Examiners' Report/ Lead Examiner Feedback

March 2016

NQF BTEC Level 1/Level 2 Firsts in Applied Science

Unit 8: Scientific Skills (20474E)

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Overall Comments

Learners were generally well prepared for answering many sections of the paper. It is clear that learners are improving in their ability to draw graphs of various types and to interpret data from them. Learners are increasingly confident in taking data from tables and graphs and giving descriptions of what they contain or show. Many learners can give some of the aspects expected in a plan for an experiment. Simple calculations involving averages are generally completed correctly.

In this examination learners found substituting values into an equation and rearranging the equation a challenge. Learners find explaining improvements to an experiment difficult or any form of explanation of data. It was evident that some learners had not seen some of the simple tasks that were in the paper, for example measuring the length of leaves, or using agar plates to look at bacterial growth. In some cases answers to these questions were very general and missed the marking criteria.

A recurring theme in these reports is the difficulty many learners have in distinguishing between a description and an explanation. Many learners can give a description, but they then struggle with explaining the situation that has been presented to them. Centres must spend time on preparing learners for answering 'explain' questions. This is difficult, but it is limiting the marks of many learners. In both the six mark questions many learners did not give enough detail and hence had their marks limited. In Q7(b), the final, levels based question, many learners simply repeated the stem of the question.

Q2(b) was the planning question from section A of the unit 8 specification. A significant number of learners did not fully read this question and devised a plan relating to counting spikes, rather than to looking at the length of leaves. Some learners spent a good deal of time explaining a plan that was not asked for. Learners must read the question carefully before attempting it.

In some questions that were awarded 1 mark, learners often wrote lengthy responses that were unnecessary. Q5(b) is an example where one or two words would have been sufficient. Some learners gave answers that went over several lines. The command word in the question was 'state'; this requires a short response. Learners would have done better by spending time on the questions worth more marks. Centres should make clear to learners the demand of the command word that is in every question.

In previous reports it has been made clear that this examination is based on practical activities. It is still apparent that many learners have a lack of some of the skills that are developed in the Unit 8 specification. Learners will greatly benefit from being exposed to as wide a range of practical scenarios and activities so that they can develop the necessary skills to answer the questions set in this examination.

Feedback on Specific Questions

Q1(b)(i) and Q1(b)(ii)

This question focused on risks and hazards. Some learners were not able to distinguish between these two ideas. In a number of cases learners considered that the flame was a risk and that the hazard was being burnt. This is the wrong way round. In addition some learners gave generic answers to Q1(b)(ii) and used the idea that there may be broken glass, which was not an acceptable answer.

Q1(c)(i)

Many learners were able to give at least one control, usually the ball or some aspect of the ball. Many gave the ruler, incorrectly as the second control.

Q1(c)(ii)

This item gave some learners difficulty. Some learners incorrectly considered the height that the ball was dropped from. In many cases it was clear that learners were not really sure of what dependent variables were and how these differed from control variables.

Q2(a)

This question usually gave one mark for stating that the number of spikes increases with the length of the leaf.

This answer gained both marks:

> The data shows that the number of spikes increase when the length increases but once reached a certain length the huber of spikes stays the same.

The learner has given both the points from the mark scheme. The second marking point was seen less often.

Q2(b)

This six mark points based question was a challenge to many learners.

The answer below gives an example of a 5 mark answer.

3-5 (6)

Collect^ holly leaves from near the bottom, middle and top of the tree and ~~count how many spikes are on the leaves. Collect the leaves from only one tree to make it a fair test.~~ measure the length of each leaf and record the results in a table. You should only collect leaves from one tree to make it a fair test. You could conduct the ~~ex~~ experiment on others trees but keep the results seperate from the other trees.

The learner has suggested collecting leaves from three different heights, measuring the length of the leaf and collecting leaves from the same tree. The learner goes on to state 'collect 3-5 leaves' which is a repeat mark on the mark scheme. Finally the learner suggests that the experiment could be conducted on other trees. It was rare to see an answer with such detail.

More typically learners gained 3 marks. This is a three mark answer.

Your plan should include the:

- measurements Rami should record
- factors Rami should control.

(6)

use 5 different heights of holly leaves
and test each height twice to make
the investigation more reliable. For example
heights could be 2, 4, 6, 8, 10. ~~state~~
Record each result after you have tested
it. Make sure when doing the experiment,
you are using the same type of leaf. A
holly leaf. Use the same holly tree.

The learner indicates five different heights and that each height should be repeated twice and finally that the same type of tree should be used.

Many learners scored one mark for measuring the length of the leaf.
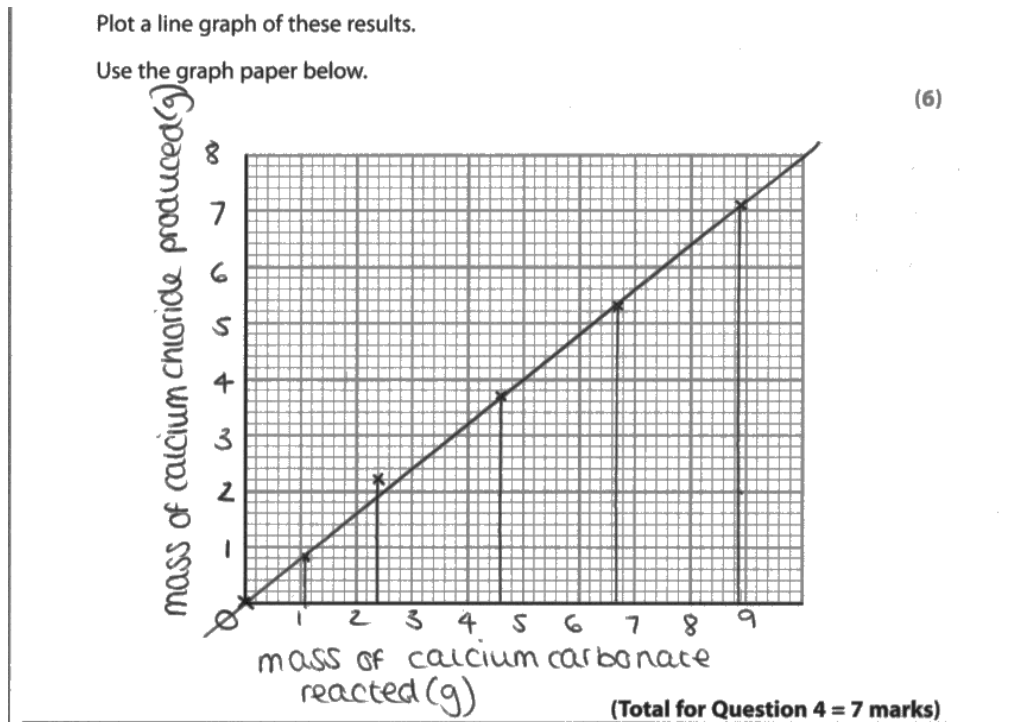
Q3

This question was a challenge to a few learners. The headings should have been 'metal carbonates' and 'relative formula mass' , 'formula mass' was acceptable, but not 'mass'. Many learners who scored less than three marks did so because they used 'mass' in the column heading. Learners need to be careful when completing tables that they do not abbreviate names as this can lead to a loss of marks.

Q4(b)

Many learners are becoming more confident in producing a graph. There are a few that lost marks for forgetting the unit on each axis. Scaling remains a problem for many learners, there were a considerable number that used the numbers straight from the table to produce the numbers on the x and y axes. In some cases learners made errors on their graph and the centre gave the learner another piece of graph paper on which to draw the graph. In cases like this the

size of the graph paper provided must be the same as in the paper. An A4 sheet of graph paper is not an acceptable alternative to the graph square in the paper.

The graph below is a good six mark answer. Both axes are labelled and have units, the sales are linear and take up the graph paper and the plotting and line are correct.

Plot a line graph of these results.

Use the graph paper below.

(6)

(Total for Question 4 = 7 marks)

The graph below scored 3 marks. At first sight it does not look much different to the previous graph, but, the units are missing from the axes and one of the points is incorrectly plotted and the line does not pass through 0,0. This reduces the mark significantly.

(Total for Question 4 = 7 marks)
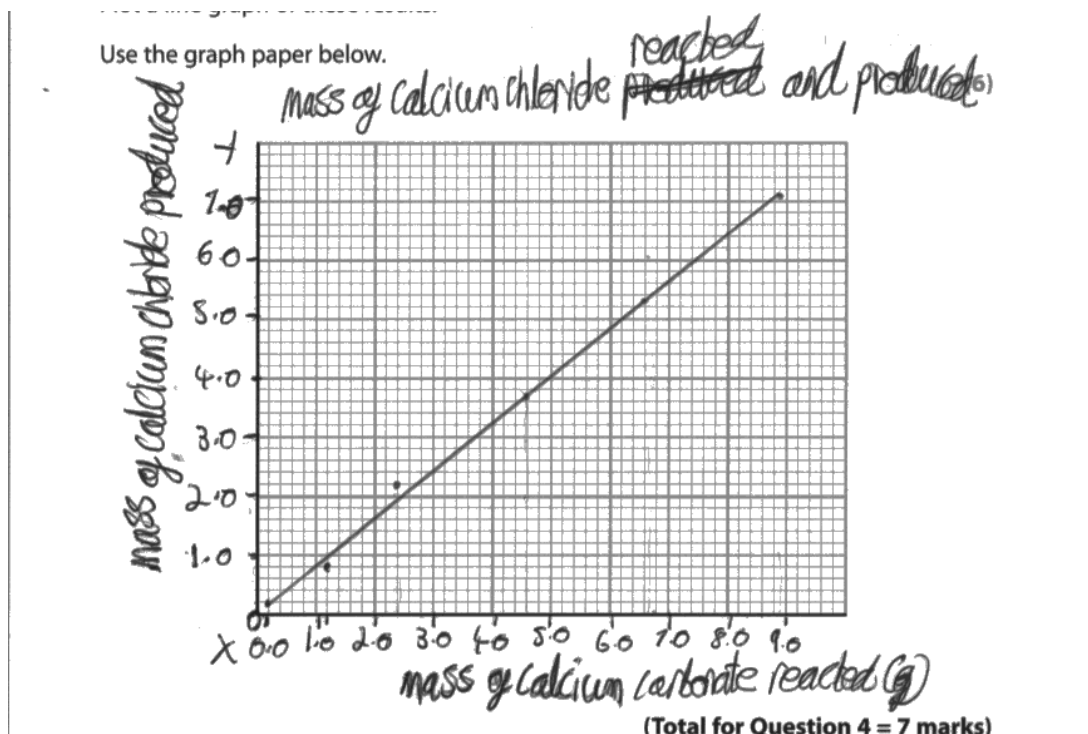
The final graph is typical of those where the scaling is incorrect as the numbers were taken from the table directly. Just one mark can be scored here for the labels with correct units.
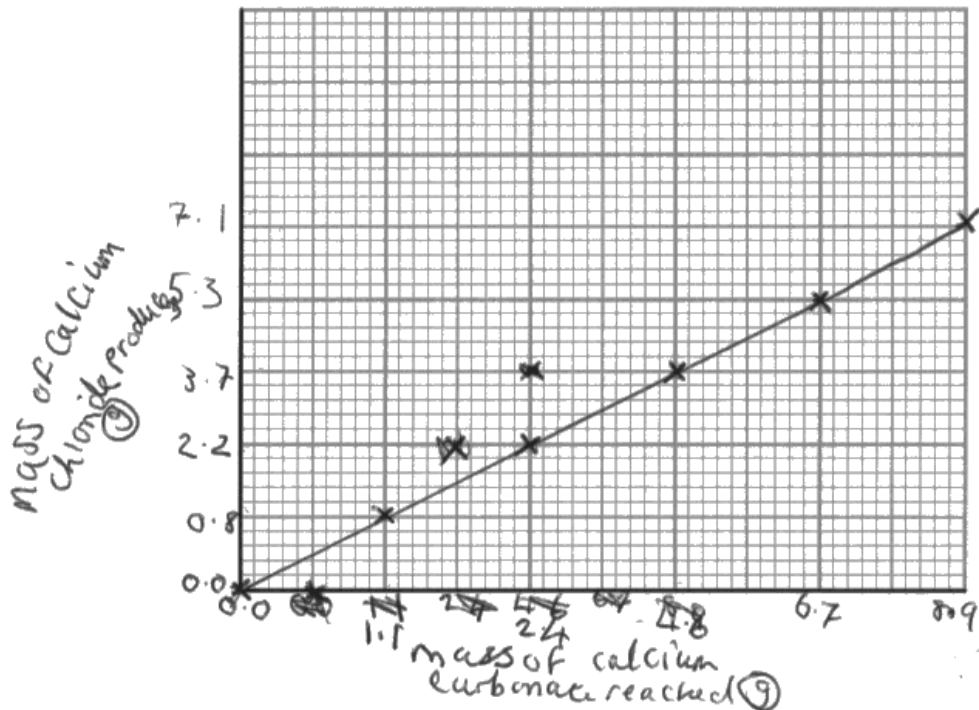
(Total for Question 4 = 7 marks)

Q5(a)

This answer is worth both marks. The learner has identified the type of indigestion tablet and has stated the most carbon dioxide is given off. The second mark was for a comparative statement.

B contained the most as
it produced the most
carbon dioxide 185

The answer below scores one mark as the comment on carbon dioxide is not a comparative.

(2)

Table B be metal carbonates are produced when carbon dioxide is produced.

This question is a simple explain item and the learner must give the reason why B is the best by making a comparison with the others in terms of carbon dioxide production.

Q5(b)(i) and Q5(b)(ii)

Both these questions were generally answered well. Learners could give reasons for anomalies and could easily state what to do when there were anomalies. Learners are becoming more confident in answering questions of this sort.

Q6(a)(i)

Most learners were able to identify the anomalous result, but were less confident in explaining it. This is a two mark answer.

The dim light test 2. It is not as close as test 1 and 3 which are 495, 500. Test 2 is no where near them.

The learner has identified the anomaly and compared the value to the ones on each side of it in the row.

Q6(a)(ii)

This question gave correct answers from many learners. Working out an average correctly is becoming more common. In the example below the full working out is shown.

(ii) Calculate the average resistance of the LDR when the light is **bright**.

Show your working.

(2)

220 + 222 + 227

220
222
227
———
669

664 ÷ 3 =

223
3 | 6 69

223 .... ohms

In many cases learners do not show working and so risk losing intermediate marks to the answer. Centres should encourage learners to show their working in all calculations.

Q6(a)(iii)

This question gave many learners a great deal of difficulty. The idea of significant figures and appropriate rounding of numbers continues to be an aspect of section B of the Unit 8 specification that causes difficulty. Very few learners scored any marks in this part. The answer below is a rare example of a two mark answer.

Because the answer goes into to many decimal places the answer should be rounded to (192)

Q6(b)(ii)

Learners are becoming more adept at describing trends in data on graphs. Many scored at least one mark for describing the relationship, but few were able to score the mark for describing the direct proportion.

Q6(b)(iii)

Many learners found this calculation based on a formula difficult. The rearrangement to give the answer was the biggest problem. Many learners gave an answer of 0.45 by multiplying the numbers, far fewer were confident in rearranging and then dividing to give the answer 5 ohms.

Q7(a)

This 4 mark question required learners to explain two weaknesses in the conclusion. Learners were able to describe reasons for why the graph did not support the conclusion made, but could not explain them using the data on the graph. In many cases a mark was scored for noticing that the graph ended at 2004, but did not then go on to explain that it was not possible to know what had happened to the resistance of MRSA after that date. Many learners described the graph, but did not do anything else.

Q7(b)

This was a six mark levelled question. Learners found this question difficult and scored few marks. The same issue as in previous series occurred. Learners did not explain improvements. Without explanations it is not possible to move beyond the Pass marks. In many cases learners restated the stem of the question and this did not score marks.

This is an example of a distinction level response.

(6)

- Could get a specific bacteria like Salmonella or ecoli for instance.
- Specifically place the antibiotics where you placed your bacteria so they can kill them.
- Place the agar plate in a specific temperature like 30°c.
- Have a table so you can record the results and place the results in.
- Have the same person doing the experiment.
- Have the same type of antibiotic (brand).
- Have the same size agar plate. For instance 10 cm diameter wide.
- Place the same amount of bacteria each time

in the agar plate.
· Leave the agar plates for 1 week.
· Count the amount of bacteria killed.
· Seal the agar plates so nothing goes
inside it.

The learner has given an improvement 'specifically place the antibiotics where you place the bacteria so they can kill them'. The learner has then given a further improvement which has been explained 'seal the agar plates so nothing goes inside'. The learner also states that the agar plates should be placed at a specific temperature and has the same amount of bacteria. These are not explained. There are two explained improvements and some good improvements without further comment. Very few learners gave answers of this type.

The learner has been given a Pass for this answer as there are improvements, but without explanations and this limits the mark to a Pass level.

· State How much bacteria you wanna
  put on the agar plate.
· State how much antibiotics to put on
  the plate.
· Use a range of up to 5 different plates
  and repeat the experiment So it The
  results are reliable.
· record how ~~much~~ bacteria was on
  the plate at the start and at the
  ~~begining~~ finish to see how much was
  killed.
· State how warm the place has to be.

The learner has scored the Pass for stating 'how much bacteria' and 'how much antibiotics'.