



Examiners' Report/ Lead Examiner Feedback

November 2013

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 1: Principles of Science (20460E)

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Introduction

This report has been written by the lead examiner for the BTEC Principles of Science unit. It is designed to help you understand how learners performed overall in the exam. For each question, there is a brief analysis of learner responses. You will also find example learner responses from Level 2 Pass and Distinction learners. We hope this will help you to prepare your learners for future examination series.

Grade Boundaries

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

General comments

This was the second time that this paper has been set. Learners did appear to slightly better prepared for the paper than in the previous session with more learners attempting the calculation questions and attempting the long answer questions.

Learners that did well, did so because they had learnt key terms and used good scientific language, they were able to use equations and evaluate them to give correct answers. They were also able to apply the scientific concepts that they had been taught to new situations.

However it is evident that some learners are still finding the exam hard, it seems that in many of these cases it is because learners were not prepared for the exam and did not have scientific knowledge to back up the answers they gave. In some cases learners lost marks as they did not address the question scientifically but used common everyday ideas that did not always relate to the situation given.

Centres need to prepare learners better for the exam by practicing exam technique, especially in relation to reading the question carefully and checking that the question set has been addressed in the answer given, using appropriate scientific knowledge and vocabulary. There is also the need for centres to continue to focus on learners learning the key scientific knowledge in the specification, one way this could be achieved would be to practice structuring extended writing questions as it is an obvious that this is not a skill that the learners are proficient in.

Q2bii

Learners did not score well on this question. Many learners could state that the vacuole contained cell sap, but very few mentioned that it was full/filled and hence scored nothing. Learners should take care that they do not just repeat the stem of the question as many just stated that vacuoles help keep the plant supported and did not explain how this was done and therefore scored no marks.

Q3a

Learners found this question hard and appeared to not be able to articulate well the purpose of the brain. The idea was usually present, but poorly described. The function of the spinal cord in the process was not well understood with many confusing it with the spine and stating that it supports the body or keeps the body upright.

This is an example of a good answer which scored full marks.

(a) The central nervous system is made up of the brain and the spinal cord.

State how the components of the central nervous system control the body's responses to stimuli.

(1)

Brain: Receives messages and processes them into a reaction (1)

Spinal cord: messages travel up and down the spinal cord

Q3b

Many learners did not score well here as they did not answer the question posed, to explain how the endocrine system reacts to the change in glucose, but instead stated that the blood sugar rose which does not answer the question. Learners should always check that they are answering the question posed rather than the question they think has been asked.

Many answers were seen that related to the release of insulin, some candidates mixed up the effect on blood sugar or gave answers which related to Vincent having more energy or that he has been more active because he has eaten the chocolate which did not score any marks.

Vincent eats a chocolate bar. This will change the amount of glucose in his body.

(b) Explain how the endocrine system reacts to the change in glucose.

(2)

His energy level will increase and he will be more active.

This answer gained full marks, but was rarely seen.

Vincent eats a chocolate bar. This will change the amount of glucose in his body.

(b) Explain how the endocrine system reacts to the change in glucose.

(2)

it produces insulin which will lower the blood sugar level.

Q3c

Learners found this question very difficult, many failed to mention electrical impulses/signals and chemical signals. Where learners did score marks, it was for writing about the passage of electrical signals in nerve cells. This was another case where learners repeated the stem of the question by stating that messages are communicated quickly through the body.

(c) Explain **two** reasons why the nervous system is able to communicate messages from the brain to the feet quickly.

(4)

There are lots and lots of nervous cells travel around your body from your brain to your arms legs so when they touch they pass the message on which is very quick

Many learners did not attempt to give two reasons and it was very rare to see mention of the chemical aspect.

Q5bi

In general, this question was answered very well, with many learners giving correct uses of microwave such as mobile phones and TV or satellite transmission.

(b) Microwaves are used in a microwave oven.
(i) Give one other use of microwaves. (1)
for communication

Some learners had not read the stem and so reconsidered heating food.

(b) Microwaves are used in a microwave oven.
(i) Give one other use of microwaves. (1)
to heat up food

Some candidates confused microwaves with other forms of radiation.

(b) Microwaves are used in a microwave oven.
(i) Give one other use of microwaves. (1)
Radiation can cure cancer

Q5bii

Learners found this question hard, some learners were able to relate microwaves to damaging cells/tissues/organs.

(ii) State one harmful effect of microwaves. (1)
It can damage cells

However, many learners confused microwaves with another region of the electromagnetic spectrum and gave responses relating to skin cancer and many focused on microwaves blowing up/ burning food or burning people's hands when they remove hot food from microwaves none of which gained credit.

(ii) State one harmful effect of microwaves. (1)
Cancer

(ii) State one harmful effect of microwaves. (1)
they get hot and will burn you

Q5c

Learners that are confident with numbers tended to do well in this question and scored 2 marks or where slips were made 1 mark.

Standard form is obviously a concept that is not understood by learners, with some multiplying the separate terms in the standard form 3×10^8 to give an answer of 240.

The strongest learners were able to evaluate the calculation correctly after appropriate substitution. However simple arithmetical slips lost some candidates marks. It was evident that the lack of calculators for some candidates limited performance in this item.

This answer scored full marks for a correct substitution and evaluation.

(c) A radio antenna transmits radio waves with a wavelength of 75 m.

The radio waves travel in the air with a speed of 3.0×10^8 m/s.

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

Calculate the frequency of the radio waves transmitted by the radio antenna.

Show your working.

$$\text{Frequency} = \frac{\text{speed}}{\text{wavelength}} = \frac{\text{wave length}}{\text{speed}} \quad (2)$$

$$3.0 \times 10^8 = 300000000$$

$$300000000 \div 75 = 4000000$$

$$\text{Frequency} = 4000000 \text{ Hz}$$

Q6

Learners found this question difficult and had not recognised that their answers had to be scientific and gave answers centred around cost or the aesthetics of the farm.

Learners that did score, usually did so for linking lack or variable winds to poor guarantee of energy supply.

Learners found it hard to give an advantage of the wind farm, with many just repeating the stem of the question and stating that the wind turbines are renewable or stating, incorrectly, that the energy produced can be reused.

It has decided to invest in a wind farm.

Explain **one scientific** advantage and **two scientific** disadvantages of using a wind farm.

Advantage: Its not using electricity,
It is renewable

Disadvantage
It is very expensive to run/build
even more expensive than using
electricity

Disadvantage
If it is not windy there will
be no power off the wind
farm. ✓✓

Q7ci

It was obvious that learners had been taught the test for hydrogen well as many could recall that a lighted splint should be used. Some candidates lost marks here as they gave the answer for 7cii, squeaky pop here which did not gain credit.

(c) Hydrogen is also produced when zinc chloride is formed.

(i) Give the test for hydrogen.

(1)

a lit splint

Q7cii

Learners did very well on this question with the majority being able to correctly state the hydrogen gives a squeaky pop when lit.

(ii) Give the result you would expect if hydrogen is present. (1)

It will give a squeaky pop

(Total for Question 7 = 4 marks)

Q8f

Learners found this question difficult, it was obvious that many learners had not learnt about isotopes and therefore did not know what to do with the number given to them.

Some scored the intermediate compensation mark but in cases where the calculation was not clear it looked as though candidates were trying combinations of numbers to arrive at a correct outcome. As with the previous calculation some candidates either added or multiplied all the numbers together if they were unsure of what else to do.

The example shows a correct answer with clear working, which is good practice for learners.

(f) Chlorine occurs naturally as two isotopes.
Chlorine contains 75% chlorine-35 and 25% chlorine-37.
Calculate the Relative Atomic Mass of chlorine.
Show your working. (2)

$$\begin{array}{l} 35 \times 75 = 2625 \\ 25 \times 37 = 925 \\ \hline 2625 + 925 = 355 \\ 100 \end{array}$$

35.5

(Total for Question 8 = 8 marks)

Q9

This final question was a challenge to many learners, although many did better on this than they did on the other 6 mark question.

The majority of learners were able to score 1 or 2 marks for giving a basic description of the effect of the acid rain on the lake. Better learners however, were able to give a detailed explanation of how the acid in the lake could be neutralised, though many of these learners did not give any detail of why the lake needed to be neutralised in the first place or the problems that might be caused by the acid.

You can include appropriate word or symbol equations to support your answer.

Mr Bream can reduce the acid in his lake by neutralising it, he should test how much acid is in the river by using the pH scale then he should put the same amount of alkali in the river this will make the balance even and let the fish live in a nice clean lake this method is called neutralisation

A very common response was to either put a cover over the lake or to move the fish elsewhere. Clearly these were attempts at answers that did not address the science and were used by learners that did not possess the scientific knowledge that was required to be able to give a better scientific response.

The response to levelled questions such as this remains problematic and is an area for development in many centres.

9 Mr Bream manages a fish farm in a lake. He is concerned about the impact that acid rain may cause to the lake.

Giving specific problems in your answer, **explain** how he can reduce the effects of acid rain.

You can include appropriate word or symbol equations to support your answer.

We could add a roof to protect him from the acid rain.

by taking the fish out of the water

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