Examiners' Report/
Lead Examiner Feedback

June 2014

NQF BTEC Level 1/Level 2 Firsts in Applied Science

Unit 8: Applications of Science (20474E)

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk for our BTEC qualifications.
Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson.
Their contact details can be found on this link: www.edexcel.com/teachingservices.

You can also use our online Ask the Expert service at www.edexcel.com/ask. You will need an Edexcel username and password to access this service.

Pearson: helping people progress, everywhere
Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your learners at: www.pearson.com/uk

June 2014
Publications Code BF038169

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

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	Merit	Distinction
Boundary Mark	0	11	20	29	38

Provisional qualification outcomes for BTEC First Level 1/Level 2 Award.

The provisional qualification outcomes for the BTEC Level 2 awards can be found below.

2013 – 2014	D*	D	M	P	L1	U
Claims: 52,247	0.45	1.38	13.39	71.90	96.21	100.00

These outcomes reflect the cumulative percentage of learners who have received each grade for the qualification this year.

These figures are provisional because we are expecting more learners to claim their overall qualification outcome over the coming weeks. We will publish updated qualification outcomes in due course.

Outcomes explained
An aggregate qualification grade is where all unit outcomes are joined together to give a final grade for the qualification. Full details on how the qualification grade has been calculated can be found here (page 30):

http://www.edexcel.com/migrationdocuments/BTEC%20Firsts%20from%202012/BF029957-Specification-BTEC-Level-1-2-First-Award-Application-of-Science.pdf

2013 – 2014	D*	D	M	P	L1	U
Claims: 82,247	1.56	5.31	22.62	65.25	96.21	100.00

Number of claims released by August 2014

Eg: proportion of learners claimed & grades released achieving a merit or above 2014

We will be publishing full year qualification outcomes for BTEC in the autumn.

Overall comments

This was the second time this paper has been set. Some learners appeared to be well prepared for the paper, as they were aware of key variables and how to control them. They were able to plot line and bar graphs and attempted the long answer questions with confidence. A few learners were able to analyse results and were able to draw simple conclusions. However, there appeared to be a larger cohort of learners than in March 2014, who lacked basic knowledge of the specification they should have been taught. Consequently the performance on this paper was not as good as the performance of students who took the paper in March.

Learners that did well with this paper did so because they were able to follow their descriptions and identifications of patterns or analysis of results with linked consequences or conclusions. They were able to manipulate formula and draw faultless graphs and add appropriate trend lines. They were able to apply their understanding of variables, planning, data manipulation, conclusions and evaluations to new situations. However, there were a large number of learners who were unable to plan a method for a simple practical and clearly lacked practice at this skill.

It is evident that learners did find the examination difficult and in many cases this is because learners were not prepared for the examination in terms of the use of key skills such as practical planning, numeracy, scaling skills and literacy. Learners frequently found it difficult to communicate effectively what they were trying to say, thus failing to gain full marks. Many learners clearly had not had frequent opportunity to complete a blank results table before or to scale a graph that did not start at zero. Consequently, they struggled to comprehend what column headings to place where in a table and were not able to use an appropriate scale when plotting a graph. Few learners understood how to plan an experiment and should be encouraged to do so more often.

It was apparent that more learners had access to the basic equipment needed for the examination such as a calculator and ruler. This made it easier for them to draw the graphs and lines of best fit accurately and precisely enough to be given credit. The number of learners who tried to complete the calculations without a calculator was much fewer than in March. More learners than in March appeared to know how to use a formula. However, there were still a significant number of learners who tried to use the numbers given in a variety of ways in search of the answer. Few learners understood the idea of significant figures.

Centres should continue to work with learners in assisting them with building their practical skills and skills in sentence construction, writing practical methods, conclusions and evaluations. Reading the question to comprehend what it is asking may be self-evident, but many learners evidently did not do this and need to practice this. Learners should also have the opportunity to plan their own practical activities and results tables, so that they understand how variables and data should planned for and presented. Equally, giving learners more opportunity to plot graphs with a variety of different scales would enhance their performance in the examination. Learners need to be introduced to the command words frequently through practicing exam technique and questions. Many learners did not understand that when they are asked to explain, that they need to answer in more depth.

Feedback on Specific Questions.

Q1ai Most learners were able to identify the correct piece of equipment from the diagram given in the question, as 'gas syringe'.

(a) (i) Identify, from the diagram, the piece of equipment used to measure the volume of gas collected.

(1)

Gas Syringe

A few students gave other pieces of equipment such as conical flask.

(a) (i) Identify, from the diagram, the piece of equipment used to measure the volume of gas collected.

(1)

Conical flask

A surprisingly large number of students misspelt the answer, given that the correct spelling appeared in the question. In this case there was not really anything else the student could be indicating and was credited. However, if there are other similar words required in the questions incorrect spelling would not be credited.

(a) (i) Identify, from the diagram, the piece of equipment used to measure the volume of gas collected.

(1)

gas Syinge

Q1aii The majority of students were able to identify 'thermometer' as the correct piece of equipment for measuring temperature. Again some of the spelling was incorrect.

Q1b

A common misconception learners had with this question was that opening the 3 way tap allowed for a "fair test" and enabled "accurate results" to be collected. Learners commonly failed to realise that carbon dioxide produced by the yeast would be collected by the gas syringe and often commented that the purpose of the 3 way tap was to allow gas to be "injected from the syringe into the conical flask so that the yeast could use the O2 for respiration". They failed to realise that the layer of oil on top of the yeast meant that the yeast would be respiring anaerobically.

Learners who did understand that the syringe would collect the gas produced, commonly failed to give two reasons for opening the 3 way tap. Often commenting that opening the 3 way tap would allow the gas into the syringe so the gas could be measured. This was the same marking point on the mark scheme and so only worth 1 mark.

(b) State **two** reasons why Martin and Hazel must open the **3-way tap** at the start of the experiment.

(2)

1 To measure the volume OF gas.

2 To exclude air.

Few learners were able to explain that one of the main reasons for opening the 3 way tap was to prevent the bung from pushing out of the flask. This learner was awarded two marks as they have identified two correct reasons for opening the 3 way tap.

(b) State **two** reasons why Martin and Hazel must open the **3-way tap** at the start of the experiment.

(2)

1 Then the gas can be measured through the gas syringe, if not then its trapped.

2 The gas will just keep building up if the tap isn't opened, then it may cause pressure and break the glass.

Q1ci

Learners often failed to comment on the factors that would be controlled about the yeast. Often learners referred to the concentration / volume of glucose or the size of the layer of oil placed on top of the yeast, rather than the same volume and type of yeast.

Learners often referred to a physical method of controlling the yeast such as "use less or more yeast" or "give the yeast more or less glucose so it respires at a different

rate". There was an obvious lack of understanding of what was meant by a control in an experiment. Where learners did comment on factors relating to yeast such as the volume of yeast they often failed to comment that the volume would need to be kept the same. "Same type / species of yeast" was rarely written.

The idea of controls is a fundamental part of Learning aim A from the unit 8 specification and it was disappointing to see so many students who did not clearly understand the term.

This was awarded 1 mark for 'keep the same amount of yeast'. The second response did not refer to a way of controlling the yeast and was therefore not credited.

(c) Martin and Hazel need to control the yeast suspension for their experiment.

(i) State **two** ways in which they could control the yeast suspension.

(2)

1 Keep the same amount of yeast suspension.

2 Make sure there is a layer of oil to exclude air.

This learner was awarded two marks as although 'same product yeast' is perhaps a rather clumsy way of saying it, the learner does identify that the yeast should be kept the same. The first point also receives a mark for same amount of yeast.

(c) Martin and Hazel need to control the yeast suspension for their experiment.

(i) State **two** ways in which they could control the yeast suspension.

(2)

1 They can keep it the same amount of yeast each time.

2 They can use the same product yeast to keep it fair.

Q1cii

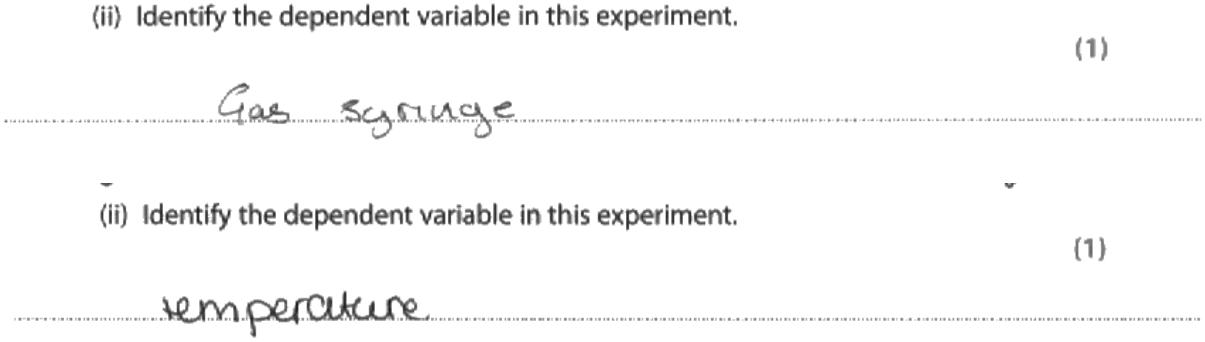
The correct answer of time to collect a fixed volume of gas was rarely written. Some learners wrote about the rate at which carbon dioxide is produce, which was credited.

(ii) Identify the dependent variable in this experiment.

(1)

The rate at which carbon dioxide is produced.

Reference to the gas produced was a common answer but a common mistake was a reference to the "amount of gas" rather than the "volume of gas". It was clear that learners were unclear as to what is meant by a dependent variable and often answered with a piece of equipment that would measure something in the experiment e.g. thermometer or gas syringe.


(ii) Identify the dependent variable in this experiment.

(1)

Gas syringe

(ii) Identify the dependent variable in this experiment.

(1)

temperature

Another common answer was that the respiration rate of the yeast was the dependent variable highlighting that learners are unclear that the dependent variable is the aspect that is measured directly. Again this is a little disappointing as it is again a fundamental part of learning aim A in the unit.

Q1d

This item proved very challenging to learners. Learners could often give a response that related to the same amount or volume of yeast and then perhaps the idea of temperature range. A few tried to mention repeats, but these were general comments and the learners had no concept of why repeats may be used e.g. to calculate a mean for each temperature.

Many learners misunderstood what they had to do and discussed aspects of planning that were irrelevant to what was on the mark scheme. Students relisted equipment from earlier in the question, but did not explain how to get results to prove the hypothesis. Many talked about heating the yeast mixture, but were describing a constant change to temperature, rather than taking readings over time at specific temperatures.

A typical response that gained no marks

(d) Martin and Hazel want to find out what the optimum temperature for the respiration of yeast is.

They make a hypothesis:

As the temperature increases the yeast will respire faster, until it reaches the optimum temperature. When the temperature goes above 40 °C the yeast will stop respiring.

Write a plan for this experiment that would test this hypothesis.

(6)

Martin and Hazel could first of all use the method of increasing the yeast but also recording it to see the difference and impact it has. Also by using this hypothesis it'll enable you to feature and effects of the yeast temperature and how its functioned.

A typical 3 mark response

- a range of temperature is given
- including below and above the optimum temperature
- measure the volume of gas

Set up the equipment as shown in the diagram, draw a table then write down the temperatures 10°c, 20°c, 30°c, 40°c, 50°c and 60°c write down the volume of the gas at these temperatures and see if the yeast stops respiring at the temperature increases after 40°c.

It was evident that learners have not had experience of planning a range of practical activities and if students are to perform well they must be given more opportunity to develop their practical skills in Centres.

Q2a

Many learners were able to identify a hazard with the practical. However they were asked to identify the risks. Therefore a common mistake was identification of a hazard rather than a risk. I.e. identification of “hot water” rather than “burns from hot

water". Learners often referred to a precaution to minimise the risk such as "they should wear gloves" rather than identification of the risk itself.

0 marks, no risks given just ideas of things that could be dangerous, e.g. the needle would get hot

(a) Identify **two** risks when carrying out this experiment.

(2)

1 the water could boil over

2 the needle could get hot and the food melts

1 mark - It might prick or cut' is the first mark point on the mark scheme for this question.

(a) Identify **two** risks when carrying out this experiment.

(2)

1 Need to be careful and sensible while using needle or it might prick or cut and it would be heated

2 Need to put a heat mat underneath the boiling tube so, if the flame is from the food falls out it would burn the table or cause any other harm..

2 marks for identifying both the major risks.

(a) Identify **two** risks when carrying out this experiment.

(2)

1 burning yourself on either the hot food or hot water.

2 Stabbing or cutting yourself with the needle.

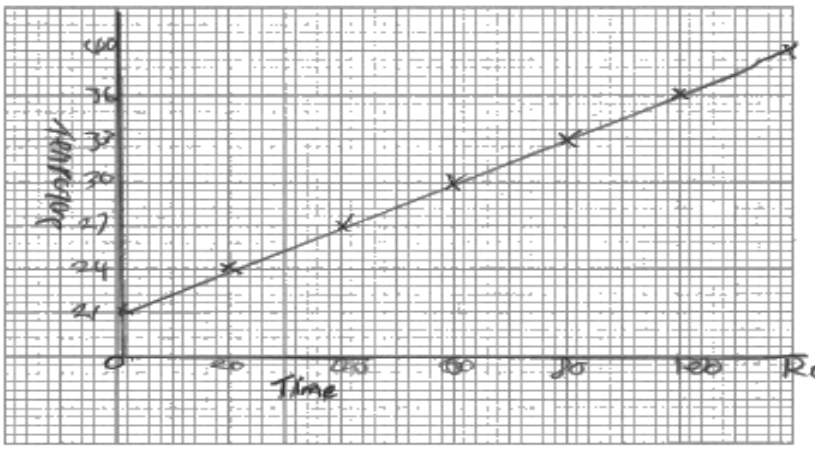
Q2b

Many learners scored 4 or 5 marks for this graph question. However, 6 marks eluded all but a very few learners. This was mainly as a result of starting the y axis at 0 rather than 20 and thus having a graph that was too small.

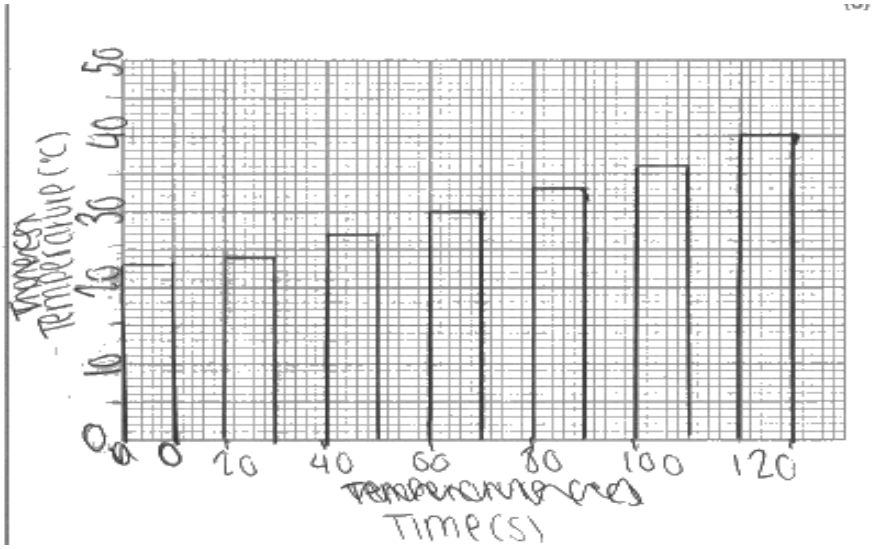
The line of best fit was another mark lost by a number of learners, dot to dot and poor lines were very commonly seen. This is an area that Centres need to work on with their learners. Many could score the remaining 4 points easily. Weaker learners were able to put in place linear scales and plot the points, even if they could do little else. Hence 3 marks were common. There were a few who scored less, but these

clearly had difficulty in seeing what the graph was about and even how to start drawing it.

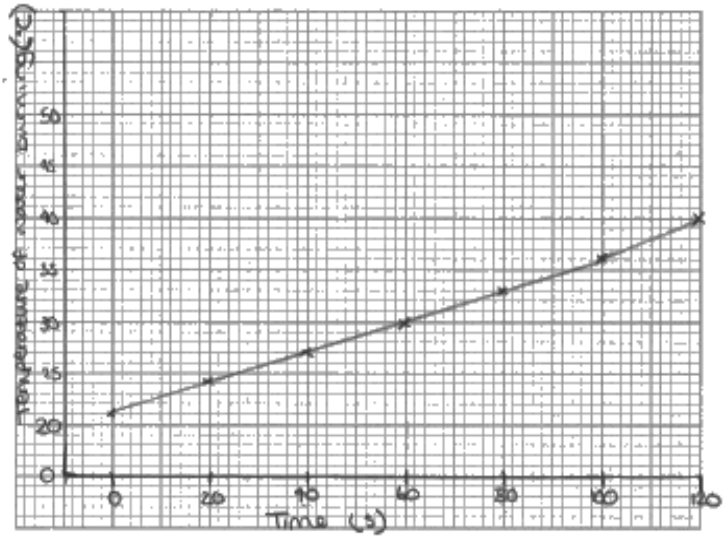
A few learners tried to plot a bar chart or placed the numbers to be plotted against the y axis in an evenly spaced way. This meant that they could gain a maximum of two marks.



1 mark.
The numbers on the y axis are taken directly from the table and are evenly spaced.
This means the learner can only gain a maximum of 2 marks.
One for correct labelling and one for correct x axis.
In this case there was no mark for labelling axes but one awarded for correct scaling of the x axis.

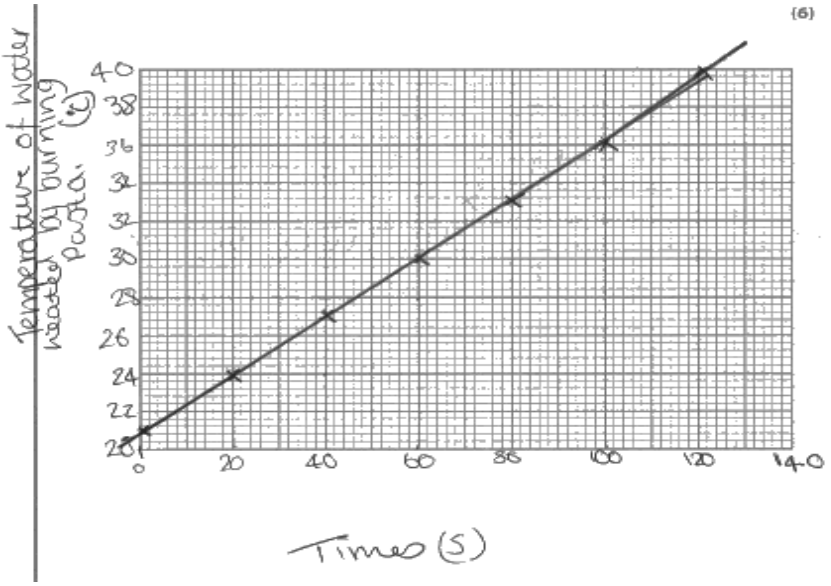


2 marks
The x axis is correctly scaled (1) and the correct axes labels and units are given (1).

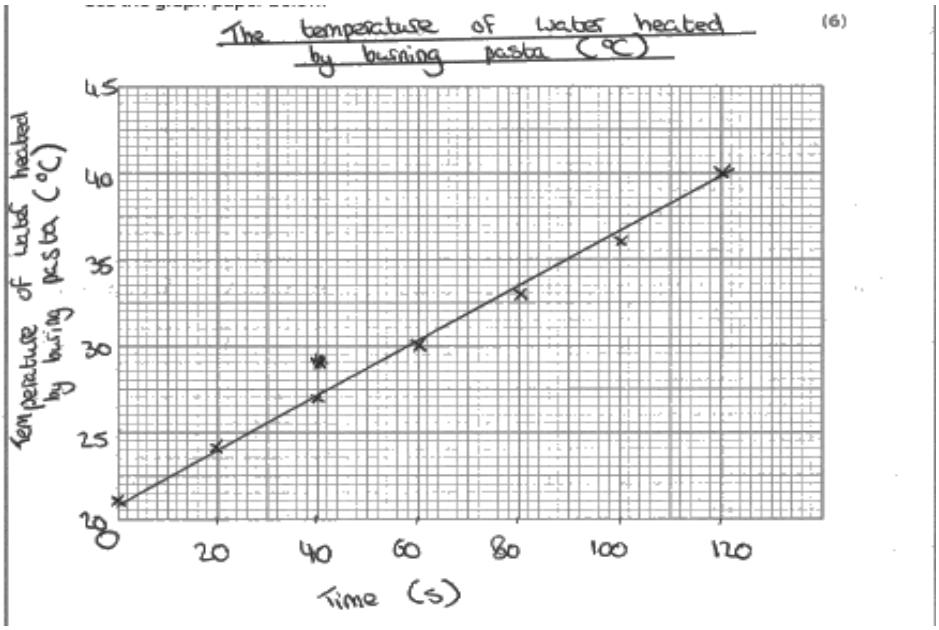


Total 4 marks

- correct labels and units (1)
- the scale on the x axis is fine for 1 mark (1), the 0 on the x axis is not on the same line as the y axis but this is fine as the scale on the x axis is still correct.
- The scale on the y axis is not large enough to allow plotted points to cover at least half of the graph paper. (0)
- plotting plots are fine to these scales (2)
- the learner has drawn a dot to dot line rather than one straight line of best fit. (0)



5 marks
The learner gains the axes labelling and scaling marks (3) and the plotting marks (2).
However the line of best fit is scruffy across last two points. It must be one single straight line of best fit.
Tramlines and feathering are not acceptable.



The learner has everything correct and gains the full 6 marks.
Although there is a scribbled out point at 40, this is ignored as the learner has then corrected it and plotted the point correctly.

Q2c
Many students could identify that potato chips heated the water up more, but did not quote correct specific trends in the data for the second marking point. Some students did not refer to the water being heated so scored zero.

This response did not score any marks. Getting hotter at a steady rate is insufficient for credit as there is no reference to the effect of burning the food on the temperature of the water.

(c) Joe and Nigel repeated the experiment for a potato chip.

Food	Time (s)	0	20	40	60	80	100	120
Pasta	Temperature of water (°C)	21	24	27	30	33	36	40
Potato chip	Temperature of water (°C)	21	28	32	36	40	44	48

Describe what the data shows about the temperature change of the water produced by burning the foods.

(2)

The longer it burns the hotter it gets and it gets hotter at a steady rate.

This response gained 1 mark for explaining that burning a potato chip has caused the water temperature to rise more than burning a piece of pasta.

This information shows us that burning a potato chip has caused the water temperature to rise more than burning a piece of pasta. This suggests that the potato chip contains more energy than the pasta.

This response gained 2 marks as the learner has identified that burning food raises the temperature of the water and has identified the difference in temperature of the water heated by potato and pasta.

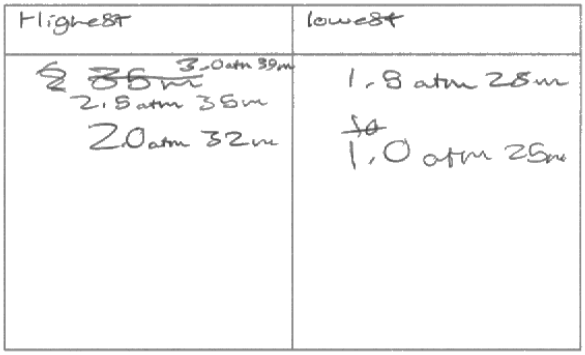
The data shows that different foods, change the temperature when being burnt. For example at 0 seconds, the temperature of water when pasta is burnt was 21°C as well as potato chip. But by 120 seconds, the pasta's water temperature was 40°C and potato chips was 48°C. So they is a difference of 8°C.

(Total for Question 2 = 10 marks)

Q3a

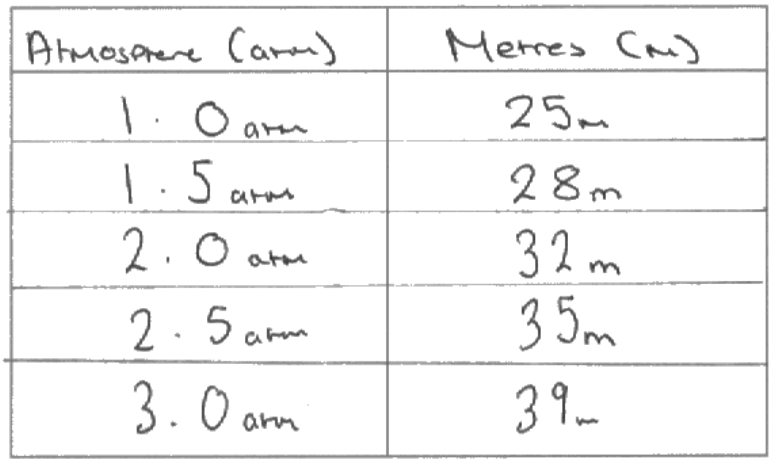
This question was generally well answered, with most learners able to put the data into two separate columns. However, many are still making errors. The main errors seen were students writing 'atms' and 'm' instead of labelling the column headings as asked. Also not arranging the data in ascending or descending order was a common error. The majority of learners gained 2 – 3 marks.

0 marks – a few learners had no idea how to record the data in the table.



2 marks – this was the most common error. The headings are incorrect; units on their own are not credited.

The numbers are together in the correct columns and are in ascending order and so gain the last 2 marking points.



This learner gains 3 marks as distance is an acceptable alternative to height. The data is in the corresponding columns in ascending order.

amount of pressure (atm)	distance (m)
1.0	25
1.5	28
2.0	32
2.5	35
3.0	39

Q3b

Most learners could calculate the mean by adding the four numbers together and dividing by four. However, few students understood what 2 significant figures meant. Therefore a common mistake was not round 28.25 to 28. Some learners often failed to divide by 4. A few learners seemed confused about what was being asked of them (e.g. mean, median or mode) and therefore were unable to give the correct answer.

1 mark as the answer has not been rounded to two significant figures.

Kim and Emma repeated the experiment for 1.5 atm and recorded the following four heights:

28 m 29 m 27 m 29 m

(b) Calculate the average for these four heights, to two significant figures. (2)

28m + 29m + 27 + 29m = 133

133 ÷ 4

28.25 m

2 marks the learner has calculated the mean and then rounded to two significant figures.

Kim and Emma repeated the experiment for 1.5 atm and recorded the following four heights:

28 m 29 m 27 m 29 m

(b) Calculate the average for these four heights, to two significant figures. (2)

28 + 29 + 27 + 29 = 113

113 ÷ 4 = 28.25

28 m

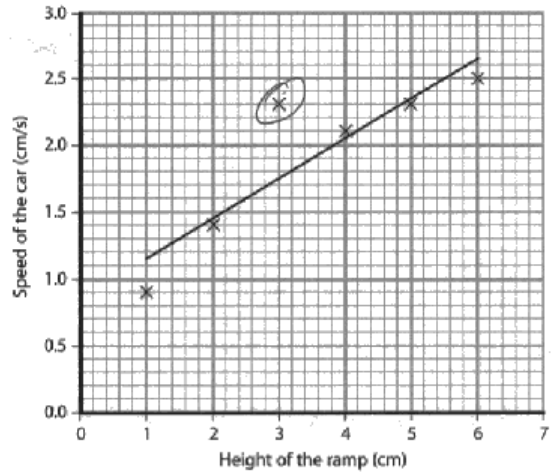
Q4a

This question was generally well answered with learners often referring to the increase in speed, acceleration, velocity or comments such as “the car goes faster”.

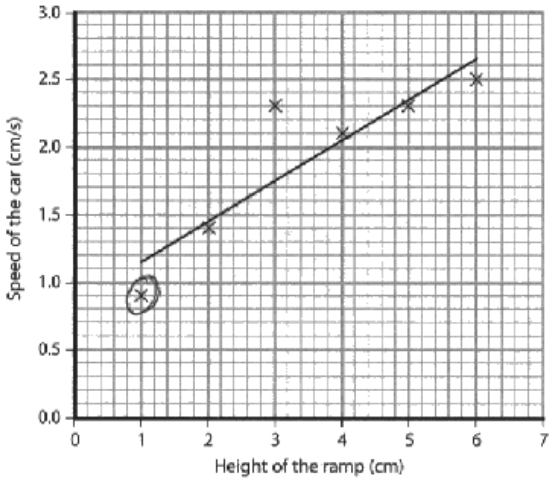
Q4bi

This question was generally well answered but some learners were careless with their circles making it difficult to identify the answer they had given. Learners had a choice of two anomalous points that they could identify and most learners identified one or both points.

(b) They plotted the results as a graph.



(b) They plotted the results as a graph.



Q4bii

Most learners were able to identify 1 or 2 sources of error. However only some learners were able to link the source of error e.g. the ramp being steeper than it should have been, to the effect on the speed of the car. A Common mistake was talking about recording speed rather than time or calculating speed. Therefore, learners often achieved the first mark of a linked pair, but did not get the linked effect this would cause, for the second marks.

A common response that gained 2 marks

(ii) Explain **two** possible errors that Connor and Ebony could have made in their experiment to produce this anomalous result.

(4)

1 the Person letting go of the car might have Pushed it by anncident.

2 the Person ~~the~~ with the stop watch could of Pressed it to eadly.

A 4 mark response explaining the effect of the identified source of error.

(ii) Explain **two** possible errors that Connor and Ebony could have made in their experiment to produce this anomalous result.

(4)

1 they may have physically forced the car down the ramp by pushing it, meaning it would ~~the~~ travel faster than usual

2 they may have measured the time shorter than usual, meaning the speed would be calculated faster.

Q4c
Most learners identified the correct answer as 1.6cm. It was good to see that most learners are able to obtain readings from a graph and line of best fit.

Q4d
Most learners gained 1 mark on this question for substituting the values into the given equation. However, few learners converted 7cm to metres before completing the calculation and therefore got an answer of 3.5, rather than 0.035. A few learners made two mistakes by squaring the speed and failing to convert centimetres to metres. This gave an answer of 35, which gained no marks.
Learners need the opportunity to complete calculations where they must rearrange formula and convert units.

0 marks as the learner has made two mistakes – the learner has mistakenly squared the 10 to give 100 and has also failed to convert the 7cm to 0.07m

The formula for calculating this is:

gravitational potential energy =	mass ×	acceleration due to gravity ×	height
(J)	(kg)	(m/s^2)	(m)
	0.05	100	7

Calculate the gravitational potential energy for a car with a mass of 0.05 kg, at a height of 7 cm.

Acceleration due to gravity is 10 m/s^2.

(2)

0.05 x 100 x 7 = 35

Gravitational potential energy = 35 J

1 mark – the most common error was for learners to fail to convert the 7cm into metres.

(2)

J = kg x m/s^2 x m

0.05 x 10 x 7 = 3.55

Gravitational potential energy = 3.5 J

2 marks

J = 0.05 x 10 x 0.07

J = 0.035

Gravitational potential energy = 0.035 J

Q5ai

Most learners were able to identify the pH as 3.8. A few learners misread the table and gave a number that was not in the table at all. Learners should be given the opportunity to interpret results from a table.

Q5aii

This was a multiple choice question and the vast majority of learners identified C 12 cm3 as the correct answer.

Q5b

It was apparent that the term 'explain' was not understood in the question. Learners gave a response that indicated an improvement, but not the reason; hence many scored 1 but very few scored 2. The general idea of 'fair test' and 'to make the results

better' was seen as responses, but they showed little understanding and were inadequate answers. Learners seemed reluctant to go the extra distance to explain their comments. This is an area that centres would be well advised to work on.
This learner has understood that an improvement would be to measure the sodium carbonate solution. It would have been more accurate to say the volume of sodium carbonate, but the answer is just credit worthy. The learner does not gain a second mark as there is no explanation as to why this would improve the experiment.
1 mark

(b) Gemma thinks that they could make some improvements to the method to make it repeatable.

Explain **one** improvement that could be made to their method.

Here is their method for the experiment.

1. Choose some amounts of sodium carbonate solution
2. Add some acid
3. When you can't see any more fizzing, measure the pH

(2)

She should measure the sodium carbonate solution first before add some acid into it, and also she should measure acid too.

2 marks
The learner has identified an improvement linked to the acid and has made a reasonable explanation as to why a specific amount of acid should be used.

Explain **one** improvement that could be made to their method.

Here is their method for the experiment.

1. Choose some amounts of sodium carbonate solution
2. Add some acid
3. When you can't see any more fizzing, measure the pH

(2)

Need to make specific measurements clearer for example need to say how much is 'some acid'? say 20ml of acid and 30g of sodium carbonate solution, record data on a frequency table measuring the temperature. This would make the results more reliable.

(Total for Question 5 = 5 marks)

Q6a
This question was generally well answered. Some learners failed to suggest reasons why the vaccine must be trialled but instead suggested reasons why the vaccine

should be available. E.g. “because flu kills a lot of people and should be eradicated” “to stop flu spreading to other people”. A common misconception is that vaccines can be used to treat / cure flu.
1 mark

The learner has identified allergies as a possible issue. This is an acceptable alternative answer to ‘make sure there are no side effects’.

(a) State **two** reasons why the flu vaccination has to be trialled.

(2)

1 To find out if people are allergic to it or not.

2

2 marks

The learner has given two good reasons for trialling vaccinations.

(a) State **two** reasons why the flu vaccination has to be trialled.

(2)

1 To see if the vaccination is working and clears the flu.

2 TO make sure there are no side affects.

Q6b
In many cases learners simply did not understand what they had to do. Some repeated the data in the table in narrative form, others failed to read the stem of the question and commented on the conclusions to be drawn, rather than the method of the task. In some cases there was complete misunderstanding, some learners thought that the ‘groups’ related to blood group and based responses on this. Where answers were successful the responses tended to be simple without explanation and so did not reach the first band Pass level 2. Some learners could give simple description and explanation for Pass level 2. Some learners managed to explain a few points to attain the second band on the question, which was level 2 merit. It was very rare to see a balanced response that could be awarded distinction. Centres are advised to enhance student’s ability to evaluate methods as well as data, conclusions and hypotheses.
0 marks

The learner has analysed the information in the table rather than explaining the strengths and weaknesses of the trial method.

Explain the strengths and weaknesses of the trial method used.

Use the information in the table to help you with your answer.

(6)

Group B had less people getting flu because they had a bigger amount of medication. However group A got more because they only gave people a small amount.

Band 1 - Level 2 pass

A pass level 2 response. The learner has identified a simple strength and weakness. The learner could have expanded on the comment about the volunteers having different injections, but did not explain in what way the injections were different.

The strengths of this trial method was that it was a fair test because they used 8000 people and then divided them randomly into four groups, they all had different injections showing the test was fair. a weakness of this trial method was that some volunteers may be more vunrable to flu than others.

Band 2 Level 2 merit.

The learner has identified several strengths and explained some of them. The learner does not reach Band 3 as the answer lacks balance in that there are no weaknesses identified.

The strengths are that they used the same number of people each time which shows that it is a fair test.
They also kept the saline solution the same throughout which meant that everybody had the same.
They used different dosages for different groups therefore testing its effectiveness.
There is a pattern with the number of people, it has prevented the flu for most parts

Band 3 Level 2 distinction

The learner has given both strengths and weaknesses and has explained two of them reasonably well. The third explanation linked to the same amount of people in each group is not as well developed as the other two. However, taken holistically the learner achieves band 3.

One of the strengths is that they used the same amount of people in each group which makes it fair and more clear on how many out of 2000 got the flu.

All 4 groups had something different injected into them to see if more flu vaccine had an impact on the developing of flu.

A weakness is they navent got 8000 people that are the same, height, weight ect, this could effect the results as Peoples bodies ~~would~~ might still need a certain amount of the vaccine for it to work in their body.

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481
Email publication.orders@edexcel.com
Order Code BF038169 June 2014

For more information on Edexcel qualifications, please visit
www.edexcel.com/quals

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE