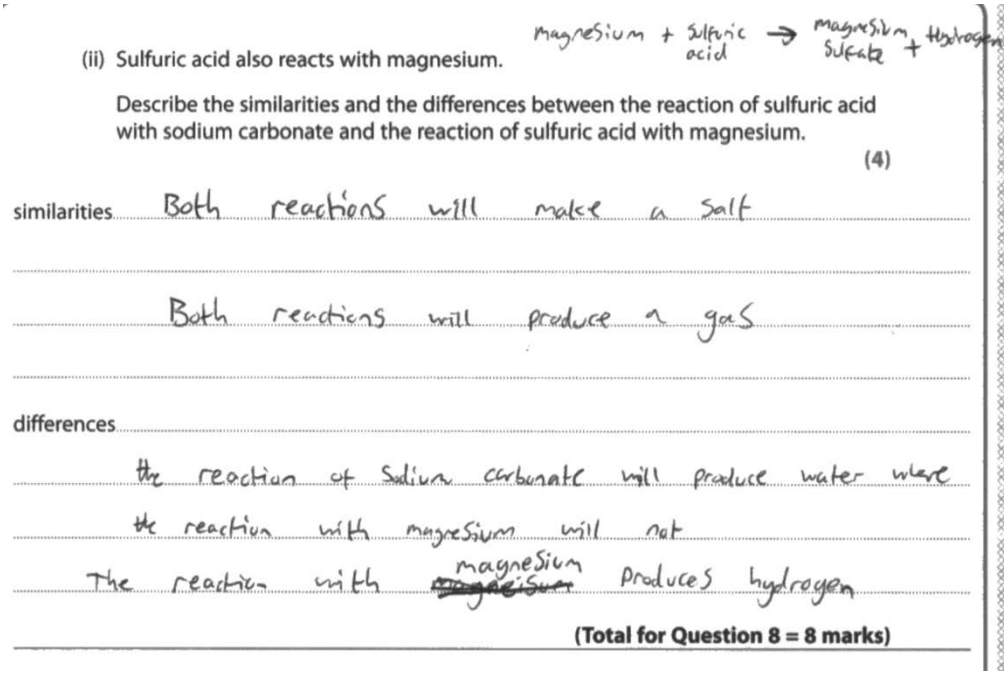
sodium carbonate + sulfuric acid → sodium sulfate + carbon dioxide + water

(i) Complete the chemical equation for the reaction. (2)

$Na_2CO_3 + H_2SO_4 \rightarrow Na_2SO_4 +$ CO^2 $+$ H^2O ~~H_2O~~

Learners found question 8(c)(ii) more difficult, but again it was pleasing to see that many learners were able to find at least one similarity or difference to gain a mark and a good proportion gained the full marks available.

In this first example, the learner states that both reactions will make a salt and that both reactions will produce a gas, these two similarities gain a mark each. They go on to state that the reaction of sodium carbonate will produce water and the reaction of magnesium will not produce water as a difference either one of these would have gained the mark alone. They describe a last difference being that the reaction of magnesium produces hydrogen. The answer scored the full four marks available.



magnesium + sulfuric acid → magnesium sulfate + hydrogen

(ii) Sulfuric acid also reacts with magnesium.

Describe the similarities and the differences between the reaction of sulfuric acid with sodium carbonate and the reaction of sulfuric acid with magnesium.

(4)

similarities Both reactions will make a salt

Both reactions will produce a gas

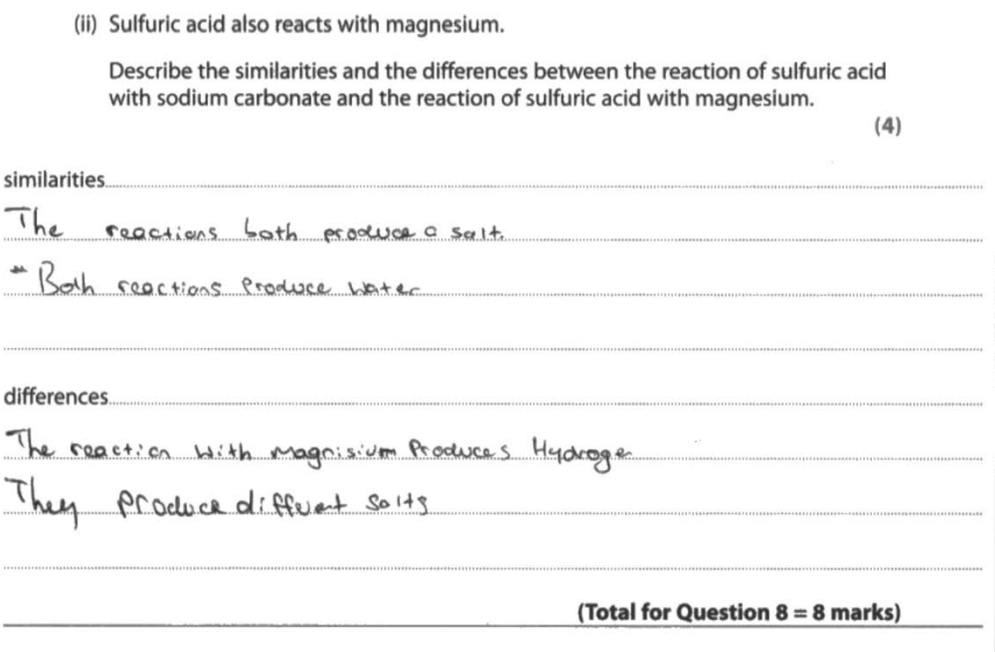
differences

the reaction of Sodium carbonate will produce water where the reaction with magnesium will not

The reaction with ~~magnesium~~ magnesium produces hydrogen

(Total for Question 8 = 8 marks)

In this example, the learner gained three marks. They state that both reactions produce a salt as a similarity which scores. They also state that both reactions produce water, this is incorrect and was ignored. However, they also state that the reaction with magnesium produces hydrogen and that different salts are produced for two differences.



(ii) Sulfuric acid also reacts with magnesium.

Describe the similarities and the differences between the reaction of sulfuric acid with sodium carbonate and the reaction of sulfuric acid with magnesium.

(4)

similarities

The reactions both produce a salt.

* Both reactions produce water

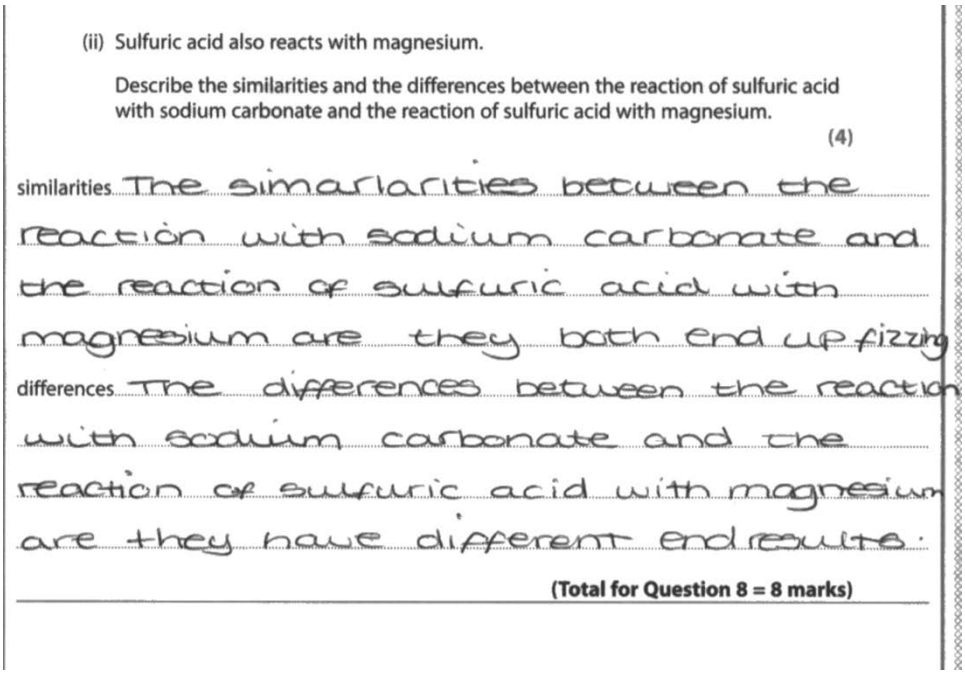
differences

The reaction with magnesium produces Hydrogen

They produce different salts

(Total for Question 8 = 8 marks)

Less able learners often scored just one mark, this was often for stating that the reaction 'bubbled', 'fizzed' or gave off a gas.



(ii) Sulfuric acid also reacts with magnesium.

Describe the similarities and the differences between the reaction of sulfuric acid with sodium carbonate and the reaction of sulfuric acid with magnesium.

(4)

similarities The simarlarities between the reaction with sodium carbonate and the reaction of sulfuric acid with magnesium are they both end up fizzing

differences The differences between the reaction with sodium carbonate and the reaction of sulfuric acid with magnesium are they have different end results.

(Total for Question 8 = 8 marks)

Question 9

The second of the two six markers, question 9, has a levelled based mark scheme. Again learners were able to score across the full mark range with less able learners scoring in level 1 and the more able learners scoring in the full six marks in level 3.

In this first example, the learner scores full marks in level 3. The learner has discussed how the relative atomic mass can be calculated. They have discussed the number of protons and neutrons in each of the atoms of the isotope.

2625 921

9 A sample of chlorine contains two naturally occurring isotopes, chlorine-35 and chlorine-37.

The table gives information about the sample.

isotope	atomic mass	atomic number	percentage of isotope present in the sample	relative atomic mass of the sample
chlorine-35	35	17	75	35.5
chlorine-37	37	17	25	

Discuss the data in the table.

(6)

~~The relative atomic mass for chlorine is 35.5 because~~ The relative atomic mass for the chlorine sample is 35.5 because you need to times the 2 atomic mass numbers of the isotopes by the percentage, add the answers together and then divide by 100 to get 35.5 as the relative atomic mass. The amount of protons ~~are~~ in each isotope are the same which is 17 however the neutrons in each isotope are ~~the~~ different. The isotope, Chlorine-35 has 18 neutrons because the atomic mass ~~which is 35~~ minus the atomic number gets you the number of neutrons in that isotope. The isotope, Chlorine-37 has 20 neutrons because the atomic mass which is ~~37-1~~ 37 minus the atomic number which is 17 gets you 20 neutrons.

(Total for Question 9 = 6 marks)

In this example, the learner has given a good discussion of why the relative atomic mass is 35.5, however there is no discussion of the atomic mass and atomic number of each atom. Therefore, a mark four in level 2 was awarded.

9 A sample of chlorine contains two naturally occurring isotopes, chlorine-35 and chlorine-37.

The table gives information about the sample.

isotope	atomic mass	atomic number	percentage of isotope present in the sample	relative atomic mass of the sample
chlorine-35	35	17	75	35.5
chlorine-37	37	17	25	

Discuss the data in the table.

(6)

Relative atomic mass is the average mass number of an elements isotopes, we know this as the RAM of chlorine is 35.5 and you can't get 0.5 neutrons. We work out RAM by getting the isotopes and the mass number of them, then you need to know the percentage of those isotopes in the sample. In this case it's 75% chlorine 35 and 25% chlorine-37. All we need is the mass number and the percentage in the sample of the ~~isotoped~~ isotopes to work out the RAM. We do this by: $\frac{(35 \times 75) + (37 \times 25)}{100}$

You times the isotopes atomic mass by its percentage, so it was chlorine-35 35x75 and chlorine-37 37x25, You add them then divide by 100 to get the average answer

(Total for Question 9 = 6 marks)

In this example. The leaner has given some generic information about isotopes which was sufficient for full credit at level 1 – 2 marks.

9 A sample of chlorine contains two naturally occurring isotopes, chlorine-35 and chlorine-37.

The table gives information about the sample.

isotope	atomic mass	atomic number	percentage of isotope present in the sample	relative atomic mass of the sample
chlorine-35	35	17	75	35.5
chlorine-37	37	17	25	

Discuss the data in the table.

(6)

& Chlorine - 35, 37 are isotopes and isotopes is the same atomic number (protons + electron) but has different number of neutrons. And chlorine - 35 / 37 both has same relative atomic mass of the sample. but they have different set of percentage of isotope ~~piessen~~ present in the sample. This might links the percentage of being in the earth were found out about it isotopes.

In some cases, learners were able to interpret the information from the table and give basic comparisons, but were not able to bring any further knowledge to their answer and so gained just 1 mark in level 1, as in this example. Learners that simply copied the information from the table with no interpretation and no comparisons gained no marks.

9 A sample of chlorine contains two naturally occurring isotopes, chlorine-35 and chlorine-37.

The table gives information about the sample.

isotope	atomic mass	atomic number	percentage of isotope present in the sample	relative atomic mass of the sample
chlorine-35	35	17	75	35.5
chlorine-37	37	17	25	

Discuss the data in the table.

(6)

Chlorine is an isotope because it has difference mass numbers but same atomic number.

The ~~total~~ percentage of isotope present in Chlorine-35 is 75 and chlorine-37 is 25 which means both has different percentages

Both chlorine isotopes have the same relative atomic mass

(Total for Question 9 = 6 marks)

TOTAL FOR SECTION C = 18 MARKS

Summary

As in previous series, exam technique is still an issue for the less able learners. Copying the stem of the questions and answering a question that the learner thinks that is posed rather than the question that is posed is an ongoing problem. Learners should be taught that explain questions will require a point to be made along with a linked expansion on that point to gain all the marks available and that no marks will be awarded for copying information from the stem of the question.