Examiners' Report/
Lead Examiner Feedback

March 2017

NQF BTEC Level 1/Level 2 Firsts in Applied Science

Unit 1: Principles of Science (20460E)

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Grade Boundaries

External assessment
The suite of 'next generation' NQF BTECs include an element of external assessment. This external assessment may be through a timetabled paper-based examination, an onscreen, on demand test or a set-task conducted under controlled conditions.

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 (Distinction, Merit, Pass and Level 1 fallback).

Setting grade boundaries
When we set grade boundaries, we look at the performance of every learner who took the 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 should be 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 ensures that a learner who receives a Distinction grade next year, will have similar ability to a learner who has received a Distinction grade this year. Awarding grade boundaries is conducted to make sure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in externally assessed question papers
Each exam 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 year on year because then it wouldn't take into account that a paper may be slightly easier or more difficult than the year before.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Grade	Unclassified	Level 1 Pass	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Boundary Mark	0	13	22	31	41

General Comments on Exam

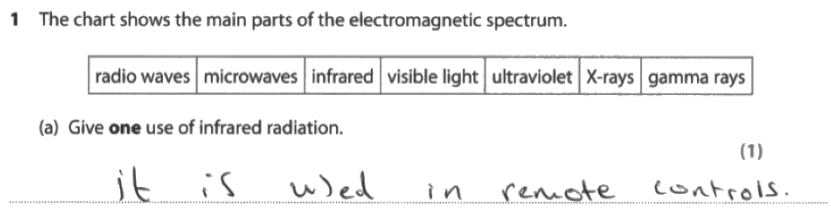
Learners that did well this series, did so because they were able to recall the definitions of the key terms used in the specification, they were able apply the science to new situations. These learners used good scientific language in the correct context, they were able to understand what was being asked for in the question and therefore apply their scientific knowledge. The best learners could rearrange formula to calculate unknowns, write chemical formula and write balanced symbol equations.

As in previous series, exam technique is still an issue for the weaker learners; Centre's need to fully prepare learners for the exam by practicing exam technique, especially in relation to reading the question carefully and not repeating the stem of the question, also re-reading the question with the answer they have given to check that they have answered the question set.

Basic scientific knowledge seemed lacking in some questions, only the best learners were able to recall definitions and processes such as the description of photosynthesis in question 5c and the definition of compound in question 7bii. Learners need to be able to learn to apply their scientific knowledge to new situations such as that in questions 9.

Q01a **Targeted Specification Area: Learning Aim F**

This was generally answered well with many learners being able to state one use of infrared radiation. The most common r4esponse seen was for use in TV re4mote controls, answers such as night vision goggles was also a common correct answer seen.



1 The chart shows the main parts of the electromagnetic spectrum.

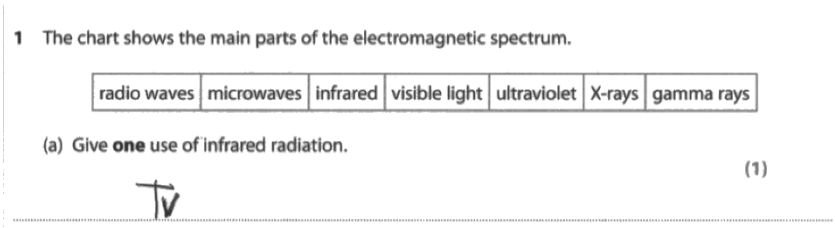
radio waves	microwaves	infrared	visible light	ultraviolet	X-rays	gamma rays

(a) Give **one** use of infrared radiation.

(1)

it is wed in remote controls.

Where learners lost marks it was because they were vague with their answer and just state TV instead of TV remote controls, this was found to be insufficient for the mark.



1 The chart shows the main parts of the electromagnetic spectrum.

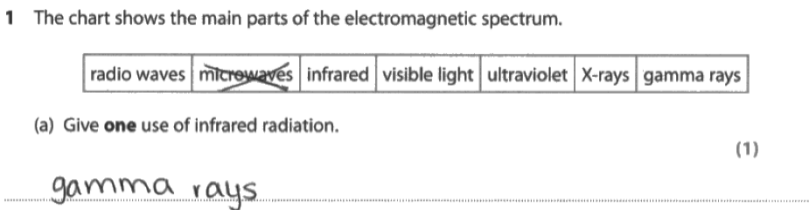
radio waves	microwaves	infrared	visible light	ultraviolet	X-rays	gamma rays

(a) Give **one** use of infrared radiation.

(1)

TV

Another common mistake occurred because learners did not read the question carefully and simply named another part of the electromagnetic spectrum.



1 The chart shows the main parts of the electromagnetic spectrum.

radio waves	~~microwaves~~	infrared	visible light	ultraviolet	X-rays	gamma rays

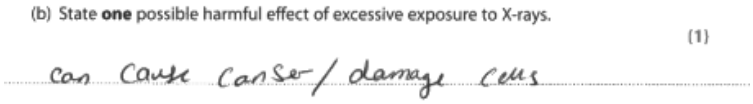
(a) Give **one** use of infrared radiation.

(1)

gamma rays

Q01b **Targeted Specification Area: Learning Aim F**

The majority of learners scored 1 mark in question 1b for either stating that excessive exposure to X-rays can cause cancer or damage cells, in their



(b) State **one** possible harmful effect of excessive exposure to X-rays.

(1)

can cause cancer / damage cells

example either answer would gain the mark.

Some learners lost marks as they did not read the question carefully and tried to give a use of X-ray instead of a harmful effect of excessive exposure.

(b) State **one** possible harmful effect of excessive exposure to X-rays.

(1)

they can look &throw you body

Again some learners did not read the question carefully and gave another part of the electromagnetic spectrum.

(b) State **one** possible harmful effect of excessive exposure to X-rays.

(1)

gamma Rays.

Q01ci **Targeted Specification Area: Learning Aim F**

Only the best learners were recall the definition for frequency as in this

(c) Different parts of the electromagnetic spectrum have different frequencies.

(i) State what is meant by the term **frequency**.

(1)

the number of Waves Per Second

example.

Many learners used their common knowledge rather than applying their scientific knowledge and gave a generic or a mathematical knowledge.

(c) Different parts of the electromagnetic spectrum have different frequencies.

(i) State what is meant by the term **frequency**.

(1)

how often Something happens or how high Something is

Q02ai **Targeted Specification Area: Learning Aim E**

The majority of learners were able to give the name of a renewable energy source other than solar power. Wind energy was a common correct answer, wind turbines was a common answer that was given credit.

2 Lee investigates solar powered lamps.

(a) Solar energy is a renewable energy source.

(i) Name **one** other renewable energy source.

(1)

wind turbines

Many learners did not read the question carefully and repeated the stem to give solar energy or power a renewable energy source, while this is a renewable energy source as it is given in the stem it can gain no credit.

2 Lee investigates solar powered lamps.

(a) Solar energy is a renewable energy source.

(i) Name **one** other renewable energy source.

Solar panels

Q02aii and 2aiii	**Targeted Specification Area: Learning Aim E**

Questions 2aii and 2aiii were generally well answered with most learners

(ii) Name **one** form of useful energy the solar powered lamps produce.

(1)

light

being able to name a form of useful energy and a form of energy wasted by the solar powered lamps.

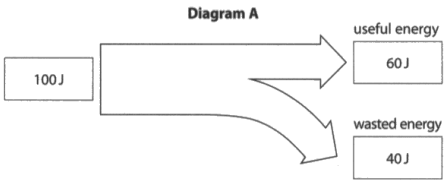
Q02bi	**Targeted Specification Area: Learning Aim E**

Many learners were able to score the mark in question 2bi for completing the diagram B to show a system with a greater efficiency than that shown in

(b) Lee researches the efficiency of solar powered lamps.

(i) Diagram A shows the energy transfer for a solar powered lamp.

Diagram A



(1)

Complete diagram B for a solar powered lamp that is more efficient.

(1)

Diagram B

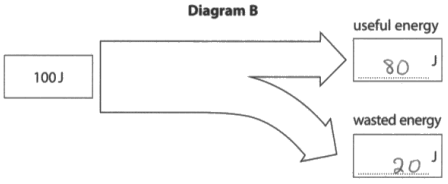


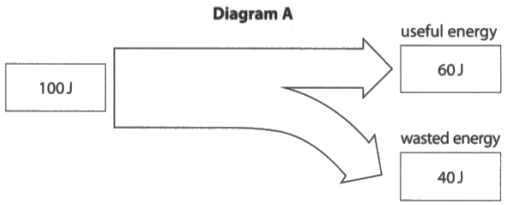
diagram A.

Unfortunately, some learners gave a higher value for the useful energy, but then gave a larger value for the wasted energy also and so were not able to gain the mark.

(b) Lee researches the efficiency of solar powered lamps.

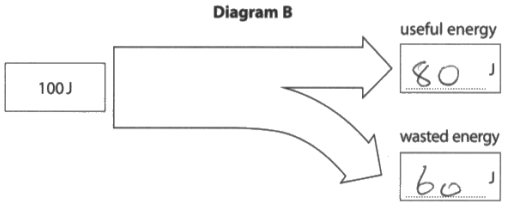
(i) Diagram A shows the energy transfer for a solar powered lamp.

Diagram A



Complete diagram B for a solar powered lamp that is more efficient. (1)

Diagram B

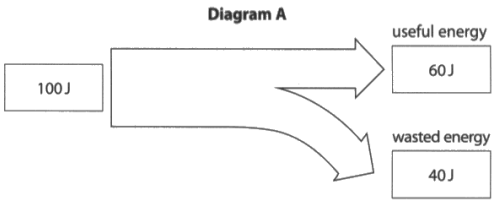


Some learners thought that a more efficient system would have a higher value for the wasted energy rather than the useful energy.

(b) Lee researches the efficiency of solar powered lamps.

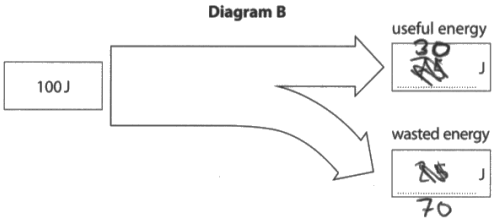
(i) Diagram A shows the energy transfer for a solar powered lamp.

Diagram A



Complete diagram B for a solar powered lamp that is more efficient. (1)

Diagram B



Q02bii | **Targeted Specification Area: Learning Aim E**

In question 2bii, only the best learners were able to calculate the total energy supplied to the system.

(ii) The efficiency of a solar powered lamp is 75%.

The amount of useful energy produced by the solar powered lamp was 30 J.

Calculate the total energy supplied to the solar powered lamp.

$$\text{efficiency} = \frac{\text{useful energy}}{\text{total energy supplied}} \times 100\%$$

Show your working.

(2)

30 × 75

$\frac{30}{75} \times 100 = 40$ J

40 J

Some learners showed their working and were therefore able to score 1 mark for substituting the correct values into the equation.

(ii) The efficiency of a solar powered lamp is 75%.

The amount of useful energy produced by the solar powered lamp was 30 J.

Calculate the total energy supplied to the solar powered lamp.

$$\text{efficiency} = \frac{\text{useful energy}}{\text{total energy supplied}} \times 100\%$$

Show your working.

(2)

$75 = \frac{30}{45} \times 100 = 66.7$

66.7 J

Q03b | **Targeted Specification Area: Learning Aim E**

Many learners attempted question3b, however only the best were able to correctly explain how convection currents caused the dissolved purple crystal to spread throughout the water.

In this example, the learner was awarded the full four marks. Although the learner hasn't mentioned water in the first part but have just referred to particles, water is implied in the last sentence. They have therefore shown an understanding that the less dense 'particles' move up and the more dense particles move down. They also talk about the particles from the purple crystal moving with this movement.

(b) The diagram shows how the experiment looked before heating and after five minutes of heating.

Explain how convection currents cause the dissolved purple crystal to spread throughout the water.

(4)

During convection a current is formed, when heat is applied the less dense particles will rise up. When the particles reach the top they become more dense and will move downwards, this cycle constantly repeats. The particles from the purple crystal will be moved along by this current and will spread out throughout the water

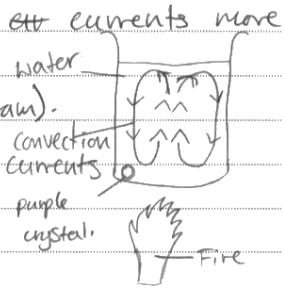
Some learners drew diagrams to help their answer. In this example the learner was awarded four marks for their two of the

(b) The diagram shows how the experiment looked before heating and after five minutes of heating.

Explain how convection currents cause the dissolved purple crystal to spread throughout the water.

(4)

As the water heats up convection currents start to flow. Convection ~~etc~~ currents move up and around ~~the~~ either water side. (As shown in the diagram). As the currents move they begin to pull the crystal in with it. Causing the crystal to dissolve.



convection current diagram which shows the rising and falling of the water. The learner also stated that the currents in the water pull the crystal with which gain another mark.

Some learners simply repeated the stem of the question or stated that the crystal dissolved which was also in the stem of the question, therefore no credit was awarded.

(b) The diagram shows how the experiment looked before heating and after five minutes of heating.

Explain how convection currents cause the dissolved purple crystal to spread throughout the water.

(4)

convection current causes the dissolved purple crystal to spread throughout the water because the ~~energy~~ heat energy cause the crystal to dissolve in the cold water which caused the ~~purple~~ water purple because of the crystal.

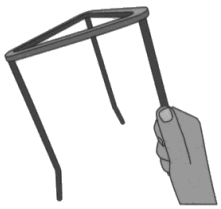
d

Q03c | **Targeted Specification Area: Learning Aim E**

Learners found this question quite difficult, with few being able to explain the process of conduction made the bottom of the tripod hot.

Only the best learners were able to score both marks available, the following example shows a distinction learner who scored both mark for showing an understanding that the heat energy from the Bunsen burner made the particles vibrate and these vibrations were passed on to neighboring particles.

(c) Tanuka clears her equipment away at the end of the experiment.



She picks up her tripod and finds the bottom of the tripod is warm.

Explain how the process of conduction has made the bottom of the tripod warm.

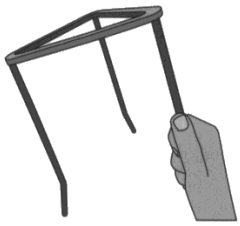
(2)

The ~~partii~~ particles in solids are packed closely together. So as ~~one~~ one heats up it begins to vibrate once it ~~N~~ is full of energy it will pass it around to other particles causing them to vibrate and get warmer.

(Total for Question 3 = 8 marks)

Some learners answered in terms of movement of electrons, which was accepted. This learner scored just 1 mark as they talked about the free electrons but did not explain how they caused the heat to transfer.

(c) Tanuka clears her equipment away at the end of the experiment.



She picks up her tripod and finds the bottom of the tripod is warm.

Explain how the process of conduction has made the bottom of the tripod warm.

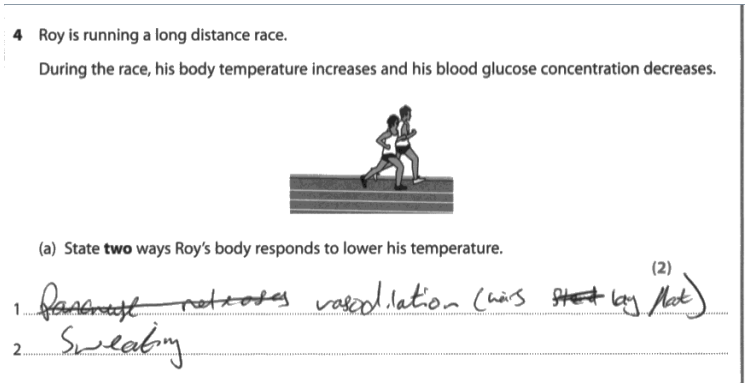
(2)

The tripod is warm because there are free electrons in the metal and free electrons means that heat can pass through faster meaning it will heat up quicker.

(Total for Question 3 = 8 marks)

Q04a | **Targeted Specification Area: Learning Aim B**

The majority of learners were able to score at least one mark in this question by showing an understanding that Roy's body would sweat to lower his temperature. Better learners were then able to give a second way that Roy's body would respond, with most of these stating that the body



4 Roy is running a long distance race.

During the race, his body temperature increases and his blood glucose concentration decreases.

(a) State **two** ways Roy's body responds to lower his temperature.

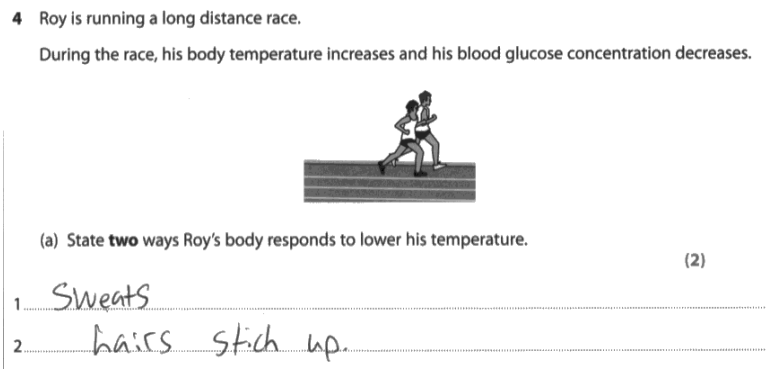
(2)

1 ~~Pancreas~~ ~~releases~~ vasodilation (hairs ~~flat~~ by flat)

2 Sweating

would lower the hairs on the skin or that vasodilation would occur.

Some learners were confused between vasodilation and vasoconstriction and whether hairs on the skin lie flat or raised when the body needed to lower its temperature.



4 Roy is running a long distance race.

During the race, his body temperature increases and his blood glucose concentration decreases.

(a) State **two** ways Roy's body responds to lower his temperature.

(2)

1 Sweats

2 hairs stick up.

Q04bii | **Targeted Specification Area: Learning Aim B**

Some were learners were able to recall that homeostasis was the process that maintains temperature and blood glucose regulation in this question.

(ii) Name the process in the body that maintains temperature and blood glucose concentration.

(1)

homeostasis

Some did not read the question properly and tried to give an organ in the body that might help regulate either temperature of blood glucose concentration such as the liver.

(ii) Name the process in the body that maintains temperature and blood glucose concentration.

(1)

the process that does them is in the liver pancreas.

Q04biii **Targeted Specification Area: Learning Aim B**

Fewer still were able to recall the system in the body that produces and releases hormones as the endocrine system. some misread the question and gave the name of a hormone that they knew. Only the best candidates could recall this.

(iii) Name the system in the body that produces and releases hormones.

(1)

endocrine System

A common incorrect answer was the hormonal system, where learners had repeated the stem of the question.
Some learners only read part of the stem and gave a hormone released in

(iii) Name the system in the body that produces and releases hormones.

(1)

hormonal System

(iii) Name the system in the body that produces and releases hormones.

(1)

Insulin

the body.

Q0biv **Targeted Specification Area: Learning Aim B**

Some learners were able to name the pancreas as the organ that produces and releases the hormones to regulate blood glucose concertation.

(iv) Name the organ that produces and releases the hormones that regulate blood glucose concentration.

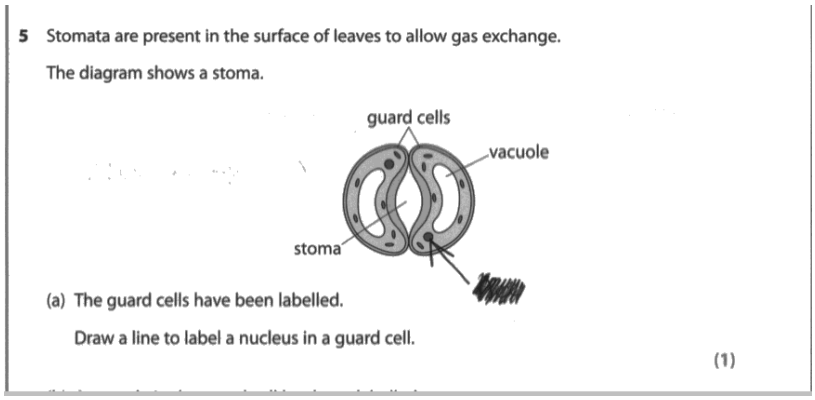
(1)

Pancreas

(Total for Question 4 = 6 marks)

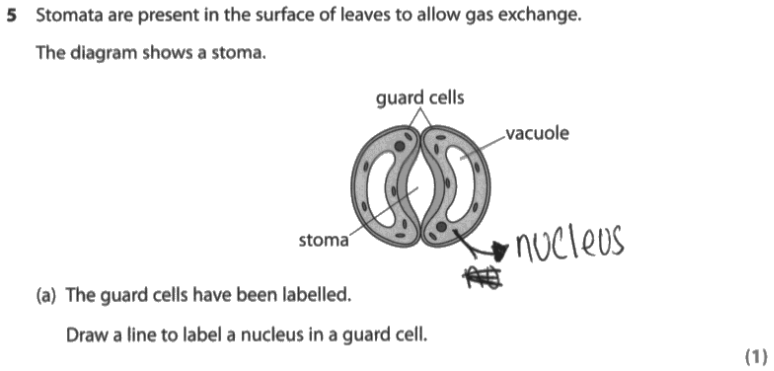
Q05a | **Targeted Specification Area: Learning Aim A**

The majority of learners were able to correctly draw a line to a nucleus in



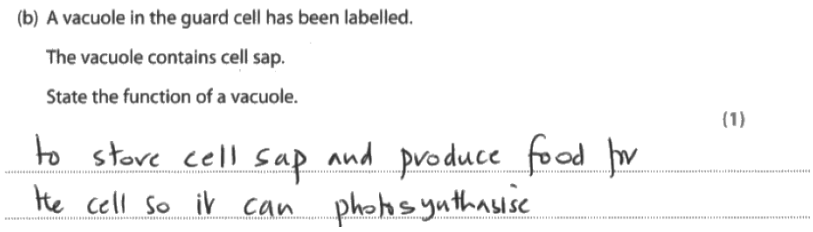
one of the guard cells.

Some learners lost marks as they were not accurate with their lines.

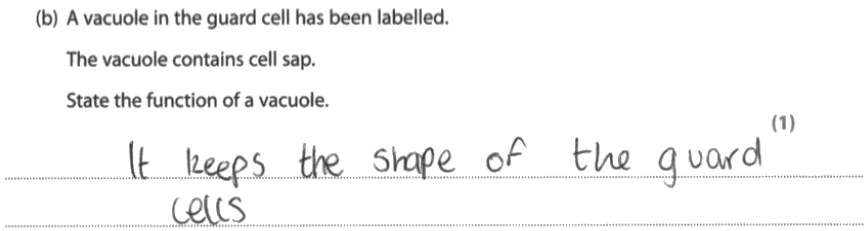


Q05b | **Targeted Specification Area: Learning Aim A**

This question was attempted by most learners, although many copied the stem of the question and stated that the vacuole stored cell sap.



Some learners recalled that the vacuole helps keep the shape of the guard cell, and were awarded credit.



(b) A vacuole in the guard cell has been labelled.

The vacuole contains cell sap.

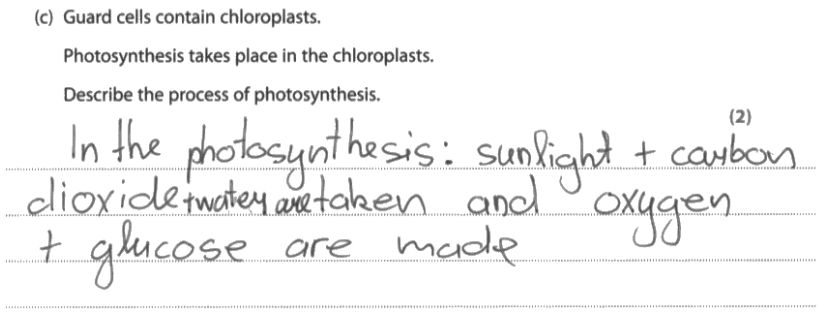
State the function of a vacuole.

(1)

It keeps the shape of the guard cells

Q05c | **Targeted Specification Area: Learning Aim A**

Learners found describing the process of photosynthesis in question 5c, quite difficult with few gaining full marks. This example gained both marks for describing the what is needed and what is produced in the process.



(c) Guard cells contain chloroplasts.

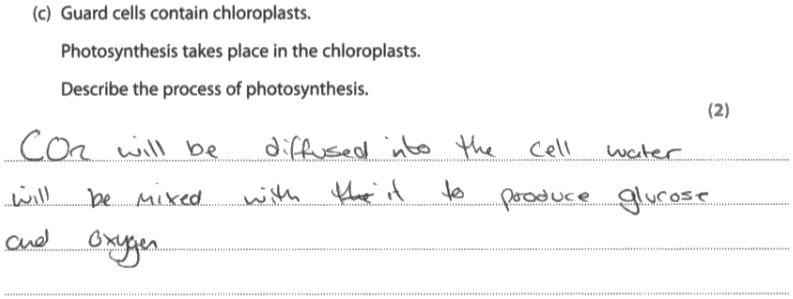
Photosynthesis takes place in the chloroplasts.

Describe the process of photosynthesis.

(2)

In the photosynthesis: sunlight + carbon dioxide + watery are taken and oxygen + glucose are made

Some learners, as in this case, knew that glucose and oxygen were the products or photosynthesis, but were not able to fully describe what was required for these to be made.



(c) Guard cells contain chloroplasts.

Photosynthesis takes place in the chloroplasts.

Describe the process of photosynthesis.

(2)

CO_2 will be diffused into the cell water will be mixed with the it to produce glucose and oxygen

Many learners were not specific with their scientific terminology and used word such as ‘food’ rather than glucose or stated that the plants needed to photosynthesize ‘to eat’

(c) Guard cells contain chloroplasts.

Photosynthesis takes place in the chloroplasts.

Describe the process of photosynthesis.

(2)

photosynthesis is the method plants use to eat The plant takes in sunlight and uses it for energy.

Q05d | **Targeted Specification Area: Learning Aim A**

Learners found question 5d very hard. Few knew how the guard cells were able to change to allow the stoma to close. Many misread the question and gave the function of the stoma, talking about gas exchange the gases that might be taken in or released.

(d) The stoma in the diagram is open.

At night the stoma closes.

Explain how the guard cells change to allow the stoma to close.

(2)

- opens to release carbon di oxide
- get fresh air in

A very common misconception seen was that the guard cells were part of the human body and that at night they closed.

(d) The stoma in the diagram is open.

At night the stoma closes.

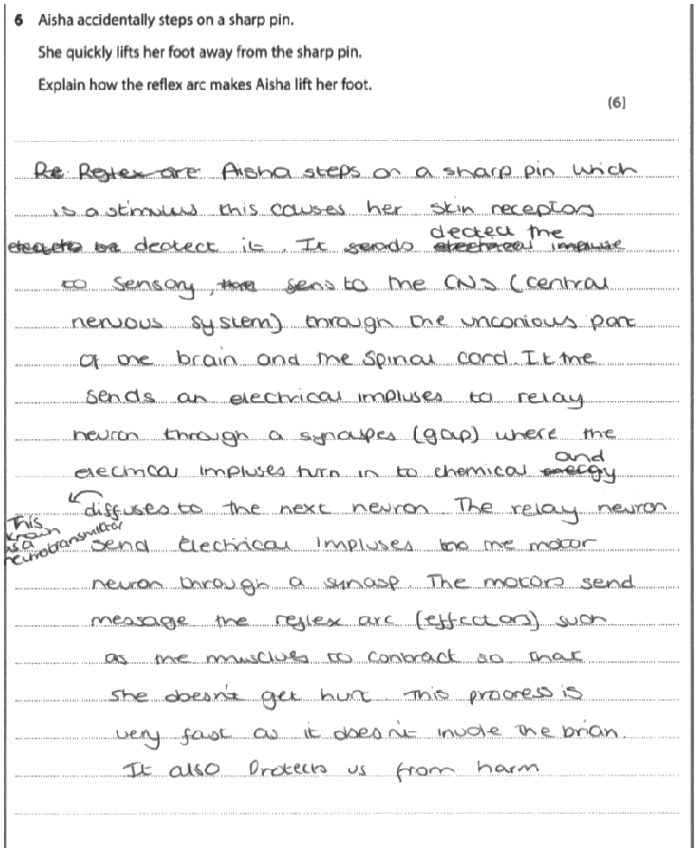
Explain how the guard cells change to allow the stoma to close.

(2)

Because your body is relaxed and isn't doing anything while you are sleeping.

Q06 | **Targeted Specification Area: Learning Aim B**

Most learners attempted this question. Those that did well did so as they had learnt their key terms well and showed a good understanding of the reflex arc.
In this example the learner scored full marks for a good description of the reflex arc.



6 Aisha accidentally steps on a sharp pin.

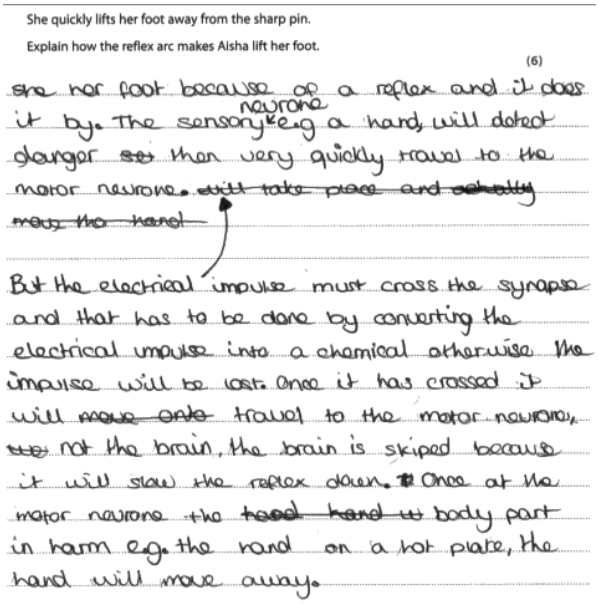
She quickly lifts her foot away from the sharp pin.

Explain how the reflex arc makes Aisha lift her foot.

(6)

Re Reflex arc: Aisha steps on a sharp pin which is a stimulus this causes her skin receptors ~~receptors to~~ detect it. It sends detect the ~~electrical~~ impulse to Sensory, ~~the~~ sends to the CNS (central nervous system) through the unconious part of the brain and the Spinal cord. It the sends an electrical impluses to relay neuron through a synapses (gap) where the electrical impluses turn in to chemical and ~~energy~~ diffuses to the next neuron The relay neuron This is a Neurotransmitter send electrical impluses to the motor neuron through a synasp The motors send message the reflex arc (effectors) such as the muscles to contract so that she doesn't get hurt this process is very fast as it doesn't involve the brain. It also protects us from harm

In some cases, learners used key terms but not necessarily in the correct places. The learner starts by stating that the sensory neurone detects danger. This is not correct and therefore did not gain credit. They go on to say that the danger very quickly travels to the motor neurone. This was insufficient for credit, as there is no explanation of how the response travels or reference to the relay neurone or spinal cord in between. The learner has given an example of the hand to describe the reflex arc which was ignored. However, the learner did go on to say that the electrical impulse must travel across a synapse and that has to be done by converting the electrical impulse into a chemical signal. They then said that the impulse then goes to the motor neurone to move the body part away.
The learner was awarded 4 marks.



She quickly lifts her foot away from the sharp pin.

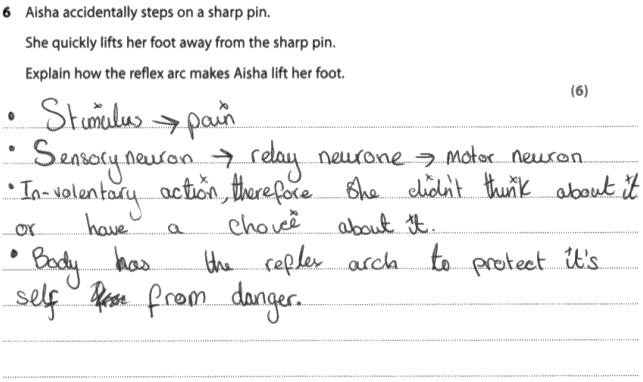
Explain how the reflex arc makes Aisha lift her foot.

(6)

she her foot because of a reflex and it does it by. The sensory neurone e.g a hand, will detect danger ~~see~~ then very quickly travel to the motor neurone. ~~will take place and actually~~ ~~move the hand~~

But the electrical impulse must cross the synapse and that has to be done by converting the electrical impulse into a chemical otherwise the impulse will be lost. Once it has crossed it will ~~move onto~~ travel to the motor neurone, ~~to~~ not the brain, the brain is skiped because it will slow the reflex down. Once at the motor neurone the ~~hand~~ ~~hand to~~ body part in harm e.g. the hand on a hot plate, the hand will move away.

Weaker learners were not able to explain the reflex arc in detail. In this example, the learner scored 2 marks for showing an understanding that the sensory neurone goes via the relay neurone and that the relay neurone goes to the motor neurone.



6 Aisha accidentally steps on a sharp pin.

She quickly lifts her foot away from the sharp pin.

Explain how the reflex arc makes Aisha lift her foot.

(6)

- Stimulus → pain
- Sensory neuron → relay neurone → motor neuron
- In-volentary action, therefore She didn't think about it or have a choice about it.
- Body has the reflex arch to protect it's self ~~Pain~~ from danger.

Some learners made an attempt to explain the reflex arc however made no reference as to how the reflex arc works. In this example there is some reference to the siganl going through the spinal cord but not how. Many learners also made reference to the messages/signal going to the brain as in this answer which made their response quite confused.
In this example there is an understanding that the 'signal' is sent by 'electrical energy', which was deemed just sufficient for the electrical signal mark and so the learner was awarded 1 mark.

6 Aisha accidentally steps on a sharp pin.

She quickly lifts her foot away from the sharp pin.

Explain how the reflex arc makes Aisha lift her foot.

(6)

When she feels the pain from stepping on the pin the brain ~~automatically~~ sends a signal that goes through your spine and then straight to her foot which automacly sends a ~~message back~~ message/signal going back through the spine and to the brain which makes her lift up her foot immediatly as the brain recognised where the pain is coming from all through eletric energy.

Q07bi **Targeted Specification Area: Learning Aim D**

This was well attempted by the majority of learners with a significant number knowing the formula for a molecule of water.

(b) Water is a compound.

(i) Give the formula for a molecule of water.

(1)

H_2O

Unfortunately many learners were not able to represent the formula using the correct scientific conventions and therefore did not gain the mark.

(b) Water is a compound.

(i) Give the formula for a molecule of water.

(1)

H_{2O}

(b) Water is a compound.

(i) Give the formula for a molecule of water.

(1)

H^2O

A significant number gave the formula for a different molecule or tried to write a word equation.

(b) Water is a compound.

(i) Give the formula for a molecule of water.

(1)

O_2 ~~H2O~~

(b) Water is a compound.

(i) Give the formula for a molecule of water.

(1)

Hydrogen + oxygen

Q07bii **Targeted Specification Area: Learning Aim D**

Learners found recalling the correct definition of a compound quite difficult. Only the best learners were able to give the correct definition as in this

(ii) State what is meant by the term **compound**.

(1)

Two different elements chemically bonded together

example.

Some learners were not specific enough to gain the mark and stated just atoms chemically bonded which did not gain credit.

(ii) State what is meant by the term **compound**.

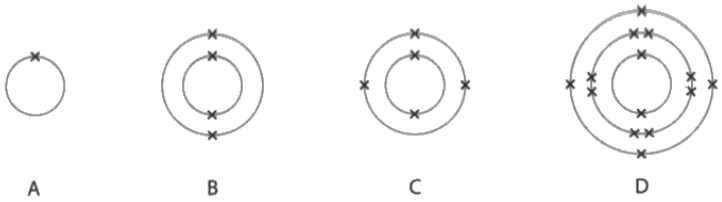
(1)

to atoms chemically combined

Q08ai | **Targeted Specification Area: Learning Aim C**

A good proportion of learners were able to correctly write the electronic configuration of element D.

8 The diagram shows the electronic structure of elements A, B, C and D.



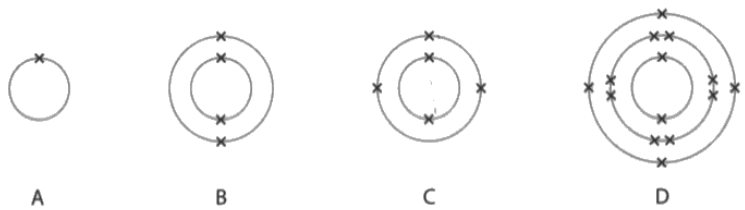
(a) (i) Write the electronic configuration of element D.

(1)

2.8.4

Where learners lost marks, it was generally because they simply stated the number of electrons rather than writing the configuration of the electrons in the element.

8 The diagram shows the electronic structure of elements A, B, C and D.



(a) (i) Write the electronic configuration of element D.

(1)

14

Q08bi **Targeted Specification Area: Learning Aim C**

This was hard for learners, with only the best being able to give a specific

(b) Lithium has an atomic number of 3.

It has two naturally occurring isotopes, lithium-6 and lithium-7.

(i) Give **one** similarity and **one** difference between the atomic structure of the lithium isotopes.

(2)

Similarity - both lithium-6 and lithium-7 have same number of electrons and protons - 3.

Difference - lithium-6 has 3 neutrons, but lithium-7 has 4 neutrons.

similarity and difference in the two lithium isotopes.

Many learners did not use the information in the stem and gave the generic definition of an isotope instead, as in the example. This scored one mark of the two available.

(b) Lithium has an atomic number of 3.

It has two naturally occurring isotopes, lithium-6 and lithium-7.

(i) Give **one** similarity and **one** difference between the atomic structure of the lithium isotopes.

(2)

A similarity is that they have the same number of protons and electrons. However the difference is the number of neutrons.

Q08bii **Targeted Specification Area: Learning Aim D**

This was also difficult for learners, but the most able were able to correctly write and balance the equation for the reaction to gain both marks.

(ii) Lithium, Li, reacts with oxygen in the air to form lithium oxide, Li_2O.

Write a balanced equation for the reaction.

(2)

$4Li + O_2 \Rightarrow 2Li_2O$

Some learners gained one mark for correctly writing the equation but not balancing it.

(ii) Lithium, Li, reacts with oxygen in the air to form lithium oxide, Li_2O.

Write a balanced equation for the reaction.

(2)

$Li + O_2 \longrightarrow Li_2O$

Where learners lost marks, it was generally because they could not correctly complete the reactants for reaction.

(ii) Lithium, Li, reacts with oxygen in the air to form lithium oxide, Li_2O.

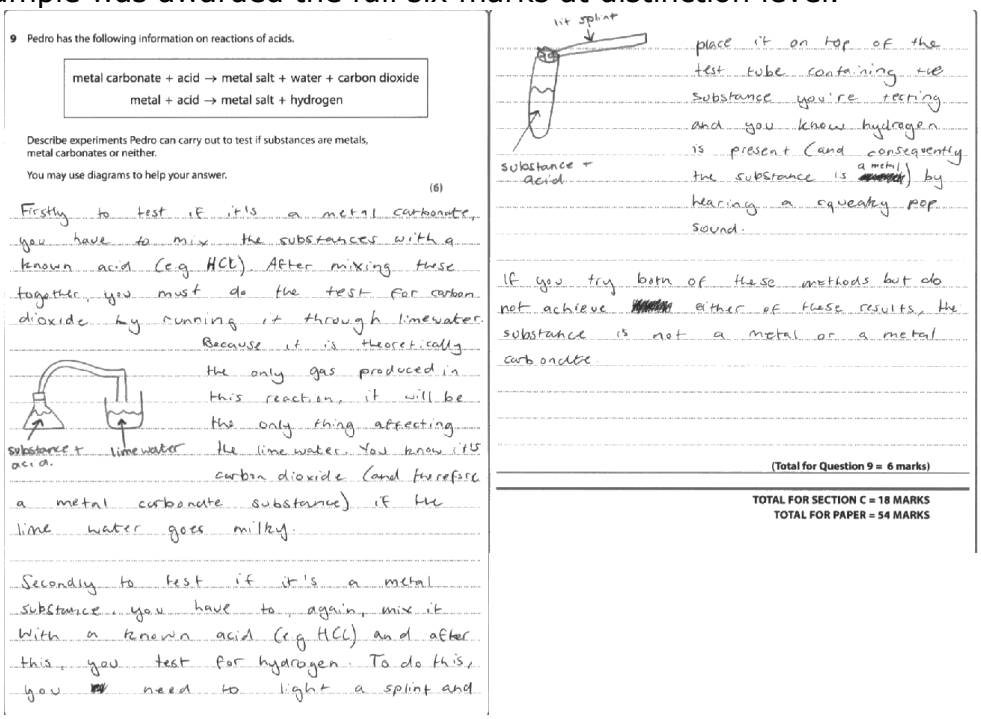
Write a balanced equation for the reaction.

(2)

$2Li + O \rightarrow Li_2O$

Q09 | **Targeted Specification Area: Learning Aim D**

This was well attempted by learners with many scoring some marks. The best learners were able to give a description of how to carry out the experiment, many gave diagrams to show how the carbon dioxide will be bubbled through the limewater or how the gas would be collected. They were able to give the test for hydrogen and for carbon dioxide. This example was awarded the full six marks at distinction level.



9 Pedro has the following information on reactions of acids.

metal carbonate + acid → metal salt + water + carbon dioxide
metal + acid → metal salt + hydrogen

Describe experiments Pedro can carry out to test if substances are metals, metal carbonates or neither.

You may use diagrams to help your answer.

(6)

Firstly to test if it's a metal carbonate, you have to mix the substances with a known acid (e.g. HCl). After mixing these together, you must do the test for carbon dioxide by running it through limewater. Because it is theoretically the only gas produced in this reaction, it will be the only thing affecting the limewater. You know it's carbon dioxide (and therefore a metal carbonate substance) if the lime water goes milky.

substance + acid | limewater

Secondly to test if it's a metal substance, you have to, again, mix it with a known acid (e.g. HCl) and after this, you test for hydrogen. To do this, you need to light a splint and

lit splint

substance + acid

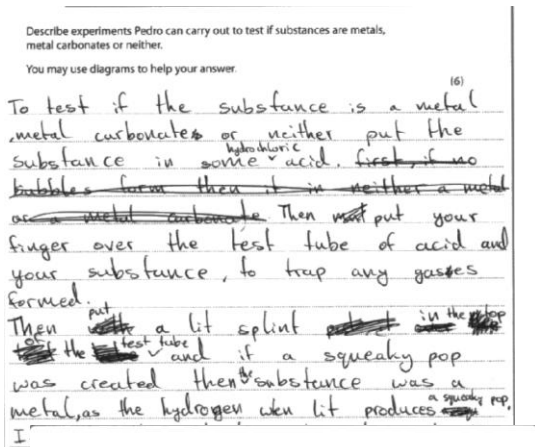
place it on top of the test tube containing the substance you're testing and you know hydrogen is present (and consequently the substance is a metal) by hearing a squeaky pop sound.

If you try both of these methods but do not achieve either of these results, the substance is not a metal or a metal carbonate

(Total for Question 9 = 6 marks)

TOTAL FOR SECTION C = 18 MARKS
TOTAL FOR PAPER = 54 MARKS

In this example. the learner has given a brief description of how to produce the gas and collect it - add hydrochloric acid and place a finger over the top of the tube to collect it. They have then gone on to describe the test for the hydrogen. The test for carbon dioxide has not been described and therefore the answer remained at merit level and was awarded four marks.



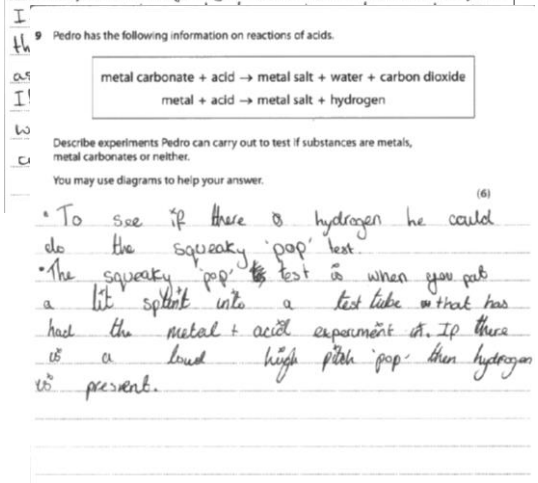
Describe experiments Pedro can carry out to test if substances are metals, metal carbonates or neither.

You may use diagrams to help your answer.

(6)

To test if the substance is a metal, metal carbonate or neither put the substance in some hydrochloric acid. ~~first, if no bubbles form then it is neither a metal or a metal carbonate~~ Then ~~must~~ put your finger over the test tube of acid and your substance, to trap any gasses formed. Then put a lit splint ~~in the top of the~~ in the test tube and if a squeaky pop was created then the substance was a metal, as the hydrogen when lit produces a squeaky pop.

The weaker learners picked up that they would need to test for the hydrogen gas and were able to



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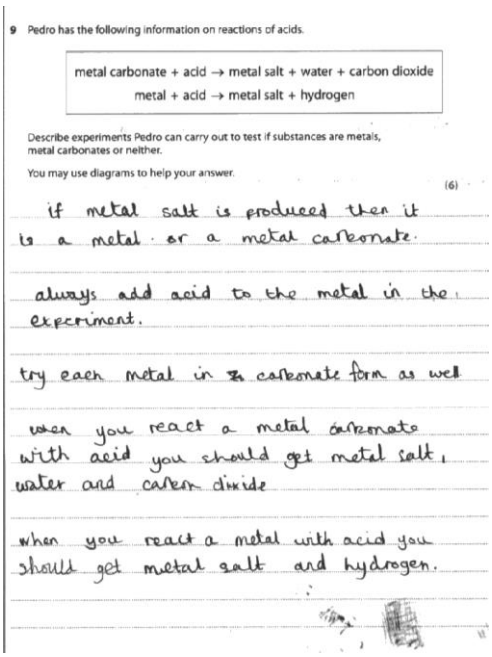
Describe experiments Pedro can carry out to test if substances are metals, metal carbonates or neither.

You may use diagrams to help your answer.

(6)

- To see if there is hydrogen he could do the squeaky 'pop' test.
- The squeaky 'pop' test is when you put a lit splint into a test tube that has had the metal + acid experiment in. If there is a loud high pitch 'pop' then hydrogen is present.

escribe the test, they did not describe how they would collect the gas to test or describe how that they would test for the carbon dioxide gas.
Learners that did not do well did so because they simply copied the stem and did not add anything further.



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metal carbonate + acid → metal salt + water + carbon dioxide
metal + acid → metal salt + hydrogen

Describe experiments Pedro can carry out to test if substances are metals, metal carbonates or neither.

You may use diagrams to help your answer.

(6)

if metal salt is produced then it is a metal or a metal carbonate.

always add acid to the metal in the experiment.

try each metal in ~~a~~ carbonate form as well

when you react a metal carbonate with acid you should get metal salt, water and carbon dioxide

when you react a metal with acid you should get metal salt and hydrogen.

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