# Examiners' Report

Principal Examiner Feedback

Summer 2017

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Non-Calculator) Paper 1F

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## GCSE (9 – 1) Mathematics – 1MA1
## Principal Examiner Feedback – Foundation Paper 1

### Introduction

The time allowed for the examination appears to have been sufficient for students to complete this paper.

Students would be well advised to show all their working clearly and set this out in a logical manner rather than in a haphazard manner all over the page.

Errors in basic arithmetic continue to be a source of lost marks for many students throughout the paper. It is important that, when attempting calculations (e.g. working out a percentage of a number, long multiplication) all stages of the calculation are shown in order to ensure that method marks can be awarded if there is a subsequent arithmetic error. A good knowledge of times tables would also have enabled more marks to be awarded in some instances.

It was pleasing to see a good level of success from students of all abilities with the early problem solving questions, particularly those problem using money as a context.

Students do need to ensure that they learn the formulae relevant for the foundation tier papers. In particular, those for the area of a triangle and the area and circumference of a circle should be learnt.

### Report on individual questions

#### Question 1

The majority of students were able to score the mark on this question for an answer of 16. There were however a significant proportion of students that didn’t understand the index notation fully, leading to common wrong answers of 8 and 32.

#### Question 2

A good proportion of students achieved the mark for rounding, but it is clear that a large number of students do not understand what rounding to decimal places means. Common errors included rounding or truncating to 2 decimal places and many moved the decimal point rather than rounding at all, or added three zeros to the end.

**Question 3**

A sizeable group of students scored the mark for algebraic simplification in part (a) of this question. A significant number of students had major misconceptions about how to simplify algebraic expressions leading to common incorrect answers such as $7e + 8f$ or $7e \times 8f$. Other students were let down by the recall of their times tables resulting in answers such as $54ef$ or $57ef$.

Most students were unable to answer part (b) of this question. It is possible that an integer on the right hand side would have resulted in more success, but the majority of students didn't appear to know how to deal with the $x$ being divided by 5. The multiplying of a mixed number by an integer then proved a further obstacle. Solving equations which include division appears to be an area for improvement for foundation students.

**Question 4**

Generally a well answered question. Those who had success normally worked through equivalent fractions such as $\frac{8}{10}$ or $\frac{80}{100}$ to achieve the correct answer. Most wrong answers, such as 90, 75, 20, came with no working.

**Question 5**

Another question where almost all students were able to show a good understanding of what is required to find a percentage, with a large proportion getting both marks. Of those who failed to gain full marks, a good number were able to get a mark for showing a suitable method to find 60%. This was commonly from finding 10% and multiplying by 6 or adding 6 lots. However, students continue to show a lack of method in their working, so the process of dividing by 10 is not stated. In most cases this didn't cost marks but, for a number of students, finding 50% and adding 10%, the first calculation was not shown and was often incorrect. E.g. 50% = 45, which results in zero marks, whereas if they had written 50% = 70 ÷ 2 = 45 they could still have gained the method mark if this had been accompanied by a correct method for the 10% as well. Poor recall of tables also caused problems here with statements like 6 × 7 = 52. It was also common to see students read the question as "60% **off** 70" and so give an answer of 28

**Question 6**

A surprising number of students answered part (a) incorrectly, normally marking at around $\frac{1}{4}$ instead of $\frac{1}{2}$. This must have come from not reading the question carefully enough and just seeing a single "B" rather than noticing there was two of them.

Almost every student was able to answer part (b) correctly.

## Question 7

This is the first of the new problem solving questions and it was pleasing to see so many students being able to score marks. In many cases both method marks were scored by dealing suitably with the items listed, and for understanding the need to multiply or divide by 3 in relation to the sausages. With the accuracy mainly being dealt with in the final mark, it meant that arithmetic errors or slightly incomplete processes were still able to gain marks. The failure to score all three marks was usually down to one of a few things; arithmetic errors, not using all the items (for example only costing the price of one pack of bread rolls not two) or for failing to write a conclusion.

## Question 8

Many students scored the mark for correctly multiplying fractions in part (a). Those who didn’t often either added or mixed up the method for adding and multiplying. Another common incorrect process was to cross multiply, doing 5 × 4 and 8 × 3 leading to an answer of $\frac{20}{24}$. Others were confused between the method for multiplication and addition and attempted methods involving a common denominator.

In part (b) students commonly forgot to use a common denominator leading to an incorrect answer of $\frac{1}{1}$ = 1. Of those who had a denominator of 12, some forgot to multiply the numerators correctly to get an equivalent fraction. Another common misconception was to confuse with division and attempt to work out $\frac{2}{3} - \frac{4}{1}$

## Question 9

The next of the problem solving questions and again a large proportion of students were able to gain marks. Almost all scored the first mark for doing something correct with time, usually 8 × 12 (=96). The second mark caused more problems because it meant students had to work with the quarter which many were unable to do. Many were then able to gain more credit for adding two lots of their overtime figure to 96. There was a relatively small proportion who were able to pull it all together, along with correct arithmetic and get to the correct final answer.

## Question 10

A twist on a traditional question which threw lots of students who simply started with the values in the question, eg 6 : 20, and scored zero. A good number, however, realised the need to multiply 6 by 20 to get the total number of eggs and were then able to set up a suitable starting ratio of 12 : 120. Students do continue to struggle to simplify ratios, especially as this involved a relatively large number, and either went wrong with their division or stopped too soon. 3 : 30 was a common answer seen, and only scored one out of the two available marks.

**Question 11**

Students found this question more difficult than the normal arithmetic number patterns. That said, a lot of students gained credit for starting the process for part (a), either through diagrams, starting to generate the sequence or for looking at the differences. A good proportion also went on to get the correct answer. A common incorrect method was to take the number of squares for pattern 3 and double it, giving an answer of 18.

Part (b) was the best answered part of the question with a large proportion of students gaining both marks. Failure to gain both marks was either because they went too far or not far enough when adding on 4s or mixed up the two sequences and calculated 20 × 20.

In part (c) students generally struggled to get both marks. However, those who made a statement about a specific term correctly were able to gain a mark, which was a common score. To gain both marks a general statement relating to all odd terms was needed; it was this generalisation that was often lacking.

**Question 12**

This is a familiar question and students generally performed well and often got both marks. Those who didn't very commonly got one mark for either a correct numerator or denominator in a proper fraction. There are still students using incorrect notation for probabilities such as ratio, or words and centres should be aware that this will always result in dropped marks.

**Question 13**

It is apparent that many students have no real understanding of metric units at all. Centres need to take note to ensure that students are familiar with all common metric units of length, mass and capacity. This will help students, not only in questions like this, but also to recognise suitability of answers on other questions working in metric units. In relation to this question, surprisingly few students scored in part (a) for a suitable estimate for the height of the man.

Many students were then more successful in part (b) however as they were able to multiply their answer to (a) by a suitable scale factor.

**Question 14**

A good number of students were able to score a mark for either one correct calculation of an angle or for one correct sector of the pie chart; this often then allowed them so gain the mark for labelling the sectors. However, full marks in part (a) was relatively rare and more time needs to be spent on dealing with pie charts without a calculator to ensure students are familiar with dividing by total frequencies like 120 here, or other factors of 360

Very few students were able to understand the difference between a larger proportion and a greater frequency in pie charts and as a result most scored zero in part (b).

### Question 15

Another problem solving question and another case of most students being able to gain marks. It is still surprising to see so many students being unable to find the area of a triangle correctly; this needs to be another focus point for centres. Those who failed to recall the correct formula automatically lost two marks on this question. This was because the first mark was for the process to find the area of the triangle and then if they had made a mistake there, invariably their final answer was wrong. However, the other two marks were accessed by most. In fact a very large proportion of students understood the processes required to solve this problem: area of triangle; multiply by 6; divide by 16. Again, as is the case through the whole paper, poor arithmetic caused the final mark to be rarely awarded, in particular the division by 16 causing problems for many.

### Question 16

This question threw up a major misconception for many students. Many omitted the "×" when substituting into "$at$", often writing $3\frac{1}{2}$ rather than $3 \times \frac{1}{2}$. Those who did substitute correctly and gained the method mark, then struggled with the arithmetic either because of not following the correct order of operation, or from struggling to carry out arithmetic with fractions, or dealing with negatives, even when they had achieved $1 + -1.5$. The final correct answer of $-\frac{1}{2}$ or –0.5 was rare.

### Question 17

Although a good number of fully correct solutions were seen, this question proved demanding for a number of students despite the easy first mark for a correct process to find the weight of one tin of soup. Unfortunately, those who understood the steps in the process to solve this problem often failed to gain all four marks as they were unable to cope with the necessary arithmetic. A common incorrect starting point was to subtract the two total weights given or to divide by an incorrect amount of tins.

### Question 18

This problem solving question involved estimation in a context. As with the previous problem questions most were able to get some marks for suitable processes. Typically these marks were awarded for evidence of estimation or for dividing an area by a coverage figure. Many students were unable to correctly recall the formula for the area of a circle; this is a formula that must be learnt by students. For some reason, a number of students thought that they needed to use 360$^{o}$ somewhere in their solution.

In part (b) the common response was to discuss the rounding done in the final step, i.e. rounding to a whole number of bags, which was not the essence of the question. To gain marks students had to discuss the effect of their estimation of either π or the coverage figure. Commonly when discussing the latter, students wrongly stated that rounding up to 50 would give an overestimate, where it would actual bring about an underestimate.

**Question 19**

A familiar question and many students were able to gain the first mark at least in part (a), often for correctly expanding the bracket. Weaker students were then unable to solve the simple linear equation often subtracting rather than adding, or being unable to divide. It is worth noting that the improper fraction $\frac{38}{4}$ is an acceptable answer and gained full marks, but that the answer written as a process, 38 ÷ 4, is not acceptable unless followed by an accurate answer.

Most students were also able to score some marks in part (b), although one mark was much more common than two marks. The usual errors regarding the end values (either including −3 or excluding 2) occurred frequently and a number of students excluded 0, presumably because they do not think it is an integer.

**Question 20**

This was a standard percentage increase question that allowed a lot of students to gain some success. Again, students were let down by their arithmetic (eg 1% shown as 1.5 rather than 15) and a lack of method shown. Weaker students struggled to find 3%, and even those who knew how, didn't normally show the steps of their method and made calculation errors. Many who were able to find 3%, forgot to add this onto the original amount or erroneously subtracted their 3% from the original amount.

**Question 21**

This was a question that was answered well by almost all students.

In part (a) almost every student scored the mark. Of those that didn't it was normally down to a misread scale, giving answers such as (10, 17) and (9.5, 18.5) or occasionally reversing the coordinates giving (19, 10)

Nearly all students stated "positive" in part (b) which was required for the mark. It is worth centres knowing that at this level no extra detail such as "strong" or "weak" is required although, if present, it was not penalised provided "positive" was also present.

Part (c) was answered generally well with most students giving an answer in the range shown in the mark scheme. Whilst drawing in the line of best fit it is not a required to gain any marks (provided the answer given is within the range on the mark scheme), it is good practice and greater use of a line of best fit would have certainly led to more correct responses.

In part (d) many students were able to write a suitable sentence referring to the positive correlation of the scatter graph.

## Question 22

Many foundation students are familiar with this type of question and almost all of those who scored marks did so through the use of a factor tree. A single arithmetic error was allowed for the method mark, but any more resulted in no marks. Students do need reminding that 1 is not a prime factor so should not be included when writing a number as the product of its prime factors. It is frustrating that some students continue to drop the accuracy mark by failing to state give correct prime factors as a product; the final answer was frequently given as a list of the prime factors or as a sum rather than product.

## Question 23

Most students used a suitable method, with correct relative place value, to multiply the two decimals. This meant that all of these students were able to score at least one mark, many then went on to get two or three. Generally the placement of the decimal point in the final answer was correct so for most one mark became two. It is essential that students set out their work in an ordered fashion that can be followed through by the examiner; this is particularly pertinent for those that work with a number of individual products. Those employing this method frequently failed to find all the necessary products, thus an incomplete method was offered which gained no marks.

## Question 24

This question proved very difficult for many students, even with the scaffolding of the individual sections shown on the diagram. Generally, most students scored zero, as they tried to work backwards from the given solution but with no real idea what to do or substituted various values in to the given equation. Those who scored marks normally got a single mark for two correct areas on the diagram or just below. Very few then simplified their expression and equated it to 10. The few students who did typically went on to complete the solution. It is essential that all steps are shown in a solution where the final answer is given in the question.

## Question 25

Another problem solving question and again many students were able to gain some credit. The less able students tended to gain just one mark for multiplying lengths by 1.5. The more able realised the need to use Pythagoras's theorem and most who did, did so successfully. Although a good number were able to get full marks a large number of those who showed the correct processes were again let down by their arithmetic skills, or by failing to multiply the diagonal by 1.5

## Question 26

Success in this question was very rare. The method mark was available to those who realised the need that, in order to compare gradients, the coefficients of $x$ needed to be compared with both equations in the form $y = mx + c$. Those who recognised what needed to be done were generally successful but the majority of students could not cope with the demand of this question.

**Question 27**

Vector geometry is new to foundation specification. Very few students understood what to do at all and as a result very few marks were scored.

## Summary

Based on their performance on this paper students should:

- continue to work to master the basic skills of arithmetic, including being able to correctly choose use the four operations with integers, fractions and decimals
- remember to show each stage of their working, especially when using build up methods for percentages
- work further on strategies for attempting problem solving skills
- spend greater time on the topics that are new to the foundation tier in this specification
- learn the conversions within the metric system. E.g. 1 m = 100 cm
- learn formulae such as those for the area of a triangle, area and circumference of a circle

## 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

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