Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

November 2024

Pearson Edexcel GCSE (9 – 1)

In Mathematics (1MA1)

Foundation (Non-Calculator) Paper 1F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. 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. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. 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 2024
Publications Code 1MA1_1F_2411_ER

GCSE (9 – 1) Mathematics – 1MA1

Principal Examiner Feedback – Foundation Paper 1

Introduction

This paper provided good coverage across the specification and offered an opportunity for learners of all abilities to demonstrate their understanding of a variety of mathematical concepts. Plenty of success was seen across the early questions as learners showed confidence picking up marks in the first half of the paper. Most questions were attempted by the majority of learners.

Challenges arose when questions contained a context, particularly where learners needed to extract the key pieces of information followed by determining and applying the correct mathematical processes. Learners also found questions with multiple stages in their working challenging. Despite this, good amounts of working out were often seen which certainly helped learners gain marks, especially those which had arithmetic errors as part of their solution.

Learners attempted most of the questions. Question 21 onwards proved challenging for this cohort with few learners gaining full marks.

For those questions requiring a written conclusion, most responses did have some sort of decision showing that learners are well-accustomed to this sort of demand in a question.

Areas of the specification that need to be improved upon are highlighted in the list at the end of this report.

REPORT ON INDIVIDUAL QUESTIONS

Question 1

The majority of learners were able to write 25% as a decimal.

Question 2

In this question learners were presented with a list of the first four even numbers and asked to find the 10^{th} even number. This was answered well by the majority of learners, however where errors were seen these included giving an answer of 10 (the next term in the sequence) or an answer of 20^{th}.

Question 3

Most learners knew that 1cm = 10mm and were able to use this to successfully convert 15 centimetres to millimetres. There were a significant minority of learners who incorrectly used the conversion factor and gave an answer of 1.5 millimetres having divided rather than multiplied by 10. A number of students also incorrectly used a multiplier of 100 rather than 10, giving an answer of 1500.

Question 4

Learners were generally able to write down the multiple of 9 that is between 20 and 30 as was required for this question. Incorrect answers were generally numbers between 20 and 30 that were not the required multiple of 9.

Question 5

Almost all learners were able to correctly work out $500 + 145$.

Question 6

This question required learners to use information on the cost of a hire car per day and the cost of insurance in order to work out change from ten £50 notes. The majority of learners were able to do this successfully and often showed clear working. Where incorrect answers were seen, some came from errors in arithmetic and others came from not understanding how to work with the information provided to find the amount of change that would be received, leading to addition and subtraction of a variety of combinations of the figures provided. A small minority of learners misinterpreted the insurance as being per day and this led to an answer of $-£250$ or £250 this was awarded SC1.

Question 7

In part (a) of this question learners were asked to measure the length of the side of the given triangle giving their answers in centimetres. The majority of learners were able to do so successfully. Where incorrect answers were seen some appeared to be due to errors in reading the scale on the ruler leading to answers around 10.5 cm or answers around 95 where millimetres were incorrectly used. Only a very small proportion of learners seemed to have worked without a ruler or could not use the ruler they had. Some candidates were unable to measure a non-integer value, or assumed they should round and either 9 or 10 were common incorrect answers.

In part (b) learners needed to identify the angle type that would describe the angle marked *x* on the diagram. The majority gave the correct answer of 'acute' although a variety of spelling errors (which were condoned) were seen. Common incorrect answers included a range of the other angle types with 'obtuse' or 'right' being the most popular of these.

Part (c) asked learners to measure the size of the angle marked *x*. Most learners were able to do this successfully. Where incorrect answers were seen these appeared to be the result of incorrect reading of the scale on the protractor, for example an answer of 45°, or errors in lining up the protractor in order to measure the angle, with many incorrect answers only being a 1 or 2 degrees outside of the allowed range.

Question 8

In part (a) of this question learners were asked to give the coordinates of the point marked. The majority of learners were able to correctly identify these as (3, 1). The most common incorrect answer was (1, 3) where the *x* coordinate and *y* coordinate were reversed.

Part (b) required learners to plot the point $(3, -4)$ on the grid. This was again correctly completed by the vast majority of learners. The most common incorrect response was to plot the point $(-4, 3)$, although some learners also plotted points that were close to the required point but out by one grid square either horizontally or vertically. Occasionally learners plotted both $(3, -4)$ and $(-4, 3)$ giving a choice of answers which was not awarded the mark.

Part (c) required learners to write down the coordinate of the midpoint of AC. This was answered correctly by slightly fewer learners than part (a) and part (b), but was still answered correctly by the majority. It was common to see learners using the diagram to find the required midpoint, often by drawing a line between A & C, and successfully giving the answer (0, 2). Incorrect answers included reversal of the order of the x and y coordinates. A minority of learners had attempted to find the midpoint of AC on the diagram but had not done so successfully, others had incorrectly attempted to find the midpoint of AB. It was unusual to see a response that suggested that the learner did not understand what a midpoint was.

Question 9

In part (a) learners were asked to use the information provided regarding the total number of stickers in order to complete the bar chart. This was answered correctly by the majority of learners. Where answers were seen that were not fully correct there was often working shown which allowed for the award of part marks. Common errors included reading one of the two given bar heights incorrectly, this was often the bar height for the football players which was sometimes incorrectly given as 16 or 18.

In part (b) learners were asked to give the fraction of the 40 stickers that are stickers of tennis players and to give the fraction in its simplest form. The majority of learners were able to identify the required fraction and correctly simplify this to give the required answer. The most common reason for an incorrect final answer was to either give the unsimplified fraction or where errors were seen in the attempts to simplify the fraction. A small minority gave the fraction of stickers that were football players rather than the fraction that were tennis players.

Part (c) of the question required learners to convert between ratio and fraction notation. The majority of learners were able to correctly complete the conversion. The most common incorrect answer was $\frac{5}{4}$ where learners did not sum the parts of the ratio to obtain the denominator of the fraction.

In part (d) learners were asked to give the ratio $5:4$ in the form $n:1$. This proved challenging for learners with only a minority able to give the correct answer. Some learners made an attempt to write the given ratio in the required form but made errors when attempting to calculate $5 \div 4$, others started the process to divide but did not reach the form $n:1$. Other incorrect responses included 1:0.8 (the form $1:n$) and answers of 1.25 without $n=$ or any attempt to write as a ratio. There were a significant number of incorrect answers of $5:1$ or where n had been introduced into the ratio in some way, for example $5n:4$.

Question 10

In part (a) learners were asked to reflect a shape in a given mirror line. Around half of learners were able to give a fully correct answer. There were also a significant proportion of learners who were able to reflect the shape, but did not use the given mirror line correctly which commonly led to their answer being translated vertically from the correct position. In a small number of cases learners reflected in a vertical mirror line. In the minority of responses where the answer was not a reflection this was commonly due to the learner performing a different transformation, most commonly a rotation around the origin, or an attempt at a reflection but with errors in the drawing of the reflected shape.

In part (b) learners were asked to write down the equation of the mirror line. This was answered correctly by less than half of the learners. The correct answer was $y = 1$. Common incorrect answers were $x = 1$, 1 and $y = x$.

Question 11

In part (a) of this question learners were asked to use the information given to complete the two-way table about the type of film liked by adults and children. There were a good proportion of learners who could complete this fully correctly using the given information and working out the missing values. Where incorrect answers were seen these generally had the given information correctly completed in the table but had errors in working with these numbers in order to determine the missing values. Some learners were able to complete some of the given values correctly but made errors in placing some values possibly due to the need to identify both the appropriate row and appropriate column to input the values in.

In part (b) of the question learners were asked to give the probability that a person chosen at random from the 500 was an adult who said that they liked action films the best. A majority of learners were able to give the required probability. There were a significant proportion of incorrect answers also seen, common incorrect answers were $\frac{100}{280}$ (the probability of an adult chosen at random saying that they liked action films the best), or 100/150, which was awarded 1 mark for the correct numerator, or completely incorrect fractions using a variety of different numbers from the table. There were a minority of learners who had a correct answer, but made errors when trying to simplify or convert their probability fraction (in these cases subsequent working was ignored) or gave their probability as a ratio which is not an acceptable form but which does gain method marks. Learners should be reminded that probabilities should be given as a fraction, decimal or percentage.

Question 12

Learners were asked to identify the error in a calculation. A slight majority of learners were able to give a correct explanation of the error in the method, with answers such as ‘he should have multiplied first’ and ‘he didn’t use BIDMAS’ being the common correct responses. Where incorrect answers were seen these commonly included correct reference to the need to do multiplication first, but then indicated that the calculation should be $12 - 5$ or showed 5 – 12 = 7 which was incorrect.

Question 13

In part (a) of the question learners were asked to find the output of the number machine when the input was 11. The majority of learners were able to do this correctly often showing their working to achieve the answer of 8. Only a minority of learners made errors in arithmetic in otherwise correct working. A common incorrect answer was 13.5 which arose from learners applying order of operations rules to the two separate steps within the function machine. Another incorrect approach was was putting the output as 11 then calculating either $\times\ 2 - 5\ =\ 17$ or $\frac{11}{2} + 5 = 10.5$.

Part (b) of this question required learners to complete the number machine by adding the missing operation. This was answered well by the majority of learners, although caused slightly more difficulty than part (a). The answer of -3 was much more common than $\times\ 0.7$ Where learners were not able to find either of the possible answers they were often able to gain 1 mark for finding 7 as an intermediate step or dividing 28 by 4.

Some learners did not transfer their answer over to the function machine, leaving a choice of methods and answers. Candidates need to ensure they are identifying their answer and not just leaving it in the body of their working.

Question 14

In part (a) learners were asked to work out the height of the given cuboid having been given its volume, length and width. This proved slightly more challenging than the earlier questions on the paper and was answered correctly by around half of the learners. Where incorrect answers were seen there was often evidence of a start to the method to find the height, most often finding the area of the base rectangle ($10 \times 4 = 40$) in this way the majority of learners were able to gain the first mark.

In part (b) learners were asked to work out the surface area of a cuboid. Learners found this challenging and the majority were not able to gain marks. The most common error was to work out the volume of the cuboid rather than the surface area. A minority of learners were able to find the area of one face or the total surface area for three or more faces. Some learners worked with the area of six faces but incorrectly assumed that there were 4 faces that were 18 (6 by 3) having struggled to extract the information from the three-dimensional diagram of the cuboid. A number of learners multiplied each dimension by 4 and then added the answers; some learners worked out the perimeter of each face.

Question 15

The factorisation of $6a + 15$ (part (a) of this question) was answered correctly by around half of the learners. Common incorrect answers included attempts at factorisation that would not expand to give the initial expression, for example $3(a + 5)$, $3a(2a + 5)$ and $3(2a + 3)$.

In part (b) learners were asked to solve $4(3y + 1) = 28$. Around half of the learners were able to solve this successfully with the more popular approach being to expand the bracket before solving the equation. There were also a significant minority of learners who were able

to gain partial credit often for expanding the bracket correctly or for correctly isolating terms in *y* following an incorrect attempt at expanding the brackets. Common errors included use of addition rather than multiplication when attempting to remove the bracket, use of subtraction rather than division when attempting to divide through to remove the bracket or attempts including collecting together terms which did not simplify in this way. Another common error was to forget to multiply the 4 and +1 leading to $12y + 1 = 28$. Quite a number of students used no algebraic solution, and instead approached this via a trial and improvement method.

Question 16

This question presented learners with information about the costs of two different combinations of teas and coffees. They were asked to find the cost for a third combination. This proved to be challenging for learners with the majority not being able to make progress towards a correct solution. Around a quarter of learners were able to correctly find the required cost.

In attempting this question the majority of learners chose to work with the information provided without converting to simultaneous equations. This proved to be successful for those learners who could recognise how the two separate pieces of information could be used to determine the cost of just some teas (more commonly) or just some coffees (as was seen occasionally). Most that were awarded one mark for finding some teas, also successfully found the cost for one tea. Many learners, however, struggled to see how to find the cost of only one type of drink. The most common incorrect approach was assuming that the cost of a cup of tea and a cup of coffee were equal (£2.25). Others attempted to guess the cost of one of the two drinks and see what the cost would be for the second drink type. This approach had the potential to be successful if these costs were checked using both of the initial sets of information, but often the values only worked for one set of cost conditions and this was not recognised. It was common to see extensive working where these trial and improvement approaches had been tried. Some candidates recognised that you could multiply the first cost scenario by three and then add on a cup of tea to gain the correct answer of 15.5(0).

Question 17

Around half of learners were able to make some progress with this question, although only a minority were able to give the decision of 'no' together with correct supporting figures. Where fully correct responses were seen these generally worked from the required ratio for the paint and found the volumes of each paint colour needed to make 24 litres. Some learners made a start to a correct process by finding that $24 \div 8 = 3$ or, having recognised that there were 24 litres of paints that could be mixed, by starting a process to scale down the ratio of the available paints (12:7:5) to compare it to the required ratio (4:3:1). In some cases, learners had made a start to a process, often by showing $12 \div 4 = 3$, or appeared to have come to the correct conclusion, but did not show the figures to support their decision. Incorrect responses often identified that there were 24 litres of paint available to mix and concluded that there was sufficient paint available without considering the required ratio for the green paint. Many got the correct answer of 12:9:3 but then incorrectly stated that they needed more white paint.

Question 18

This question asked learners to work out $818.4 \div 1.2$. Many learners made an attempt to perform the division and working with $8184 \div 12$ before considering the place value / position of the decimal place in the answer. In general, the division was attempted by use of the 'bus stop' method and there were a good number of learners who could perform this fully correctly to obtain the digits 682. Where errors in arithmetic were made these often lead to 6 as the first digit which was sufficient for the method mark to be awarded. There were learners who set up the division calculation, but were not able to complete this due to arithmetic errors or not being able to recall the method beyond the initial layout. The fully correct answer was only obtained by a minority of learners, this was often due to the final answer being given as 68.2 or 6.82.

Question 19

In part (a) of this question learners were asked to work with the probabilities provided to find an estimate for the number of times the dice would land on 2. Learners found this to be a challenging question. Whilst a minority were able to find the required estimate, often by first finding the missing probabilities and then using these to make the estimation, the majority were only able to find the sum of the unknown probabilities or could not make any progress with the question. A common error was to add the given probabilities and divide by 2. The most common mistake was to give an answer of 0.15.

In part (b) of the question learners were asked how the answer to (a) would be affected if Kasim's assumption was wrong. Correct answers often referred to the answer to (a) being larger or there being more 2's. The majority of learners were not able to give a correct response to this question, referencing the probabilities changing, stating that the answer would change but not explaining how or saying that the answer would not change.

Question 20

This question differentiated well between learners. In part (a) learners were to perform a subtraction of mixed numbers. Slightly under half of the learners were able to correctly write both fractions over a common denominator, subtract them and give the answer as a mixed number. There were a significant minority of learners who had a partially correct response where they had attempted to write the fractions with a common denominator in order to subtract, but either gave the answer as an improper fraction or made an error in one of the numerators when writing the fractions with a common denominator. There were also a significant proportion of incorrect responses seen which sometimes made an attempt to write over common denominators but had no correct numerator due to errors in the method or where an incorrect method was attempted, often combining the whole number part of the fraction, numerator and denominator in some way. A few learners added rather than subtracted their fractions.

In part (b), learners were asked to show a given result for the division of two mixed numbers. There were a minority of fully correct answers showing the required result. A similar number of responses gained 2 marks having converted one, or both, of the mixed numbers to

improper fractions and then showing a method to divide by a fraction, but making an arithmetic error or not showing sufficient working to justify the required result. Many learners failed to achieve the third mark because they were unable to show how $\frac{63}{28} = 2\frac{1}{4}$. The 'keep, flip, change' approach to multiplying fractions was the more popular of the two. There were also a significant proportion of learners who gained 1 mark for conversion of one or both of the mixed numbers to improper fractions. Incorrect answers were common, with many incorrect attempts at converting mixed numbers to improper fractions and incorrect approaches to multiplication of fractions attempted.

Question 21

A significant majority of learners struggled with this question which used the angle properties of parallel lines and it was very rare to see a fully correct answer. The majority of learners did not correctly identify any of the angle results that could be obtained by using angles in parallel lines. Where marks were awarded, this was often for identifying angle *ACD* as being *e* and gaining the first mark. Some learners identified *ABC* as 3*e* or referenced the sum of angles in a triangle being 180° but these alone did not gain marks. It was common to see angle *DAC* being incorrectly identified as *e* or multiple angles labelled with *e*, 3*e* or similar. Very few learners were able to give an appropriate reason even when they had found a correct angle.

Question 22

The first part of this question asked learners to use a given distance and speed to work out an estimate for the time taken by a car. There were relatively few fully correct answers, however many learners were able to start the process by rounding one or both of distance and speed. Following on from the rounding it was common to see incorrect calculations with 30×5 and $30 \div 5$ being common. There were a significant number of learners who attempted to work with the exact values rather than rounding and others who rounded incorrectly. In some cases learners showed very little process for their calculation of the estimate. For those that did gain the second mark for dividing distance by speed ($5 \div 30$), many incorrectly calculated this to be 6.

In part (b) learners were asked whether their answer to (a) was an over- or under-estimate. This was not well answered. Some learners only referenced rounding of one value in their answer, however they had rounded both and the nature of the calculation (division) meant that both needed to be considered in giving a decision. Many of the answers were not consistent with the rounding and process that had been used in (a). There were also a number of learners who incorrectly indicated that their answer to (a) was both an under- and over-estimate. Several just wrote over/under-estimate without an attempt at explanation. Learners need to be aware that it is ok to say I can't tell whether it is an over or under estimate as long as they justify their answer.

Question 23

This question gave learners information about the interior angles of a pentagon and asked them to find the size of one of the missing angles. There were a minority of learners who could give a fully correct answer which often came from trial and improvement. only a very small minority were able to use algebraic methods to find c. Some learners gained 1 or 2 marks for the interior angle sum of a pentagon and/or for the start to a process of giving each angle in a common form. A common error here was to work with the wrong interior angle sum, often 360°, or to assume that angle *d* or *e* was the same size as angle *b* based on looking at the diagram. Quite a few did *their* angle sum – 155 but then divided by 4 forgetting that the other angles were not all the same size.

Question 24

This question was very poorly answered with few learners able to give an explanation that related to rate of change of volume. Incorrect answers often described the relationship between the volume and time rather than interpreting the gradient, for example 'as time increases the volume of water in the tank decreases' or 'negative correlation'. Others incorrectly described the change over a number of seconds or referenced specific values from the graph.

Question 25

This question proved very challenging with only a minority of learners able to correctly change the subject of the formula. It was common to see the unknowns being incorrectly combined in a variety of different ways such as $13w$ or $30w$. It was also common to see errors in attempts to rearrange when incorrect inverse operations were used. There were a few examples where '$w =$' was omitted giving just $\frac{y+10}{3}$ on the answer line. Many candidates made an incorrect first step, by either incorrectly subtracting 3, attempted to divide by three but did not divide 10 by 3 too, or subtracted 10 incorrectly. Many just swapped the *y* and *w*.

Question 26

This question was not well answered. Only a small minority were able to make progress with factorising the quadratic and it was uncommon to see attempts at using the quadratic formula. Many learners attempted to solve the quadratic using methods based on those for linear equations. A number of learners found one root, often $x = 5$, through use of trial and improvement, but did not find the second root and therefore did not gain marks. Of those learners who were able factorise the quadratic, the majority did not progress on to find both solutions.

Summary

Based on the performance on this paper, learners / centres should work on:

- improving numeracy skills, including multiplication and division skills when working with integers, decimals, and fractions (including mixed numbers), including writing calculations in the correct order and checking that their answers have a sensible value,
- the interpretation of problems involving ratio, particularly combined ratios,
- considering the context of the problem they are solving and checking if their answer would be feasible,
- knowing, stating and applying angle facts, particularly those relating to angles in parallel lines,
- solving equations and inequalities,
- processes for estimation (with emphasis of rounding a value to 1 significant figure) and identification of whether the chosen rounding leads to an overestimate or an underestimate of the answer and giving reasons for their decision,
- encouraging learners to set out their working using logical steps,
- encouraging learners to read the question carefully so that they understand what they are required to do and what format the answer should be stated in,
- interpretation of questions involving context and multiple step processes,
- understanding of real-life graphs including interpreting intercepts and gradients in context.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom