Examiners' Report/
Lead Examiner Feedback

March 2016

NQF BTEC Level 1/Level 2 Firsts in Applied Science

Unit 1: Principles of Science (20460E)

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Grade Boundaries

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General comments

Learners who did well this series, did so because they had learnt key terms and used good scientific language. They were able understand what was being asked for in the question and therefore apply their knowledge of the science well.

As in previous series, exam technique is still an issue for learners; Centres need to fully prepare learners for the exam by practising exam technique, especially in relation to reading the question carefully.

Key terms from the specification should be taught so that learners are able to fully access the question. Terms such as 'property' in question six, seemed to confuse learners and meant that they lost marks as they focused on uses rather than properties. Learners must be taught to use the information in the stem and apply it rather than simply copying parts of them stem of the question.

Learners should also be taught that when they have answered the question, they should be checking that the question set has been addressed in the answer they have given and that they have used appropriate scientific knowledge and vocabulary.

Again, it was found that learners seemed to be able to complete some sections of the paper better than others. For example, they may have gained a large proportion of marks in the physics section but then lost marks on simple questions in the chemistry/biology or vice versa. This appeared to be Centre specific.

Feedback on specific questions

Q1(a)

The majority of learners were able to show an understanding that one function of the root of the plant is to absorb water or nutrients/minerals from the soil, better learners could also recall that another function of the root is to anchor the plant into the ground.

Unfortunately, some learners referred to the root providing nutrients or water to the plant which is incorrect and therefore could not gain credit.

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then put a cross in another box ☒.

SECTION A: Biology

1 Roots and leaves are plant organs.

(a) State **two** functions of the root of a plant.

(2)

Function 1 To take in water from the soil for the plant

Function 2 It is serve as an anchorage to prevent the tree from falling over

Q1(b)

Learners found Q1(b) more difficult, with few learners being able to show an understanding of how leaves are adapted so that they can absorb light for photosynthesis.

Where learners scored a mark, it was generally for stating that the leaf contained chloroplasts or that they had a large surface area.

(b) One function of leaves is to absorb light for photosynthesis.

State how leaves are adapted for this function.

(1)

They have chloroplast ~~Photo~~ in them that is used for photosynthesis

(b) One function of leaves is to absorb light for photosynthesis.

State how leaves are adapted for this function.

(1)

They have a large surface area

However, the majority of learners as in this example, read the question incorrectly and simply restated the question and therefore scored no marks.

(b) One function of leaves is to absorb light for photosynthesis.

State how leaves are adapted for this function.

(1)

Photosynthesis is when the plant/leaves exsorbethesun light

Q1(c)

Learners found Q1(c) very difficult, only the very best learners were able to state what is meant by the term transpiration.

(c) Transpiration is a process that occurs in plants.

State what is meant by the term transpiration.

(1)

Transpiration is the process where by plant loses water through the leaves when the guard cells open.

(Total for Question 1 = 4 marks)

A common misconception seen was that transipiration 'is when plants breathe'.

(c) Transpiration is a process that occurs in plants.

State what is meant by the term transpiration.

(1)

transpiration is when plants breathe

(Total for Question 1 = 4 marks)

Q2(a)

Q2(a) focused on cells. Many learners were able to show an understanding that the function of the nucleus is to control the activity of the cell.

(ii) State the function of the nucleus.

(1)

controls the activity of cells

In many cases learners stated that the nucleus is the brain of the cell, which was rejected.

(ii) State the function of the nucleus.

(1)

The nucleus is like the brain of the cell and contains its DNA keeps it safe.

In Q2(a)(iii), many learners were able to recall that the base that pairs with guanine is cytosine.

(iii) The nucleus of a cell contains DNA.

The DNA contains a sequence of base pairs.

Adenine (A) pairs with the base thymine (T).

Name the base that pairs with **guanine (G)**.

(1)

Cytosine (C)

In some cases the learner did not gain the mark as they repeated the stem of the question.

(iii) The nucleus of a cell contains DNA.

The DNA contains a sequence of base pairs.

Adenine (A) pairs with the base thymine (T).

Name the base that pairs with **guanine (G)**.

(1)

Thymine pairs with the base guanine

Q2(b)

This question focused on cystic fibrosis. The majority of learners were able to complete the Punnett sqaure in Q2(b)(i) to show the geneotypes of the parents.

(b) Cystic fibrosis is a disease caused by abnormal alleles of a gene.

The Punnett square in the diagram shows how alleles are passed from parents to offspring.

The normal allele is dominant and can be shown as F.

The allele for cystic fibrosis is recessive and can be shown as f.

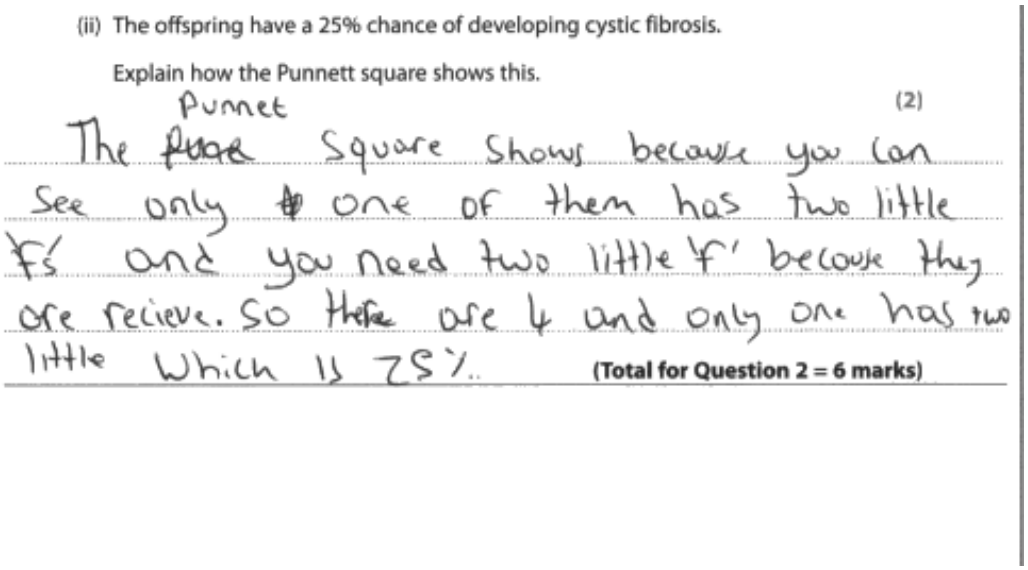
(i) Complete the Punnett square to show the genotypes of the parents.

(1)

		male: F	male: f
female	F	FF	Ff
	f	Ff	ff

However, Q2(b)(ii) proved more challenging for learners with very few showing an understanding of why the offspring would have a 25% of developing cystic fibrosis. When learners scored a mark, it was generally for showing an undestanding that one out of the four boxes in the Punnett square contained the two recessive alleles. Often however they were not able to continue this further to state that it is necessary to have two recessive alleles for the cystic fibrosis to develop or the reverse of this, to state that if a dominant gene was present that cystic fibrosis would not develop.

This is a good example that scored both mark points.



(ii) The offspring have a 25% chance of developing cystic fibrosis.

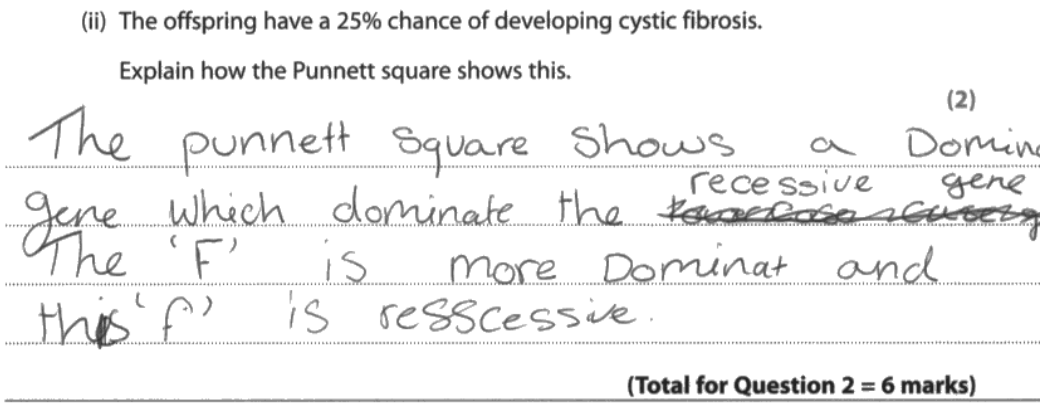
Explain how the Punnett square shows this.

(2)

The Punnet Square shows because you can See only ~~#~~ one of them has two little f's and you need two little 'f' because they are recieve. So there are 4 and only one has two little which is 25%.

(Total for Question 2 = 6 marks)

In this case, the learner scored no marks as they just repeated information from the stem.



(ii) The offspring have a 25% chance of developing cystic fibrosis.

Explain how the Punnett square shows this.

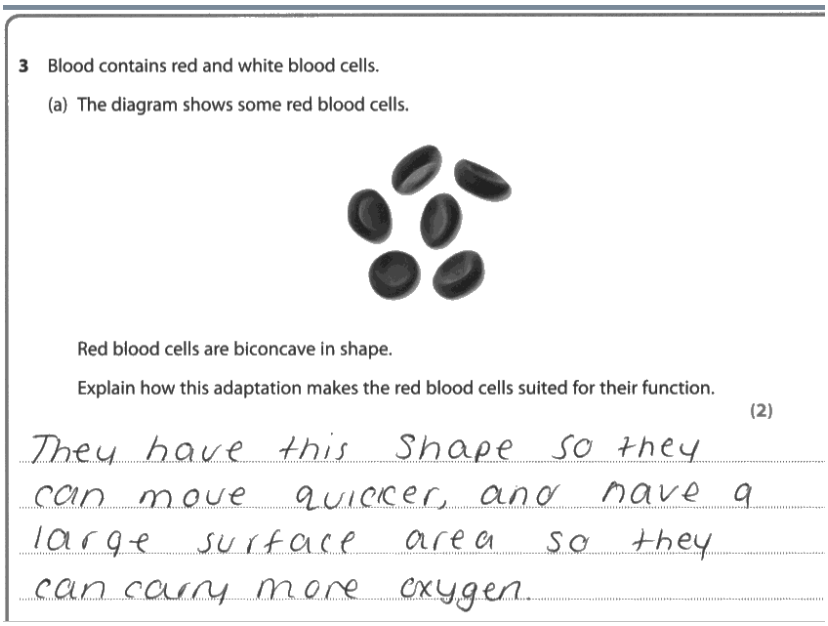
(2)

The punnett square shows a Domin gene which dominate the recessive gene ~~[illegible]~~ The 'F' is more Dominat and this 'f' is resscessive.

(Total for Question 2 = 6 marks)

Q3(a)

In Q3(a) learners were asked about the adaptation of red blood cells. The best learners read the question carefully and gained full marks for explaining that the larger surface area gained by the biconcave shape enabled the red blood cell to carry more oxygen.



3 Blood contains red and white blood cells.

(a) The diagram shows some red blood cells.

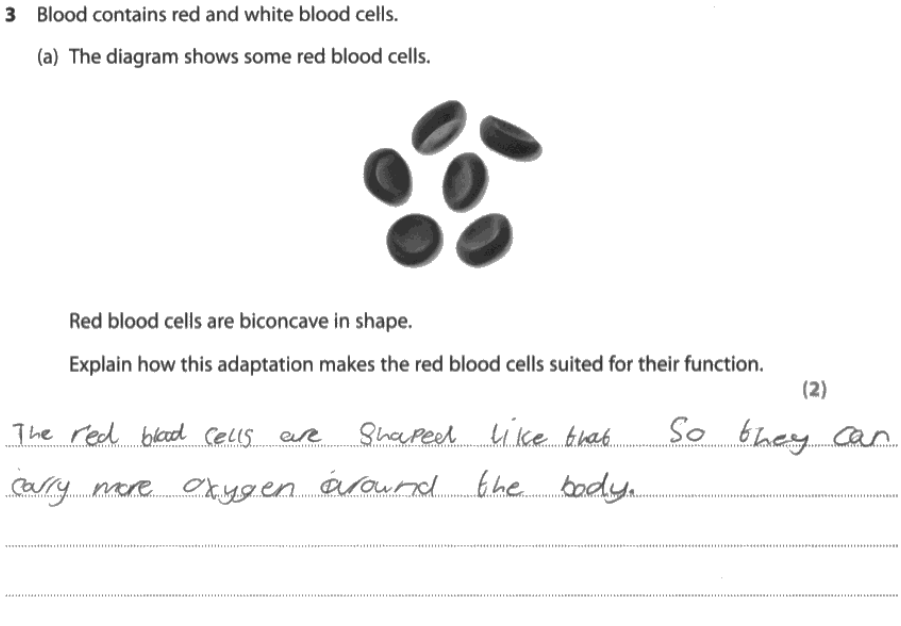
Red blood cells are biconcave in shape.

Explain how this adaptation makes the red blood cells suited for their function.

(2)

They have this shape so they can move quicker, and have a large surface area so they can carry more oxygen.

In the majority of cases, learners gave the function of the red blood cell (that it carried oxygen) but did not link this to the question as to why the adaptation of the biconcave shape made it suitable for the function. In other cases, learners lost marks as they gave other adaptations such as a lack of nucleus, which, whilst true, did not answer the question and therefore could not gain credit.



3 Blood contains red and white blood cells.

(a) The diagram shows some red blood cells.

Red blood cells are biconcave in shape.

Explain how this adaptation makes the red blood cells suited for their function.

(2)

The red blood cells are shaped like that so they can carry more oxygen around the body.

Q3(b)

Many learners were able to show an understanding of the function of white blood cells. However, many were not able to explain one adaptation of the white blood cell which made it possible for the blood cell to serve this function.

In this case, the learner has understood that white blood cells can change shape easily which makes them able to squeeze through blood vessels which was worthy of two marks.

(b) Explain **one** way in which white blood cells are adapted for their function.

(2)

White blood cells protects the body from infections. They can change shape easily which allows them to squeeze through the walls of blood vessels to get to any infected tissues.

Whilst some learners showed that they did have some understanding, they were let down as they did not use specific scientific terms in their answer and therefore could not gain credit.

(b) Explain **one** way in which white blood cells are adapted for their function.

(2)

White blood cells have an irregular shape and can take any shape while trying to counteract bad cells.

A common misconception seen was that white blood cells stopped bacteria entering the body.

(b) Explain **one** way in which white blood cells are adapted for their function.

(2)

They stop any diseases entering the body so they eat the bad cells

Q3(c)

The most common mark scored in Q3(c) was for showing an understanding that insulin lowered blood glucose levels.

In this example, the learner has scored three out of the four available marks. They have shown a good understanding of how insulin regulates blood glucose levels by storing the glucose as glycogen in the liver. There is also some understanding as to how blood glucose levels can be raised, however as they have not correctly spelt the term glucagon, and could be confusing this with glycogen, this mark could not be awarded. The learner was given credit for understanding that glycogen is converted back into glucose.

(c) Blood glucose concentration in the body is regulated by hormones in the endocrine system.

Explain **two** ways in which this system maintains a constant blood glucose concentration.

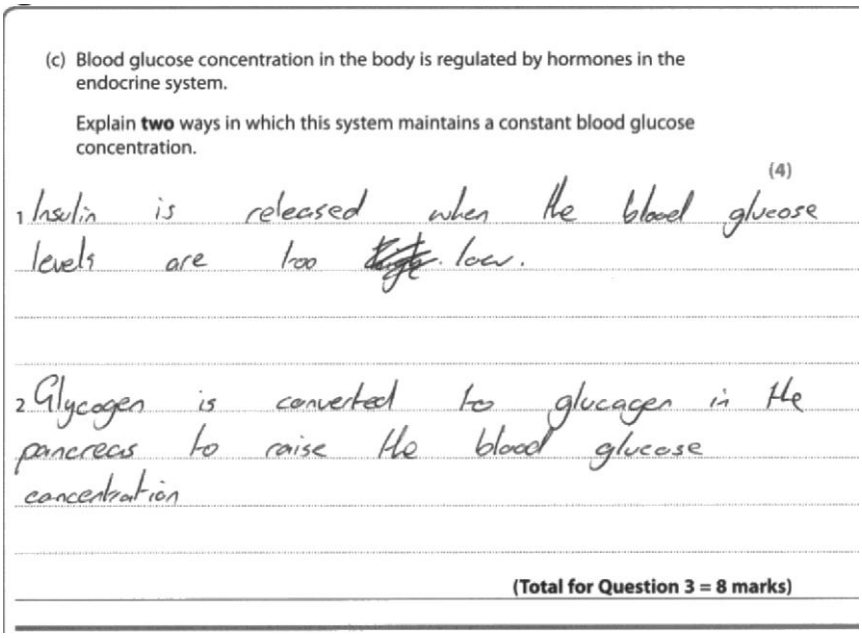
(4)

1 Insulin can be released decreasing the concetration of glucose in the blood by ~~St~~ the body storing it in the liver as glycogen

2 glucogen can be released to increase the concetration of glucose in the blood by it changes the glycogen back into energy (glucose)

(Total for Question 3 = 8 marks)

In many cases learners lost this mark as they were under the impression that insulin increased blood sugar levels.



(c) Blood glucose concentration in the body is regulated by hormones in the endocrine system.

Explain **two** ways in which this system maintains a constant blood glucose concentration.

(4)

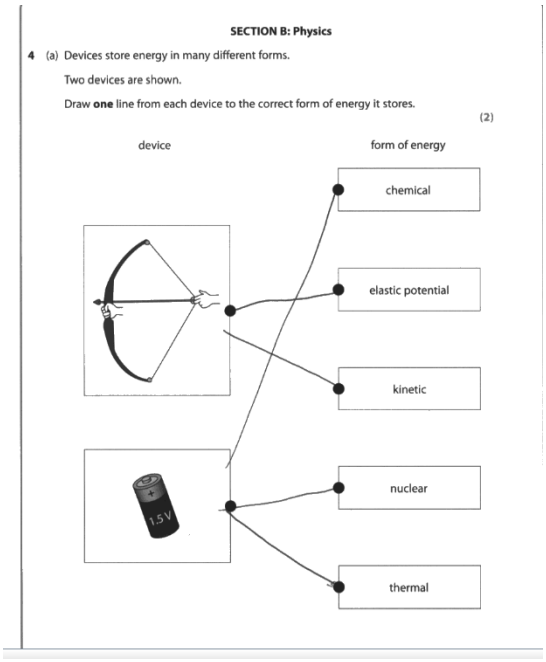
1 Insulin is released when the blood glucose levels are too ~~high~~ low.

2 Glycogen is converted to glucagen in the pancreas to raise the blood glucose concentration

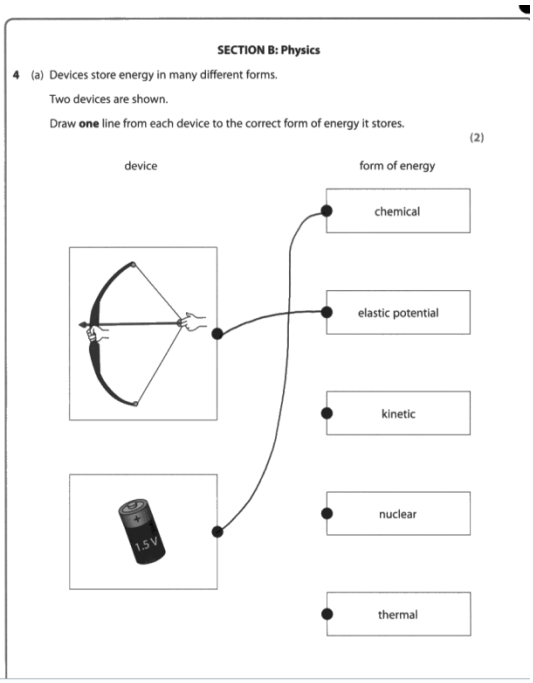
(Total for Question 3 = 8 marks)

Q4(a)

In Q4(a), it was pleasing to see that whilst some are still losing marks for drawing more than one line from each box, in the main it appeared that learners had been practising past papers and fewer learners are losing marks for this reason.

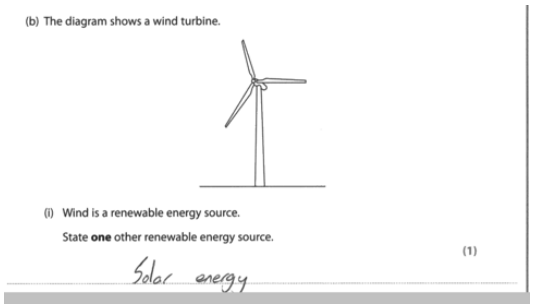


In general learners performed well in this question with many understanding that the bow stores elastic potential energy and the battery stores chemical energy.



Q4(b)(i)

Learners performed well in this question, with the majority being able to state a renewable energy source other than wind. Solar energy seemed to be one of the most popular correct responses.


(b) The diagram shows a wind turbine.

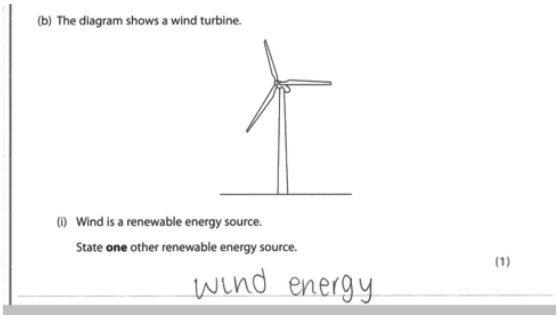
(i) Wind is a renewable energy source.

State **one** other renewable energy source.

(1)

Solar energy

In some cases, learners did not read the question carefully and gave wind as a renewable energy source. Whilst this is correct, as this was the example given in the question credit could not be awarded.


(b) The diagram shows a wind turbine.

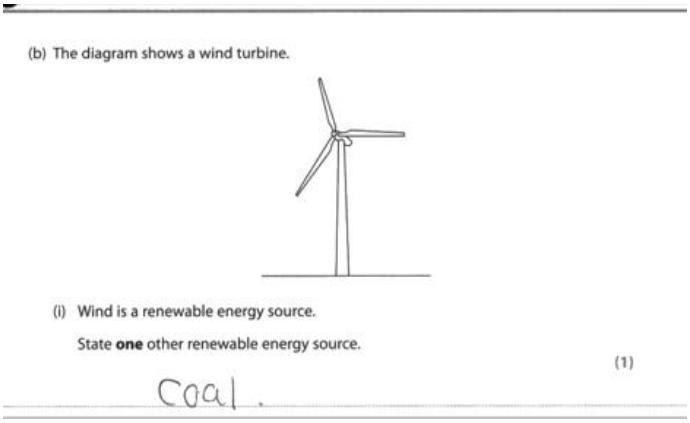
(i) Wind is a renewable energy source.

State **one** other renewable energy source.

(1)

wind energy

In other cases, students seemed to be confused between renewable and non-renewable energy sources and gave non-renewable examples.


(b) The diagram shows a wind turbine.

(i) Wind is a renewable energy source.

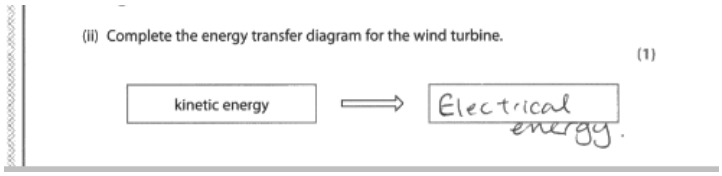
State **one** other renewable energy source.

(1)

Coal.

Q4(b)(ii)

Learners performed well in Q4(b)(ii) and most were able to complete the energy transfer diagram correctly.

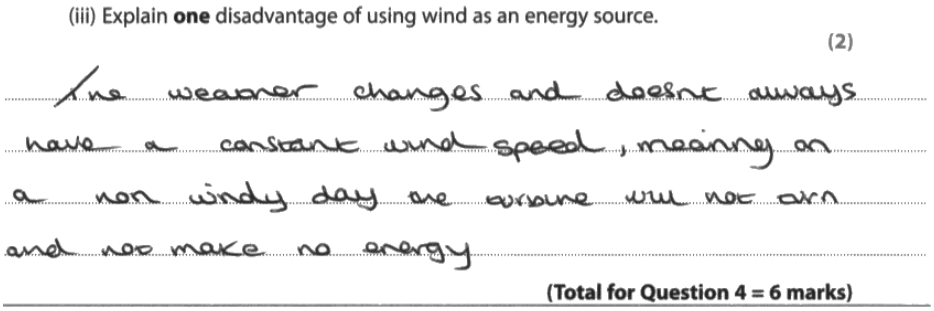

(ii) Complete the energy transfer diagram for the wind turbine.

(1)

kinetic energy ⟹ Electrical energy.

Q4(b)(iii)

Question 4(b)(iii) was also well answered by learners. Most were able to score at least one mark for showing an understanding that for wind turbines to work, it must be windy. Fewer learners however were then able to then take this further to explain that this would mean that there would be no energy.

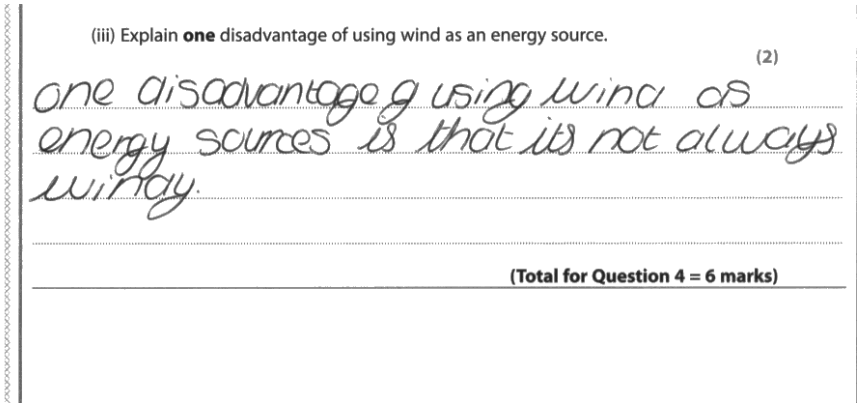

(iii) Explain **one** disadvantage of using wind as an energy source.

(2)

The weather changes and doesn't always have a constant wind speed, meaning on a non windy day the turbine will not turn and not make no energy

(Total for Question 4 = 6 marks)

The following example scored just one mark.


(iii) Explain **one** disadvantage of using wind as an energy source.

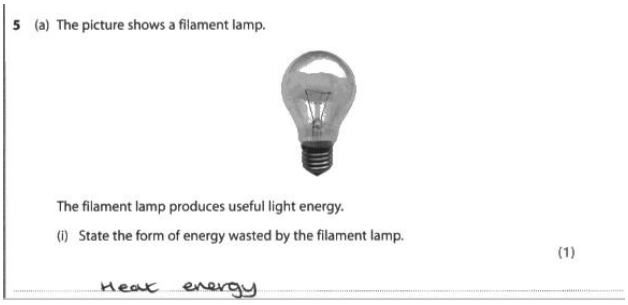
(2)

one disadvantage of using wind as energy sources is that its not always windy.

(Total for Question 4 = 6 marks)

Q5(a)

Question 5(a) was generally answered well by the majority of learners. Most were able to gain one mark for understanding that heat energy is wasted by a light bulb. Some learners stated that electrical energy was wasted, which was not acceptable.



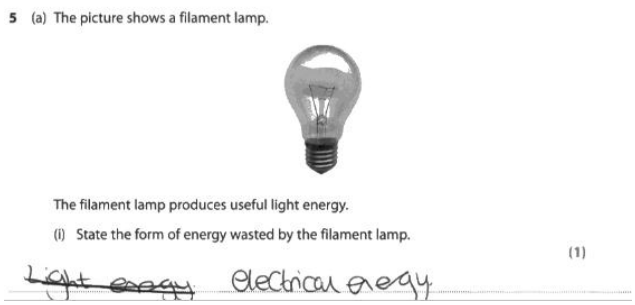
5 (a) The picture shows a filament lamp.

The filament lamp produces useful light energy.

(i) State the form of energy wasted by the filament lamp.

(1)

Heat energy



5 (a) The picture shows a filament lamp.

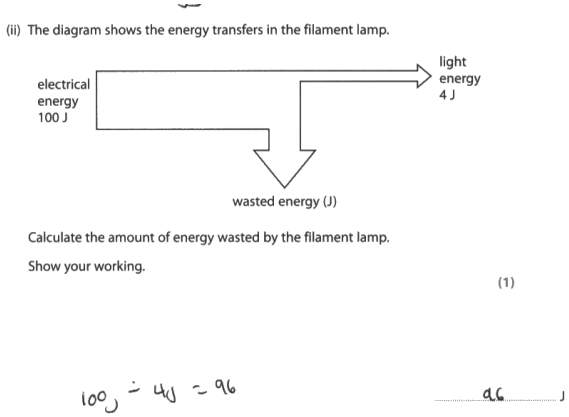
The filament lamp produces useful light energy.

(i) State the form of energy wasted by the filament lamp.

(1)

~~Light energy~~ Electrical energy

Many learners were able to calculate the energy wasted by the light bulb, using the energy transfer diagram. However, a significant number of learners were not clear as to how to calculate the wasted energy and divided the electrical input by the amount of useful energy light energy produced, to come to an answer of 25.



(ii) The diagram shows the energy transfers in the filament lamp.

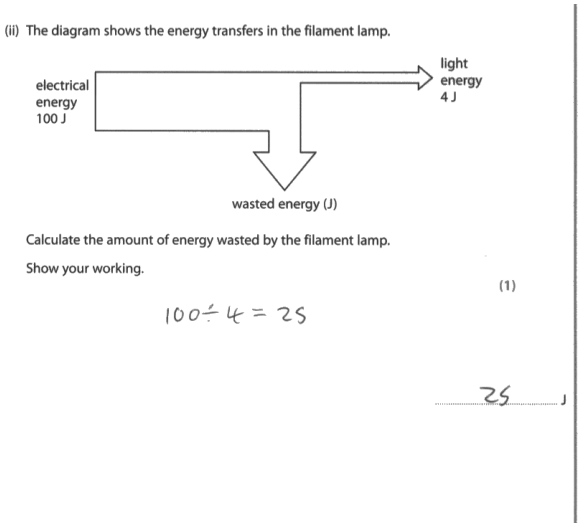
Calculate the amount of energy wasted by the filament lamp.

Show your working.

(1)

100 J ÷ 4J = 96

96 J



(ii) The diagram shows the energy transfers in the filament lamp.

Calculate the amount of energy wasted by the filament lamp.

Show your working.

(1)

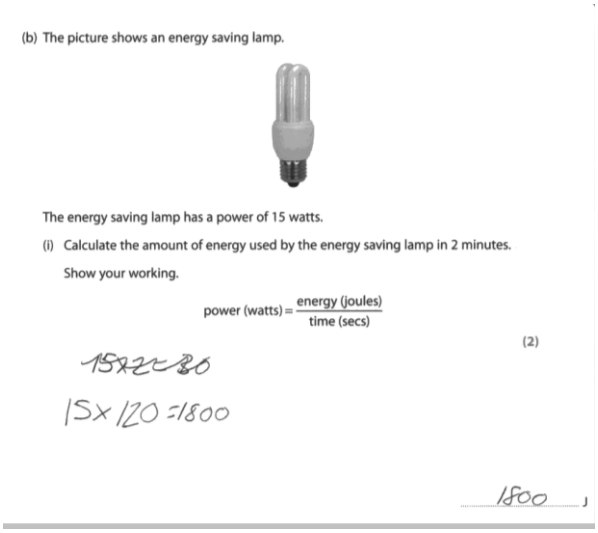
100 ÷ 4 = 25

25 J

Q5(b)

Q5(b) was not answered as well as Q5(a).

Q5(b)(i) was generally answered better than Q5(b)(ii). Most learners were able to rearrange the equation and so knew to multiply the power by the time. Out of these, only the better learners also remembered to convert the time into seconds when substituting into the equation and so therefore gave an answer of 30, which gained one mark, instead of 1800 which gained two marks.



(b) The picture shows an energy saving lamp.

The energy saving lamp has a power of 15 watts.

(i) Calculate the amount of energy used by the energy saving lamp in 2 minutes.

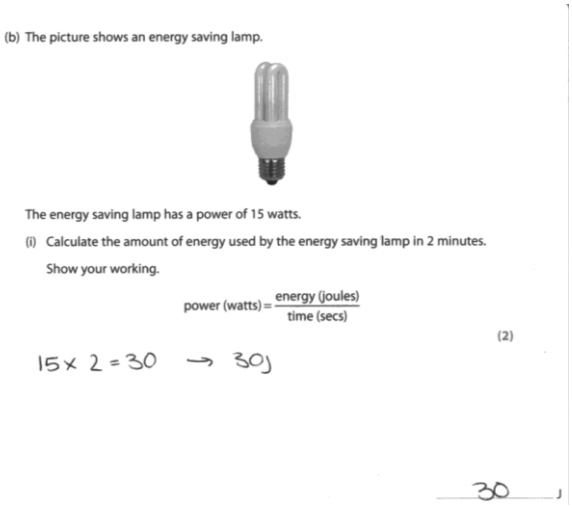
Show your working.

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

(2)

15x120 =1800

1800 J



(b) The picture shows an energy saving lamp.

The energy saving lamp has a power of 15 watts.

(i) Calculate the amount of energy used by the energy saving lamp in 2 minutes.

Show your working.

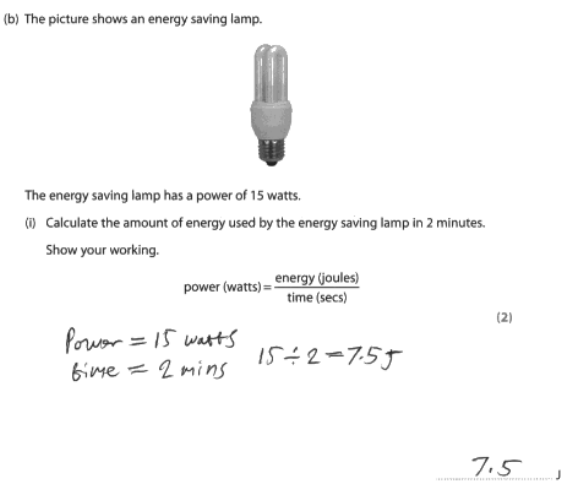
$$\text{power (watts)} = \frac{\text{energy (joules)}}{\text{time (secs)}}$$

(2)

15 x 2 = 30 → 30J

30 J

A common mistake by learners in this question was to substitute into the equation without rearranging it or converting the minutes into seconds, so scored no marks.



(b) The picture shows an energy saving lamp.

The energy saving lamp has a power of 15 watts.

(i) Calculate the amount of energy used by the energy saving lamp in 2 minutes.

Show your working.

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

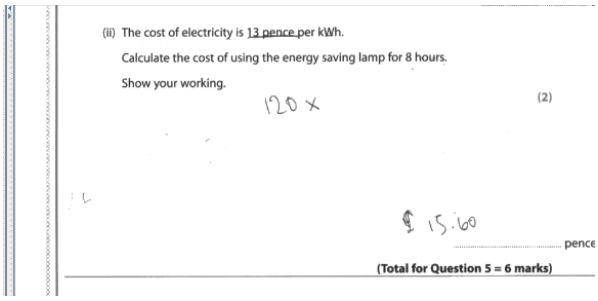
(2)

Power = 15 watts
time = 2 mins

15 ÷ 2 = 7.5J

7.5 J

Only the very best learners were able to score in Q5(b)(ii). A small number of learners understood that they needed to use the power and multiply it by the time and pence per hour given. However this was quite rare. Where learners include the power, they often confused the units.



(ii) The cost of electricity is 13 pence per kWh.

Calculate the cost of using the energy saving lamp for 8 hours.

Show your working.

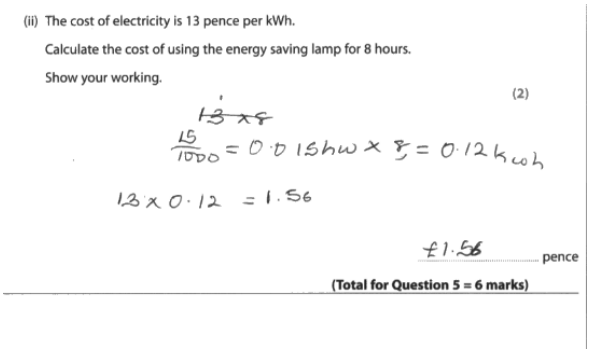
120 x

(2)

£ 15.60

pence

(Total for Question 5 = 6 marks)



(ii) The cost of electricity is 13 pence per kWh.

Calculate the cost of using the energy saving lamp for 8 hours.

Show your working.

(2)

~~13 x 8~~

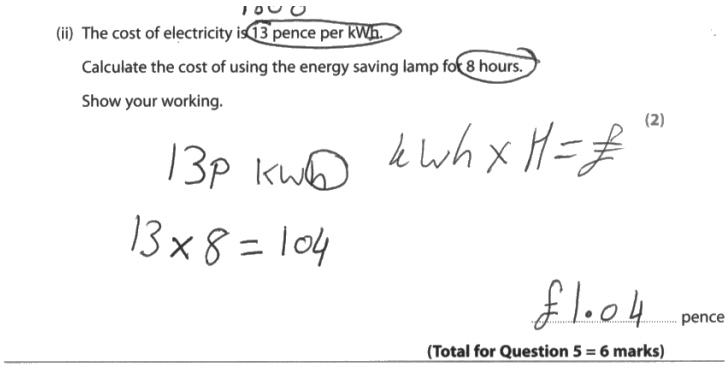
$\frac{15}{1000} = 0.015kw \times 8 = 0.12 kwh$

$13 \times 0.12 = 1.56$

~~£1.56~~ pence

(Total for Question 5 = 6 marks)

The majority of learners did not use the whole stem of the question and simply multipled the two numbers given to get an answer of 104.



(ii) The cost of electricity is 13 pence per kWh.

Calculate the cost of using the energy saving lamp for 8 hours.

Show your working.

(2)

13p kWh kwh x H = £

13 x 8 = 104

£1.04 pence

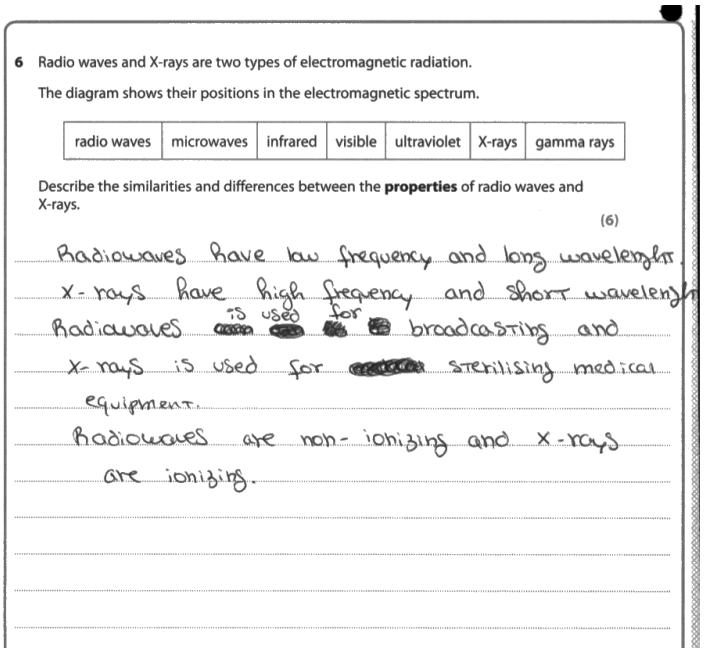
(Total for Question 5 = 6 marks)

Q6

Learners who did well in Q6 had read the question carefully and gave similarities and differences between radio waves and gamma rays. Learners found it harder to give similarities between the two types of waves than they did to give difficulties. Unfortunately, many learners misunderstood what was meant by the term properties and gave answers relating to the uses of the two waves.

The following example shows a learner who understood that radio waves have a low frequency and X-rays have a high frequency but radio waves have a longer wavelength, they also consider the ionizing nature of both waves.

The learner has also included some correct uses. Although correct, the uses were ignored as the question asked about properties not the uses. This learner scored three marks.



6 Radio waves and X-rays are two types of electromagnetic radiation.

The diagram shows their positions in the electromagnetic spectrum.

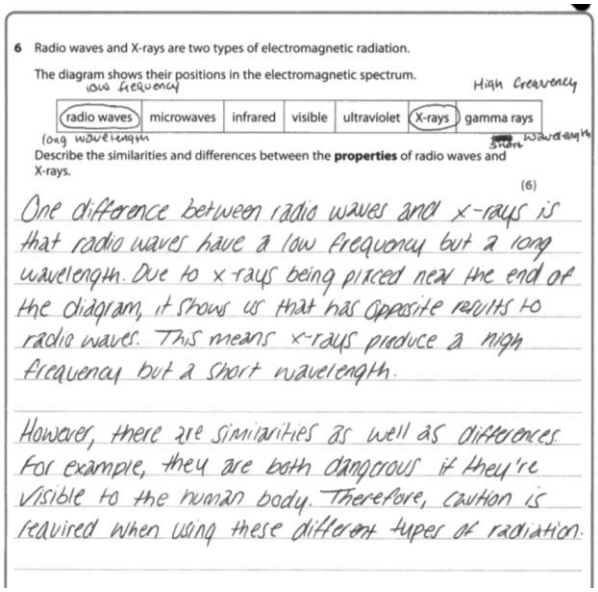
radio waves	microwaves	infrared	visible	ultraviolet	X-rays	gamma rays

Describe the similarities and differences between the **properties** of radio waves and X-rays.

(6)

Radiowaves have low frequency and long wavelength.
X-rays have high frequency and short wavelength.
Radiowaves is used for broadcasting and
X-rays is used for sterilising medical
equipment.
Radiowaves are non-ionizing and X-rays
are ionizing.

In this case, the learner scored two marks as they correctly compared both the frequency and the wavelength.



6 Radio waves and X-rays are two types of electromagnetic radiation.

The diagram shows their positions in the electromagnetic spectrum.

low frequency — High frequency

radio waves	microwaves	infrared	visible	ultraviolet	X-rays	gamma rays

long wavelength — short — wavelength

Describe the similarities and differences between the **properties** of radio waves and X-rays.

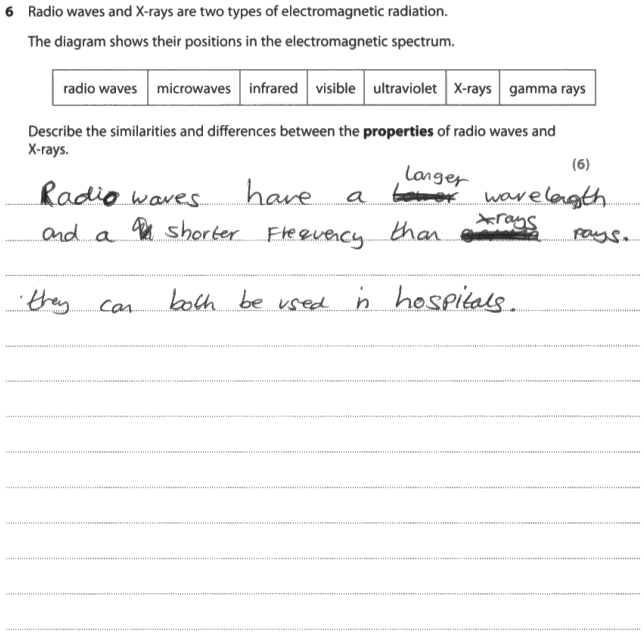
(6)

One difference between radio waves and x-rays is that radio waves have a low frequency but a long wavelength. Due to x rays being placed near the end of the diagram, it shows us that has opposite results to radio waves. This means x-rays produce a high frequency but a short wavelength.

However, there are similarities as well as differences. For example, they are both dangerous if they're visible to the human body. Therefore, caution is required when using these different types of radiation.

In this example learner scored one mark for giving the comparison that radio waves have a longer wavelength, therefore implying that the X-rays are shorter. Unfortunately, when talking about the frequency the learner talks about shorter frequency instead of higher and lower, so therefore was not awarded this marking point.

Again, the uses given do not answer the question and so were ignored.



6 Radio waves and X-rays are two types of electromagnetic radiation.

The diagram shows their positions in the electromagnetic spectrum.

radio waves	microwaves	infrared	visible	ultraviolet	X-rays	gamma rays

Describe the similarities and differences between the **properties** of radio waves and X-rays.

(6)

Radio waves have a ~~lower~~ longer wavelength and a shorter frequency than ~~gamma~~ x-rays.

they can both be used in hospitals.

Stating that X-rays are more harmful than radio waves was considered insufficient for the ionising mark. There was no credit for uses given. The following example therefore scored no marks.

6 Radio waves and X-rays are two types of electromagnetic radiation.

The diagram shows their positions in the electromagnetic spectrum.

radio waves	microwaves	infrared	visible	ultraviolet	X-rays	gamma rays

Describe the similarities and differences between the **properties** of radio waves and X-rays.

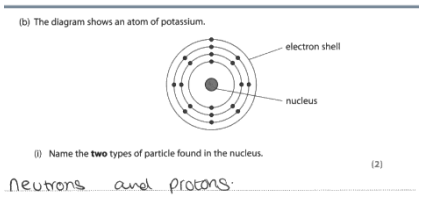
(6)

Radio waves are the least harmful thing where as x-rays are one of the most harmful things. X-rays's are used in hospitals ~~were~~ where as radio wave aren't. Even though x-rays are harmful they can also help people but radio waves don't. Radio waves are the least harmful thing so they can't harm any human where x-rays could seriously harm someone if they ~~didn't~~ don't do the x-ray the right way. Radio waves are passed through bound where as x-rays aren't.

Q7

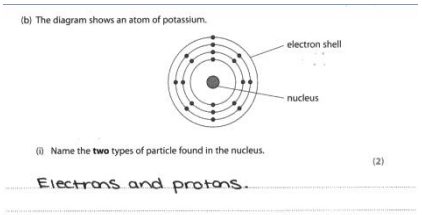
Many learners knew that the symbol shown in Q7(a) is there to warn that a substance is considered to be flammable.

In Q7(b)(i), learners generally knew that protons were present in the nucleus of an atom, some confused the neutrons with electrons and thought that electrons were present in the nucleus also.


(b) The diagram shows an atom of potassium.

(i) Name the **two** types of particle found in the nucleus. (2)

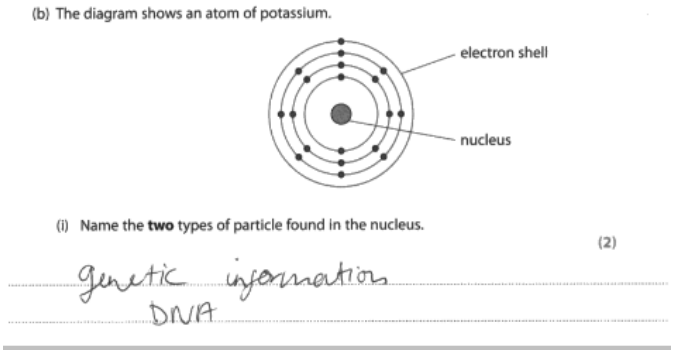
Neutrons and protons.


(b) The diagram shows an atom of potassium.

(i) Name the **two** types of particle found in the nucleus. (2)

Electrons and protons.

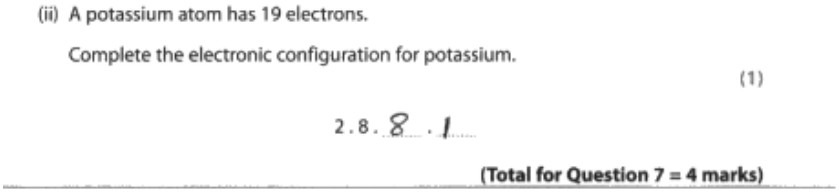
Even though the question made reference to the atomic structure of potassium, some learners confused the nucleus in the atom with the nucleus of the cell and stated that it contained DNA or genetic information. This was not awarded credit.


(b) The diagram shows an atom of potassium.

(i) Name the **two** types of particle found in the nucleus. (2)

genetic information
DNA

In Q7(b)(ii), many students were able to complete the electronic configuration for potassium.

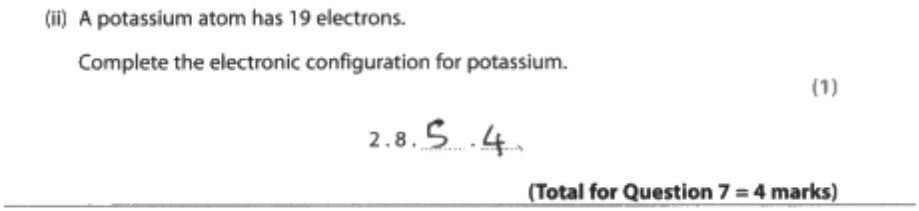

(ii) A potassium atom has 19 electrons.

Complete the electronic configuration for potassium. (1)

2.8.8.1

(Total for Question 7 = 4 marks)

However, in some cases it was clear that the learner had not been taught electronic structure and gave what appeared to be random numbers.



(ii) A potassium atom has 19 electrons.

Complete the electronic configuration for potassium.

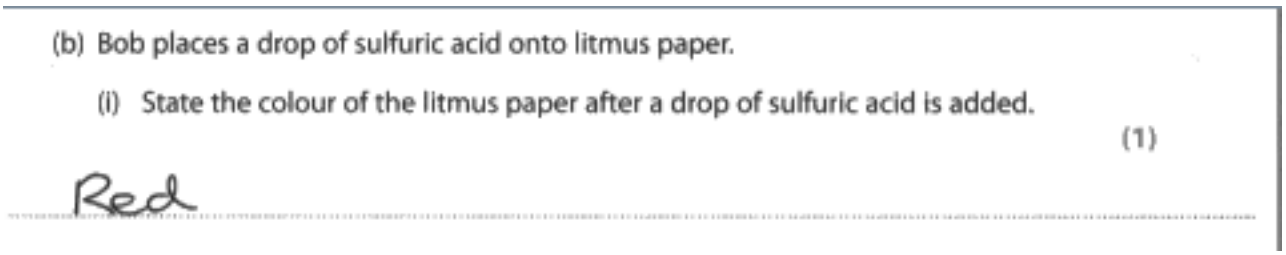
(1)

2.8.5.4

(Total for Question 7 = 4 marks)

Q8(b)(i)

In Q8(b)(i), some learners were able to state the colour that litmus paper would turn with the addition of sulfuric acid.



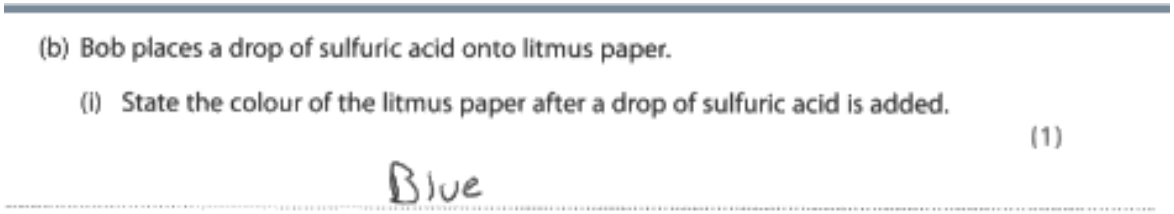
(b) Bob places a drop of sulfuric acid onto litmus paper.

(i) State the colour of the litmus paper after a drop of sulfuric acid is added.

(1)

Red

However, this was not the most common answer, many learners thought that the paper would turn blue or purple.



(b) Bob places a drop of sulfuric acid onto litmus paper.

(i) State the colour of the litmus paper after a drop of sulfuric acid is added.

(1)

Blue

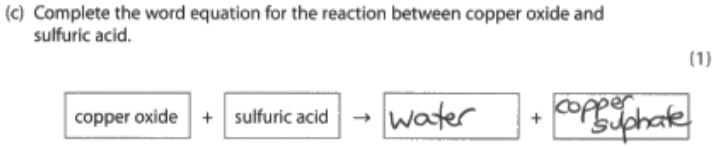
Q8(b)(ii)

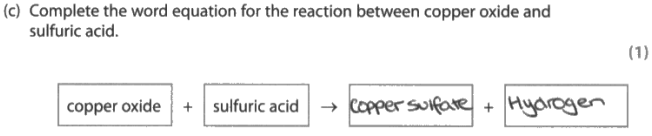
Q8(b)(ii) was very poorly answered with very few learners being able to recall the formula for sulfuric acid. It was pleasing to see however that those that could recall the formula, were also able to write it using correct scientific conventions in terms of capital letters and subscripts as seen in this example.

The most common answer seen was SuA.

Q8(c)

Learners also found Q8(c) difficult. The better learners were able to correctly complete the equation, however a very common error was to give hydrogen as the additional product rather than water.

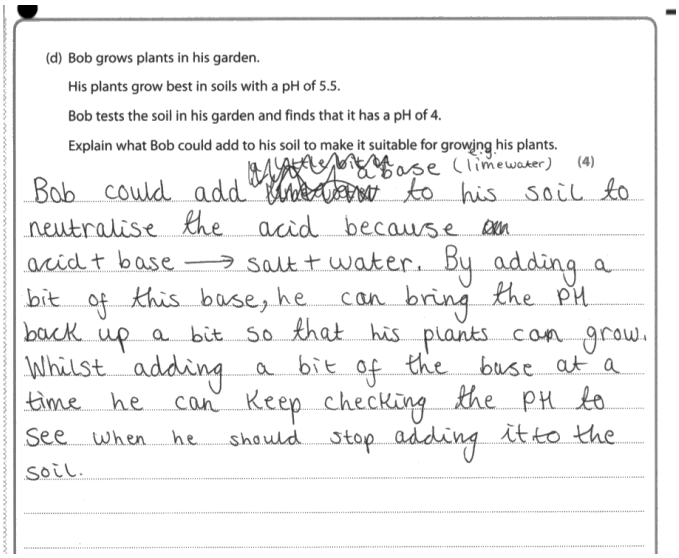




Q8(d)

Learners seemed to interact well with Q8(d). Many were able to make a good attempt at explaining how Bob could change the soil so that it was suitable for his plants to grow.

In this example, the learner has shown an understanding that the pH would need to be increased and this should be done by adding a base, they have gone on to give a name a base that they thought would be appropiate, in all this answer was worthy of three marks.



(d) Bob grows plants in his garden.

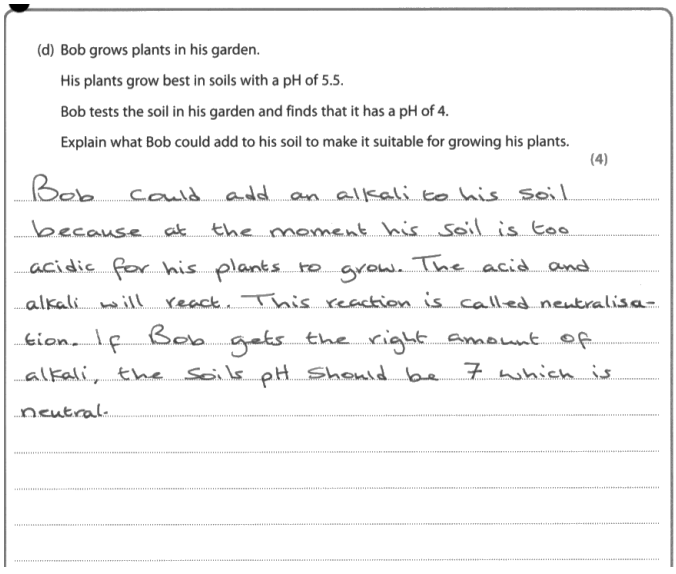
His plants grow best in soils with a pH of 5.5.

Bob tests the soil in his garden and finds that it has a pH of 4.

Explain what Bob could add to his soil to make it suitable for growing his plants. (4)

Bob could add a base (limewater) to his soil to neutralise the acid because an acid + base → salt + water. By adding a bit of this base, he can bring the PH back up a bit so that his plants can grow. Whilst adding a bit of the base at a time he can keep checking the PH to see when he should stop adding it to the soil.

In the next example the learner has stated that the pH should be 7 which is incorrect. However they have shown an understanding that the soil is too acidic and that to rectify this then an alkali should be added, which was accepted in place of adding a base.



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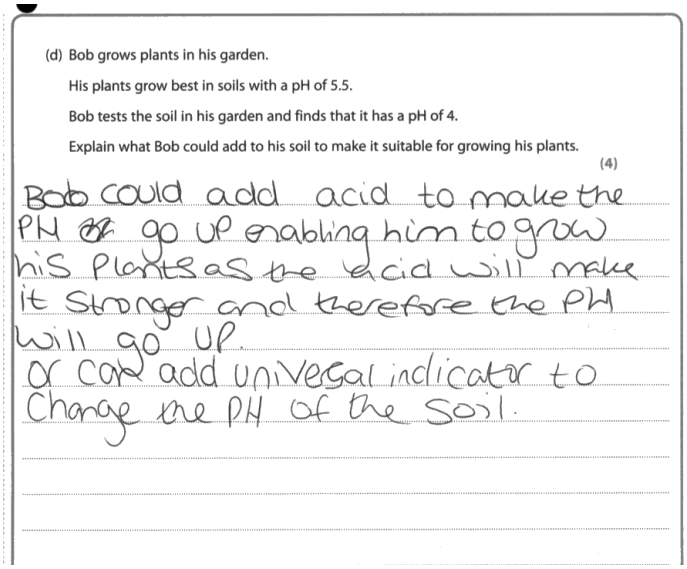
Explain what Bob could add to his soil to make it suitable for growing his plants. (4)

Bob could add an alkali to his soil because at the moment his soil is too acidic for his plants to grow. The acid and alkali will react. This reaction is called neutralisation. If Bob gets the right amount of alkali, the soils pH should be 7 which is neutral.

Some learners were confused and thought that an acid should be added to increase the pH, this was not worthy of credit and the following example gained no marks.



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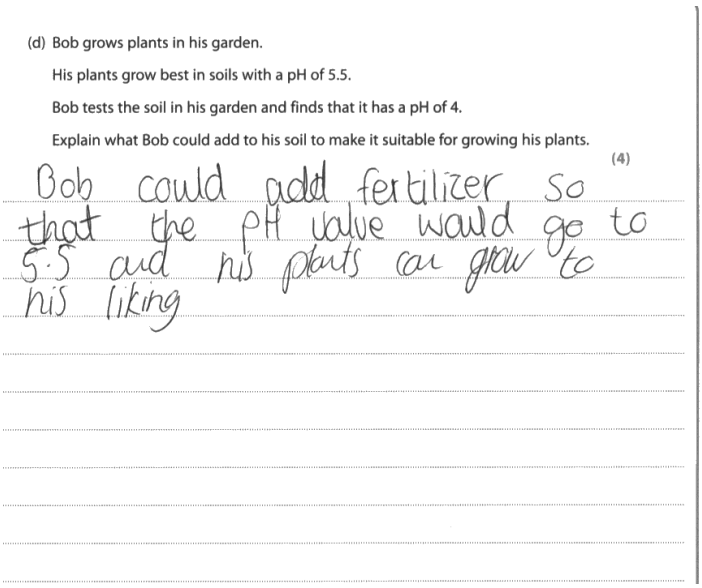
Explain what Bob could add to his soil to make it suitable for growing his plants.

(4)

Bob could add acid to make the PH go up enabling him to grow his plants as the acid will make it stronger and therefore the PH will go up.
Or can add universal indicator to change the PH of the soil.

In some cases, learners did not apply their scientific knowledge and answered in terms of adding a fertiliser or similar. This was not worthy of credit. The learner has repeated the stem and stated that the pH should go from 5.5 to 4, this also was not awarded any credit. Learners should always be aware that repeating the stem of the question will not gain credit.



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His plants grow best in soils with a pH of 5.5.

Bob tests the soil in his garden and finds that it has a pH of 4.

Explain what Bob could add to his soil to make it suitable for growing his plants.

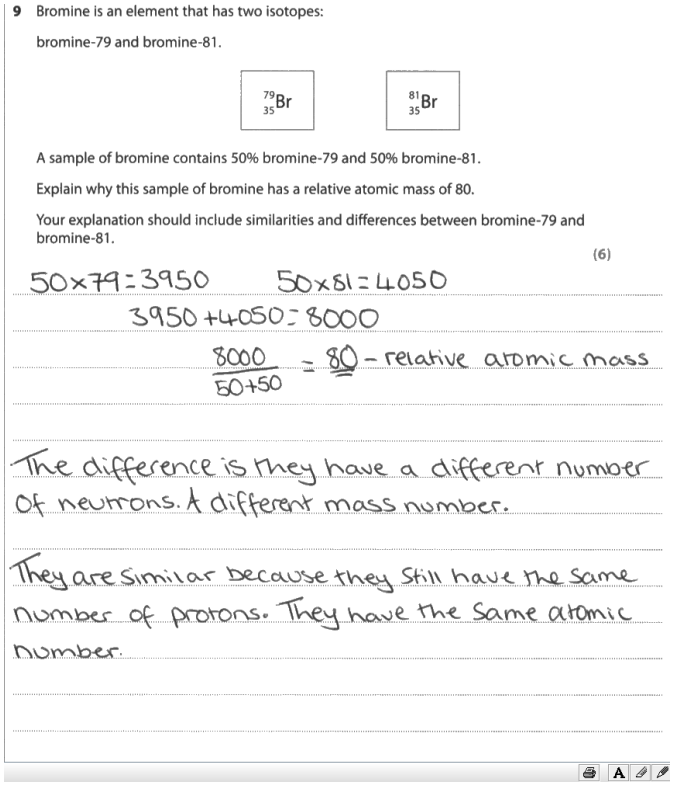
(4)

Bob could add fertilizer so that the pH valve would go to 5.5 and his plants can grow to his liking

Q9

The majority of learners made a good attempt at Q9. Learners that did well, used information given in the stem of the question and applied their knowledge showing a good understanding of what an isotope is and why a sample of an isotope might have a relative atomic mass that is different to that of another sample of the same element. Other learners gave generic definitions of an isotope.

This learner has correctly shown, using data from the question, how the relative atomic mass can be calculated. They have also given a similarity and difference between the isotopes. A mark of six, at the top of the distinction level, was awarded.



9 Bromine is an element that has two isotopes:

bromine-79 and bromine-81.

$^{79}_{35}Br$ $^{81}_{35}Br$

A sample of bromine contains 50% bromine-79 and 50% bromine-81.

Explain why this sample of bromine has a relative atomic mass of 80.

Your explanation should include similarities and differences between bromine-79 and bromine-81.

(6)

$50 \times 79 = 3950$ $50 \times 81 = 4050$

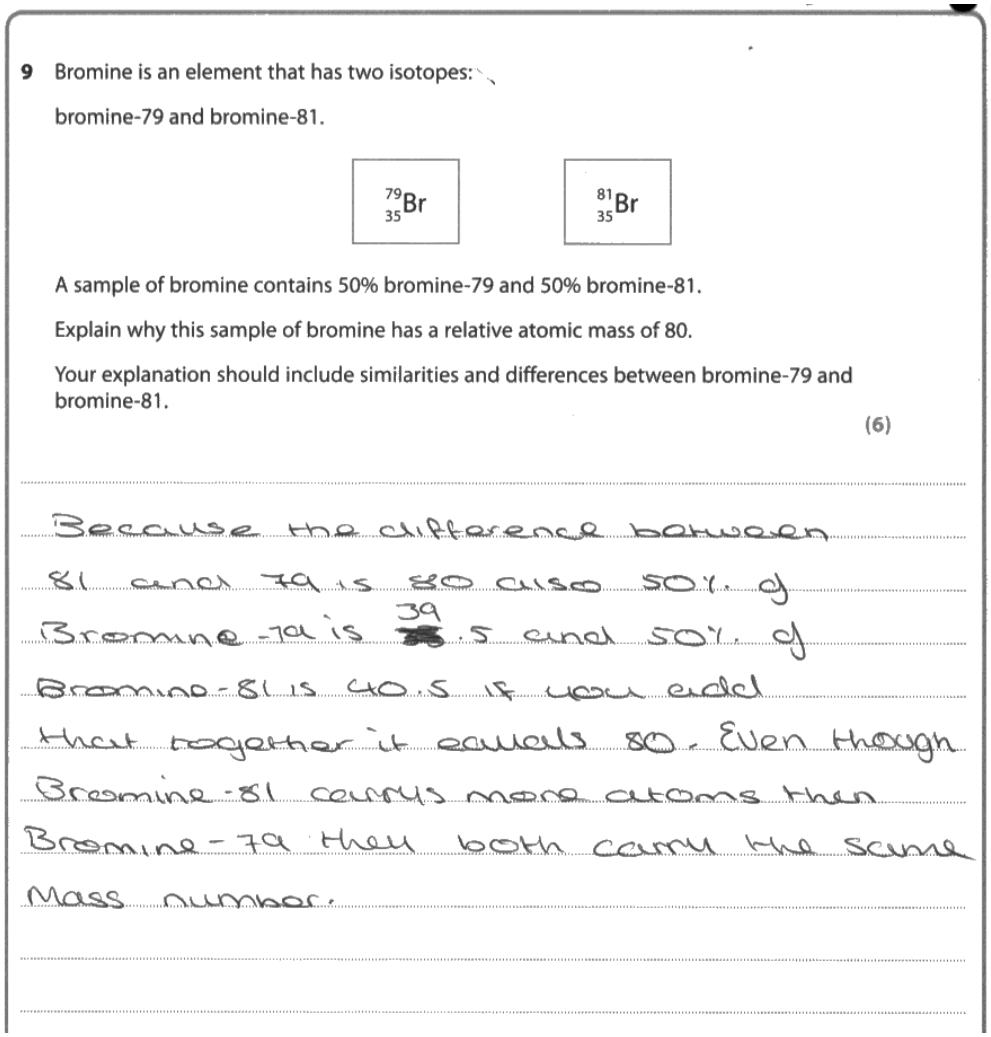
$3950 + 4050 = 8000$

$\frac{8000}{50+50} = 80$ – relative atomic mass

The difference is they have a different number of neutrons. A different mass number.

They are similar because they still have the same number of protons. They have the same atomic number.

In the following example, the learner has given a good description of why the relative atomic mass is 80. There is no description of similarities or differences in the atoms of the two isotopes to take it to a higher level. The incorrect comment about the mass number was ignored and a mark of four, in the merit level, was awarded.



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A sample of bromine contains 50% bromine-79 and 50% bromine-81.

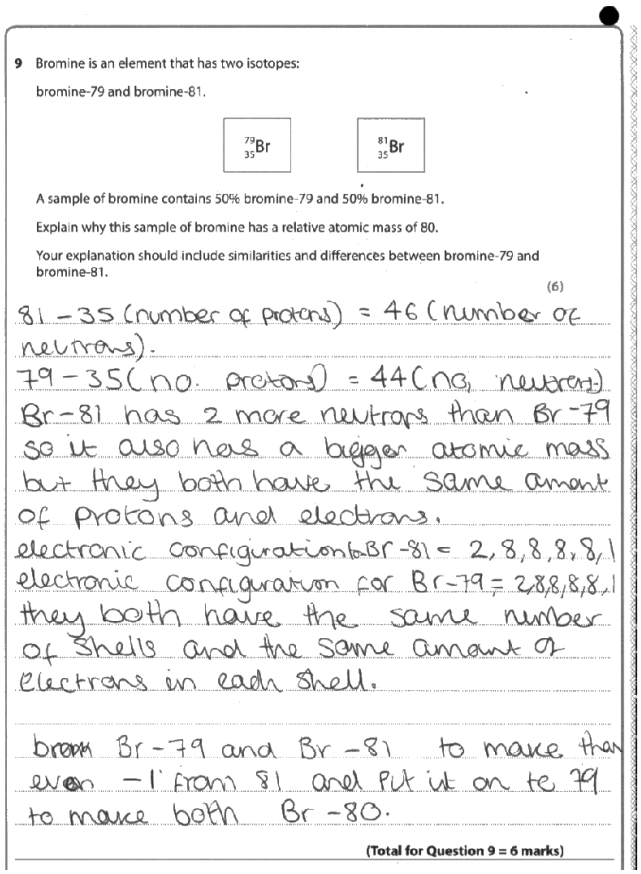
Explain why this sample of bromine has a relative atomic mass of 80.

Your explanation should include similarities and differences between bromine-79 and bromine-81.

(6)

Because the difference between 81 and 79 is 80 also 50% of Bromine-79 is 39.5 and 50% of Bromine-81 is 40.5 if you add that together it equals 80. Even though Bromine-81 carrys more atoms then Bromine-79 they both carry the same Mass number.

In this example, the learner was also awarded four marks at merit level. They have given a good description of a similarity and a difference using data from the question. Unfortunately, they have not given a correct method of working out relative atomic mass so they were not able to be awarded credit in distinction level.



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A sample of bromine contains 50% bromine-79 and 50% bromine-81.

Explain why this sample of bromine has a relative atomic mass of 80.

Your explanation should include similarities and differences between bromine-79 and bromine-81.

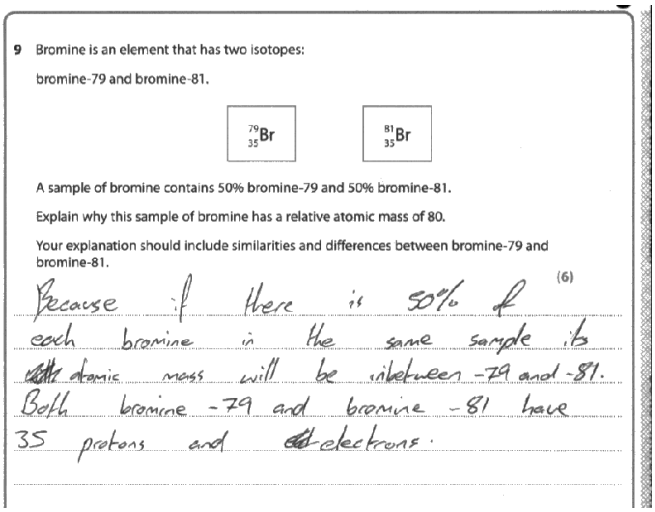
(6)

81 - 35 (number of protons) = 46 (number of neutrons).
79 - 35 (no. protons) = 44 (no. neutrons)
Br-81 has 2 more neutrons than Br-79 so it also has a bigger atomic mass but they both have the same amount of protons and electrons.
electronic configuration of Br-81 = 2,8,8,8,8,1
electronic configuration for Br-79 = 2,8,8,8,1
they both have the same number of shells and the same amount of electrons in each shell.

from Br-79 and Br-81 to make them even - 1 from 81 and put it on to 79 to make both Br-80.

(Total for Question 9 = 6 marks)

In this next example, the learner has given a specific description of some similarities between the two isotopes which and gained two marks at pass level.



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A sample of bromine contains 50% bromine-79 and 50% bromine-81.

Explain why this sample of bromine has a relative atomic mass of 80.

Your explanation should include similarities and differences between bromine-79 and bromine-81.

(6)

Because if there is 50% of each bromine in the same sample its ~~atomic~~ mass will be inbetween -79 and -81.
Both bromine -79 and bromine -81 have 35 protons and ~~electrons~~ electrons.