

Principal Examiner Feedback

November 2012

GCSE Mathematics (Linear) 1MA0
Higher (Calculator) Paper 2H

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 students at: www.pearson.com/uk

November 2012

Publications Code UG033848

All the material in this publication is copyright

© Pearson Education Ltd 2012

GCSE Mathematics 1MA0 Principal Examiner Feedback – Higher Paper 2

Introduction

Candidates generally responded well to the questions testing quality of written communication (QWC). However, not all showed all necessary working in an ordered fashion. It is important in all questions that working is set out appropriately but this takes on even more significance in questions testing QWC. Candidates should also ensure in such questions that any necessary decisions are clearly communicated as well as the final answer. Correct money notation (such as in question 3) must be used and correct units, where appropriate, should also be given.

When the answer to a question includes geometric reasons these must be given in full with correct mathematical language.

Where candidates employ a build up method for percentage calculations then it is vital that they get their first value correct or show how this value is arrived at. Without this correct value or a correct method seen to find this value, no marks can be awarded. Incorrect or inaccurate methods to find 15% were frequently seen in question 3

Premature rounding was an issue for many candidates leading to the loss of many marks across the paper. Where the solution to a question involves a two stage calculation it is vital that accuracy is maintained to the end. Premature rounding in such situations often means that the final accuracy mark is lost.

Report on Individual Questions

Question 1

The vast majority of candidates were able to gain full marks for showing that they could use their calculator correctly. Some of those who did not gain full marks were able to pick up a mark for showing the numerator or denominator evaluated correctly. It was evident that some candidates worked out the value of both the numerator and denominator correctly but then reversed the division and so divided the denominator by the numerator.

The two most common errors were to have the complete fraction under the square root sign rather than just the numerator or to fail to work out the denominator (or use brackets) before carrying out the division. Candidates should be reminded to read the demand of the question carefully as some failed to give all the figures from their calculator.

Some incorrect answers would probably have gained 1 mark if the intermediate working had been shown. Encouraging candidates to estimate the answer before using calculator may help to avoid calculator errors.

Question 2

The reflection in part (a) proved demanding for many. Reflections in vertical or horizontal line were common as were translations. A significant number of candidates were able to reflect the vertex at the right angle correctly but then had the vertical side of the reflected triangle as 3 cm rather than 2 cm. Some tried to use different lines of reflection other than the given line.

In part (b) candidates had to name the transformation as a translation rather than give a written description. Likewise, giving a written description of the translation such as '2 left and 4 down' was insufficient; the correct vector had to be seen in order to gain full marks.

Common errors were incorrect signs on one or other of the vector components or incorrect order. The vector was inverted by many candidates with fewer either writing the vector as coordinates or omitting the brackets.

Question 3

Many correct answers were seen. It was disappointing that a significant number of candidates were unable to work out 15% of £581.58 accurately. This was usually due to a build up method using 10% and 5% being used. Candidates often failed to show the method to describe how they achieved their 10 and 5% values. In this event, candidates frequently gave the wrong values for either 10% or 5% (or both) or else lost accuracy through premature rounding. This was a question testing the quality of candidate's written communication. It was therefore important that all steps in the working were shown; which they usually were. However, done less well was giving the answer in a correct form.

The answer was an amount of money so did need to be given in correct notation which meant being rounded or truncated to two decimal places with a pound sign present. A significant number of candidates gained 4 marks out of the available 5 for giving their final answer as 494.343 rather than £494.34

Another commonly seen example of poor notation was £494.34p. Quite a few candidates were also confused by the extra unnecessary information that boxes were sold in packs of 1000, misreading the question and calculating the cost of 3000 packs.

Candidates routinely failed to subtract their value of 15% from the £581.58 giving a final answer of £87.23. A few candidates added, rather than subtracted, the discount.

Question 4

The vast majority of pie charts drawn were labelled correctly but there were still a few seen without any labels at all. Most candidates used the information provided in the table to work out the size of angles for the sectors. Some, but not many, candidates used the size of the drawn sector in their calculations. It was common to see pie charts drawn without any calculated angles written down.

Candidates would be well advised to show their angle calculations when working out angles for pie charts. It was disappointing that a significant number of candidates were able to calculate the angles correctly but were then unable to measure them accurately.

Question 5

Candidates who worked in minutes from the start were generally more successful than those who worked with fractions of an hour. Those who used fractions of an hour frequently carried out the conversion from hours to minutes incorrectly; multiplying by 100 rather than 60 was a common error. It was quite clear that a significant number of candidates did not understand the concept of speed and common errors were incorrect division or multiplication of given quantities. Confusion over what to do with the speed and distance was evident with many candidates producing answers that were clearly incorrect. A few candidates, having arrived at the correct times of 25 minutes and 30 minutes then added rather than subtracted their answers.

Question 6

This question has an asterisk next to the question number indicating that the candidates' quality of written communication was once again being tested. This time, the communication mark was for ensuring that the candidate both communicated the correct answer clearly and gave the correct geometric reasons.

Probably less than half the candidates were successful with ensuring that they concluded their working by stating $x = 19^\circ$ but were even less successful in writing down correct geometric facts. Working was sometimes difficult to follow; values written on the diagram in angles were accepted and frequently seen.

When geometric reasons are asked for, these should be stated clearly and in full. It is not, for example, sufficient to say 'triangles are 180° ', the full reason 'angles in a triangle sum to 180° ' (or equivalent) should be given. Both Z angles and complementary angles are not acceptable reasons and were rarely seen. Candidates are not penalised for incorrect spelling but, for example, 'alternative' and 'alternating' are not accepted in place of 'alternate'.

Candidates regularly confused alternate and corresponding angles. A common error was to see candidates subtract all given angles from 360 thus demonstrating a misconception of what an interior angle is.

Question 7

Many candidates clearly did not understand the concept of density. A common error was to start with $160 \div 17.8$; the vast majority of candidates who did this failed to gain any marks as they went onto multiply their result by 210. Candidates who carried out the correct method in two steps frequently lost marks due to premature rounding.

The majority of candidates found the weight of 1 cm then scaled this up to find the weight of 210 cm. However, some candidates successfully found the weight of either 50 cm (the difference in the two lengths) or 10 cm and used these weights to give the right answer.

A common error was to state that the weight of 10cm was 1.78g. A relatively high proportion of candidates lost the accuracy mark when using the latter method, however. Candidates who used repeated division to get 80,40 20 and 10 often lost marks due to premature rounding.

Question 8

The most common errors in part (a) were to either include 4 or exclude -1

Candidates were less successful in answering part (b). Common errors included writing \leq instead of $<$ and vice versa. Some candidates didn't give an inequality but gave a list of integer values instead and so gained no marks. Others had one end of the inequality correct and so gained one mark. In part b, a significant number of candidates omitted x , $-4 < 3$ gaining no marks.

Some candidates had 4 as their upper limit. In part (c) the most common error was to give their final answer as $y = \frac{7}{3}$ rather than $y > \frac{7}{3}$

Another common error was to go straight from $7y > 3$ to $y > 2.3$ without showing the correct accurate answer; candidates who did not show the accurate answer were not awarded the associated accuracy mark.

The correct statement $3y > 7$ was sometimes followed by the incorrect answer of $y > \frac{3}{7}$. Candidates who used a trial and improvement approach rarely gained any marks. Too many candidates tried a 'substitution' method and resulted in no marks. There is still a reluctance from many candidates to give answers in fraction form and this often led to the loss of the accuracy mark by giving 2.3 as their answer.

Question 9

Part (a) was well answered although some candidates failed to interpret the diagram correctly and gave 2 rather than 32 as the median.

In part (b) 49 was a common incorrect answer from those candidates who worked out the range rather than, as requested, the interquartile range. Others attempted to work out the interquartile range by halving the range. Some candidates worked out that the lower and upper quartiles would come from the 7.75th and 23.25th (or 8th and 24th) values but then went onto subtract 7.75 from 23.25 rather than use the values of the variable associated with them.

Question 10

Too many candidates presented examiners with a mass of calculations involving all possible products and quotients, many of which were not valid and which were difficult to interpret. This was a question testing quality of written communication where there had to be a final comparison statement. However, too often, it wasn't clear which monetary values candidates were comparing. As the values being compared could be in pounds or dollars, be two values that the candidate had calculated or one of their values and one given value, it was essential that the monetary values being compared had the correct currency associated with them.

The majority of candidates compared the cost of one litre or one gallon of petrol but some chose to compare some other number of litres and gallons or show that 3 litres of petrol in the UK cost less than 1 gallon (3.79 litres) of petrol in the US. In the latter case, having clear unambiguous working was essential. It was common for candidates to begin to compare using one method and then switch to comparing another method, failing to fully complete either.

The large difference in the cost of petrol in the USA and UK made valid methods using approximations available to the candidates. Where such methods were used, candidates rarely explained what they were doing and failed to gain credit for what may have been a valid method.

Question 11

Candidates were more successful in answering the familiar looking question in part (b) than part (a).

Correct solutions were seen in part (a) but errors such as showing that x^3 came from $x + x + x$ were commonly seen.

In part (b) there was no starting point given to candidates but this did not appear to faze them and many fully correct answers were seen. It is vital that candidates evaluate the trials completely and not just write too small or too large. The most common errors are still to either give too many decimal places in the solution or to fail to carry out a trial to two decimal places. Some students truncated the expression substituting only into x^3 rather than $x^3 - 10x$. Too many candidates are still using a differencing method to test which answer using x to one decimal place is 'closest', this method never achieves the final method mark.

Question 12

The most common error in part (a) was to plot the points at the end of each interval rather than at mid-interval. Other errors included joining the points with a curve rather than line segments.

Part (b) was generally well done although some candidates gave the answer as 35 rather than the class interval. Some students also gave the value of the frequency, 16, rather than the class interval.

Part (c) was not as well done as might have been expected.

Question 13

The volume calculation was frequently incorrect with the formula for the volume of a cuboid being calculated rather than the volume of the given triangular prism. The other common error was to divide, rather than multiply, the volume by the density to obtain the mass of the prism. Some candidates attempted to work out the surface area or find the sum of all the edges; such incorrect methods gained no marks.

Question 14

Part (a) was generally well answered although some candidates did attempt to simplify rather than factorise the given expression with $7x^3$ being a common incorrect answer. Other incorrect attempt at factorising $x^2 + 7x$ were $(x + 3.5)(x + 3.5)$, $(x + 4)(x + 3)$ and $(x + 1)(x + 6)$

Those candidates who knew how to factorise quadratic expressions were generally successful in finding the numbers 2 and 8 in part (b) although these frequently appeared with the wrong signs. Given that there was a negative term in the given quadratic expression it was surprising to see so many factorised expressions containing two addition signs.

Part (c) was, not surprisingly, less well answered with $(2t + 2)(t + 1)$ being a common incorrect answer. There were many very poor attempts to factorise and some tried to simplify the expression. Very few correct answers to part (c)(ii) were seen. However, it was pleasing to see a number of very carefully considered fully correct explanations. The most common answer was to simply define a prime number which gained no marks. Other candidates started to try to explain why the original expression could not be prime starting with an explanation that $2t^2$ and 2 would always be even. Such attempts fell down when the $5t$ term was taken into consideration.

A more successful approach adopted by candidates was to work out how many tiles would fit along each side of the wall. Reaching 20 and 15 automatically earned the first 3 marks. Some of these candidates spoiled further working by considering the perimeter of the wall rather than the area. Too many candidates showed insufficient working and could not be awarded marks because of this.

The question discriminated well between those candidates who could identify and carry out a clear strategy, recording their method in an intelligible way and those candidates who had little understanding of the processes required and/or did not communicate them clearly to the examiner. The best candidates produced a clear and accurate solution in a few lines. However, many responses seemed disjointed comprising of several apparently unrelated calculations scattered all over the page.

Question 15

A common incorrect answer was 10.4 cm which came from attempting to use Pythagoras's theorem in triangle ADC which clearly does not contain a right angle. Other incorrect assumptions were that BC was 9 cm and/or angle ACB was 45° . Those candidates who drew a line parallel to BC from D generally went onto gain either full marks or at least one mark as errors occurred while using Pythagoras's theorem. It was disappointing that relatively few candidates realised that the trapezium could be divided in such a way that the length of the base could be found using Pythagoras's theorem. Many candidates stated the length of the upper part of AB was 6 but then did not always use the information correctly. A significant minority of candidates calculated the area of the trapezium. A few candidates used trigonometry to find angle ADC and then used the cosine rule in triangle ACD .

Question 16

There was an easy first mark available to those candidates who worked out the difference in the two weights but many failed to even get this far into the question. Trial and improvement was a method seen from some candidates but this rarely gained more than the first mark as they failed to give an answer in the range 8.48 - 8.49%. When the weights were divided candidates were often unable to interpret the answer or they carried out the division in the wrong order. A common error was to use 59.3 as the denominator in their calculations.

Question 17

On the whole, candidates either scored full marks or no marks in this question. A few candidates were unable to recognise the correct trigonometric function even having written SOHCAHTOA, others were able to start with a correct trigonometric statement and then made errors when rearranging their initial statement but most who got this far went onto obtain full marks. It was evident that some candidates had their calculator in the wrong angle mode. It was surprising the number of candidates who confused lengths and angles in their calculations. Some candidates seemed to take a lucky guess that the adjacent side was half of 32 with no evidence of the use of $\cos 60$ and were then able to use Pythagoras to find x correctly.

Question 18

Part (a) was well done by the majority of candidates. However, there were a significant number of candidates who made no attempt to complete the table.

Most candidates who completed the table went onto score at least one mark in part (b). Common errors were (0.5, 3) and (5, 1.25). There continues to be a number of candidates who plot the points from the table and then just leave the graph as a series of plotted points rather than attempting to draw a smooth curve. Some candidates did join their points but with straight line segments rather than a smooth curve.

One fairly common incorrect response was to plot all of the points but only join the points from (1, 6) to (6, 1), not from (0.5, 12).

Question 19

This question was poorly answered. Those who had some idea of what to do generally picked up a mark for dividing the real distance by the distance between the models. However, few realised that they also had to deal with inconsistent units having failed to notice that one distance was in m and the other in km and made no attempt to convert between m and km. Some candidates who did spot that units had to be consistent were then unable to change metres into kilometres successfully.

Question 20

It was obvious that many candidates had been taught to cross multiply without understanding that they were still dealing with a fraction and so a common error was to multiply both fractions by 6 and so clear the fractions giving an answer of $5x + 9$. Incorrect attempts to add the fractions were common – multiplying the numerators and adding the denominators was a fairly common mistake; the most common incorrect answers were $\frac{(2x+4)}{5}$ or $\frac{(x^2+4)}{6}$. Candidates who attempted this incorrect method gained no marks. It was disappointing to see a number of candidates get the correct two equivalent fractions and then fail to expand the brackets in their numerators correctly. Others failed at the final stage. Having reached the correct answer of $\frac{5x+9}{6}$ they then attempted to simplify this further inappropriately, sometimes to $5x + 1.5$ and thus failed to gain the final accuracy mark. Some candidates did not see this as an expression but tried to turn it into an equation to solve for x .

Question 21

Common incorrect answers were $\frac{2}{7}$ in part (a) and $\frac{5}{7}$ in part (b).

When seen, the correct two probabilities in part (a) were often added rather than multiplied. Other errors seen included evaluating the correct $\frac{2}{7} \times \frac{1}{6}$ as $\frac{3}{42}$.

It was disappointing to see so many candidates going straight to often incorrect fractions in part (b) without giving any indication as to what outcomes they were considering.

Surprisingly few candidates tried to use tree diagrams to answer this question leading to few correct answers. Very few candidates thought to construct a sample space.

Question 22

Those candidates who realised that the best method of solution was to use the quadratic formula were generally successful in gaining all three marks in part (a). However, some candidates either copied the formula incorrectly (an addition sign in the discriminant or only dividing the discriminant by $2a$) or substituted the wrong values for a or b or c .

Any candidate successful in part (b) got the correct answer by rearranging the given equation into a quadratic form and then using the quadratic formula but most candidates failed to gain any marks on this part of the question.

Question 23

It was essential in part (a) that candidates made it clear which lengths they were attempting to calculate. Some correct solutions were seen but the majority of candidates were unable to make a start on this question.

Common errors included the belief that the height of a sloping face was also 10 cm, or that their correct calculation to find the height of the sloping face meant that they had found the height of the pyramid, that the diagonal of the base was 10 cm and that base angles on the sloping faces were 45° . Some candidates who did successfully find the height of the pyramid then went on to use the wrong formula for the volume. Using $\frac{1}{2} \times \text{base area} \times \text{height}$ or introducing π were common errors.

Many candidates were successful in part (b) without showing any working and having failed to give an answer in part (a).

Question 24

As has always been the case, the most commonly drawn incorrect histogram used the frequency rather than frequency density on the y axis. Such incorrect attempts gained no marks. Candidates who did successfully work out the correct heights of the bars then did sometimes make errors in their plotting, usually with the two final bars. Other errors included omitting to provide a scale on the height axis and using the class intervals as labelling rather than a linear scale. A small minority of candidates worked out the correct heights but then ignored the class intervals in the table and drew all their bars the same width. Cumulative frequency graphs and frequency polygons were also common answers.

Question 25

The majority of candidates who realised that they had to use $\frac{1}{2}ab\sin C$ for the area of the triangle often substituted the given lengths and angle correctly but then could not progress any further. Some good fully correct proofs were seen but a very few candidates were unable to gain full marks because their calculators were clearly set in radian or gradian rather than degree mode.

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>

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 UG033848 November 2012

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

Ofqual



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

