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Examiners' Report

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Pearson Edexcel Functional Skills Mathematics Level 2 (FSM02)

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Introduction

This level 2 paper included questions based on the contexts of a holiday, a recycling centre and a wedding. Some of the questions in the paper adopted a different approach to the coverage and range than has appeared in previous series; for example, the money conversion in question 1(b) which required the learners to work out the conversion rate. This type of question necessitates a deeper understanding of the calculations involved in a conversion and it was pleasing to see the valid and different approaches that some of the learners demonstrated.

General comments

Most learners attempted the majority of the questions on the paper and engaged with the contexts. A substantial number appeared not to have the use of a calculator for this paper which was a distinct disadvantage. Learners should be reminded of the importance of taking their calculators to the exam and should be prepared in their effective use. A substantial number of learner scripts contained lengthy arithmetic calculations. The extra time learners devote to these can often result in them being unable to complete the paper in the allocated time.

Learners should be encouraged to read the questions carefully and check they have provided a full answer to the question. They should also understand that when they are asked to explain their answer, it is important to provide a decision which is supported by their calculations. It should be emphasised that examiners award marks for the process and need to see how the learner arrived at their answer.

It was pleasing to see that a large number of learners gained marks for producing a valid check of their working and in general, checks were completed more competently this series. Learners should be encouraged to check all their working as well as consider whether their answers make sense. They should be reminded that a repeat of the initial calculation does not constitute a check. Learners can provide evidence of checking any part of their working. The following is considered sufficient evidence of a check:
a reverse calculation e.g. a multiplication following a division
a different method for performing a calculation e.g. in a percentage question multiplying by 1.2 instead of finding 20% and adding it on
an estimation, if appropriate, for example by rounding

Learners are still struggling to gain full marks on questions which involve drawing a graph. Many insist on using a scale which is difficult to interpret and lose the mark for plotting. A number are still using non-linear scales which lose the scale mark and a large number are not labelling the axes which loses the mark for labelling. Centres need to give learners more practice in producing graphs to display data effectively.

Learners should be encouraged to avoid difficult scales, for example those which involve a factor of 3, and reminded of the importance of labelling both axes appropriately so that the graph is 'fit for purpose' and can be easily interpreted by anyone reading it.

Many learners have difficulty performing calculations involving time. Centres should take particular note of the comments relating to questions 1c and 2.

Section A

Q1a)

While most learners attempted this question, only a minority were able to gain full marks. Learners who did not gain full marks did so because they failed to correctly extract all the relevant information. In particular, a large number of learners did not grasp the fact that the luggage charge was per flight and only included a charge for one piece of luggage; some doubled the cost of the insurance which was stated for two people.

Another common error was calculating the accommodation charge for 1 night, or less often 6 or 8 nights, instead of the 7 nights required. When they did calculate the cost for 7 nights, a significant number of learners seemed to forget they had to reduce the hotel cost by 9% or reduced the total cost of the holiday by 9%.

Centres should prepare learners for this type of multi-stage question by encouraging them to read the question carefully, highlighting or underlining all key information.   when they have completed the question, going back through the highlighted key information ticking off all the elements they have used in their calculations. Learners need to be made aware that 2 days has only 1 inclusive night, in the same way that 2 fence posts only have one fence panel. For some learners diagrams and/or practical demonstrations would be useful. In addition, centres need to ensure that their learners understand and are able to calculate correctly using basic operations, such as percentages, that are needed to successfully answer this type of question.

Q1b)

Generally, this question was well answered and most learners used the ratio/proportions between pounds and euros or pounds and pounds effectively. Mainly learners lost marks because the question was presented in a different format and they were unsure how to calculate using an exchange rate when it was not provided, often using addition and subtraction instead of multiplication and division. Centres need to develop the understanding and application of using exchange rates ensuring learners know which operation to use at each stage. For some learners the issue with this question was the interpretation of their numeric answer, where learners arrived at the correct numerical value and then declared 'no' as they had lost track of whether they were in Pounds or Euros. Using a structured layout such as a table or two columns with headings of £ / Euro may be helpful for learners to interpret their calculations correctly.

Many learners either ignored or did not understand how to complete a valid check; although some completed the check well using sophisticated alternative methods instead of a simple reverse calculation.

Learners should be taught simple inverse operations and encouraged to use them to check all calculations as they are an excellent way to check working. The assessment of the use of a valid check is an essential component of every level two functional maths paper and possible approaches should be integral to the teaching programme in preparing learners for this qualification.

Q1c)
Although the majority of learners were able to answer this question and gain full marks there were areas of concern. Some learners lost marks because their answer was not given in correct time notation, others because they were unsure how to process the 20-minute delay before the flight and the 35-minute journey time reduction. A significant number did not use all the information, one or more of the component times were missing, and some just had difficulty with time calculations generally.

Centres need to evaluate their learners' understanding of time. Time is rarely taught post primary and it is taken for granted that the majority can 'tell the time' and therefore practice in time calculations can be ignored. However, in this age of digital clocks and watches, many learners do not understand how hours and minutes work and that the units are not decimal units although a digital time display can appear to be displaying a decimal. The teaching of time calculations could be a cross-curricular opportunity to illustrate time differences between different cities and countries.

Some explanation of the language used in connection with time and what this language means in terms of mathematical operations is needed. For example, many learners thought a delay of 20 minutes meant that 20 minutes needed to be subtracted from the journey time.

Centres could use 'real' timetables for trains/planes to practise planning journeys. Learners who have difficulty time calculations could be encouraged to draw a rough clock on the page or use an analogue watch. This will allow them to visualise and be able to count on past the hour.

Q2)

This was the least successfully completed question in the section, the majority of learners attempted it but failed to achieve full marks. Learners were able to substitute correctly into the formula given, but a large proportion failed to change the decimal time in hours into a time in minutes in order to perform a comparison. The most common error was stating that 0.35 hours was 35 minutes. Some learners, having substituted into the given formula, didn't realise that 14/40 was actually a division and did not know how to continue.

Centres need to teach the conversion of fractions to decimals with the emphasis on a fraction essentially being a division. They need to extend their teaching of time, as outlined in Q1c, to include conversion between units of time. One possible approach is to start by discussing the obvious differences using decimal time, such as 1.5 hours is not 1 hour 5 minutes or 1 hour 50 minutes.

Most learners should know that 0.5 is a half and that half an hour is 30 minutes. Then consider $0.25 = \frac{1}{4}$ and demonstrate $\frac{1}{4}$ hour is not 25 minutes.

Using these skills can be incorporated into contexts such as finding journey time, cooking time etc.

Section B

Q3)
A large number of learners did not tackle this question well. Creating a schedule requires the learner to ask themselves if their final product can be given to someone who would be able to follow it successfully. In other words, 'Is it fit for purpose?'. In this example, the staff on the training course should be able to look at the plan and be completely clear about start and finish times for the day as well as for each session. They should know how many days the training will take, at what time there are breaks and lunchtimes, and when they can go home at the end of the day. All this information was given in the question, and although there were some good responses, learners failed to deliver what should have been an easy schedule. Too often the information in the question was skimmed and bits were either missed out, for example, lunch or the assessment, or only one day was scheduled. Other common errors included scheduling activities where not necessary, for example assessments on Monday as well as Tuesday, or including additional breaks outside the 2-hour training slots.

Skimming of information is a common approach to tackle multi-step problems, but this practice can lead to errors when creating a working plan. Centres can meet this challenge by encouraging their learners in practicing reading a question once, then checking the information again after completion of the problem to check it meets all the criteria given in the question.

Q4)
This question was generally well done, with most learners working out that they could divide by 8, add on the result, and round their answer to a whole number to find the number of families. A few failed to add on, while some thought an answer including 0.75 of a family was appropriate. Learners need to consider what the answer they have found represents at each stage.

There were a large number of alternatives to dividing by 8 used by learners. Some were correct, for example multiplying by 0.125, or even 1.125. However, some learners multiplied by 8, giving an answer of 35824 which is clearly not sensible, or they found 8%, or multiplied by 0.8, or 0.08 (same as 8%), or 0.18. The relationship between fractions, decimals and percentages has obviously been worked on, but there are still some learners who do not understand their application.

Q5a)
This question was generally well answered by the majority of learners. Most could find a mean and/or a range, either for a year, or between quarters, or for the whole period of time. A few found the median, while others mixed up mean and range, but the mark scheme dealt well with all of this. Centres should be congratulated on learners' understanding of averages, but clearly there is still work to be done. Learners need to ask themselves, 'have I answered the question?" If the question is asking, 'is this correct?', then it requires some processes to prove the statement one way or another. The minimum response should be 'yes' or 'no', but it is good to see learners communicating their findings in the form of a sentence explaining their reasoning.

Q5b)
Generally, learners were able to pick up marks in this question, but too many missed out on full marks because of poor labelling or incorrect plotting. There were a few learners who insisted on using non-linear scales, but not as many as in previous series. Learners should ask themselves, 'is my graph scale easy to use?'. It is not always true that using a large scale, for example 10 squares = 500, makes the graph easier to plot. If plotting errors occur, it is usually because the scale is unmanageable or does not cover the required range.

Centres need to emphasise that the scale used needs to be easy to interpret and will depend on the range of numbers to be plotted. Remind learners that they do not need to start from zero but need to cover the range of values to be plotted.

Too many learners still fail to correctly label their graphs. Centres need to emphasise that graphs are a visual communication tool, and as such, they need all relevant information to be visible.

Q5c)
Writing a comment to compare the data for 2014 with that for 2015 was generally well tackled. To gain both marks, learners needed to comment on the relationship between the data for the two years and not just data for one year. Statements such as 'more families were helped in 2015 than 2014', and 'number of families supported in both years increased up to quarter 3 and then decreased', were given full credit. Learners needed to interpret and communicate the information given and not just comment on the shape of the graph.

Section C

Q6)
The main approach learners adopted was to work in metres with conversions of 40 feet and 25 feet into metres generally being accurately done, although a few multiplied 55 metres by 0.3 to get a conversion of 16.5 feet. Those that adopted this approach usually then stated that one 25 feet length of lighting would be enough. Most learners did manage to find valid combinations of lengths of lighting with the most popular being 4 lengths of 40 feet and 1 length of 25 feet.

Learners should be encouraged to look at conversions and assess the relationship between the units. Here it was given that 1 foot is 0.3 metres so in converting from feet to metres the number of metres should be less than the number of feet. There also seems to be some confusion about the relative sizes of 1 foot and 1 metre, perhaps using the fact that a 12" ruler is 1 foot and 30 cm may help some learners.

Learners were asked to evaluate the effectiveness of their answer. Simply restating the solution is not an evaluation and learners need to explain why their solution was a good one by making some comparison of their solution with the perimeter of the garden. For example, in the case of 4 lengths of 40 feet and 1 length of 25 feet, the total length of this combination is 55.5 metres, so a comment such as 'this would go round the perimeter of 55 metres and have 0.5 metres left over' would suffice. Centres need to give their learners the opportunity to practise evaluating the effectiveness of their answers as this is now a requirement for functional skills maths at level 2.

Q7a)
A sizeable minority of learners assumed that the top tier of the wedding cake only needed 85 g of plain flour and ended up with a total amount of 510 g of plain flour instead of the correct amount of 595 g. This was despite the fact the image clearly showed the top two tiers of cake were the same size. These learners lost the accuracy mark but could gain the other available mark providing there either was a statement that ½ kg was 500g or an implicit comparison, for example, 'she would need another 10 g'. The same applied to those who did get the correct answer of 595 g and stated that she would need another 95 g. Learners should be aware that in order to make a decision they need to compare values in the same units, in this question they needed to be clear they knew half a kilogram was 500 g in order to compare their answer in grams.

One misread by a minority of learners was to use the quantity of self-raising flour in their calculations instead of plain flour. Again this could score a maximum of 2 out of the 3 available marks. A small number of learners simply doubled and /or trebled the amounts of each ingredient which alone

scored no marks. Recipe questions involving proportions are commonly utilised in functional skills assessments and centres should give their learners the opportunity to practise working with them.

Q7b)
Although most learners achieved at least one mark on this question, often for working with 2 × 3.14 × 15 × 11 there were several areas of error. For example, 15^2 = 30, $\pi \times 15^2 = (15\pi)^2$ and $2\pi rh$ = 2 + 3.14 + 15 + 11

Of those learners who correctly substituted into the formula and arrived at an answer in the acceptable range, some came to the wrong conclusion that they did not have enough icing. In fact, they needed 1743 cm^2 and had 2000 cm^2. This is in line with errors made in comparisons in questions set in previous series. Centres need to give their learners opportunities to practice substituting into given formula and comparing the size of their answer. Many learners do not realise that variables written next to each other in a formula need to be multiplied and not added!

Q8)
Many learners seemed to struggle to engage with this question and seemed unsure about what approach to adopt. Only a minority actually measured a length on the diagram to find what scale was used. Although this question posed a more unusual approach to using a scale diagram, learners have been asked to interpret a scale in previous series and the skill is well within the coverage and range for functional maths skills at level 2 i.e. 'understand, use and calculate ….., including problems involving scale'.

Although the majority of learners did draw a rectangle on the scale diagram, there were often errors in fulfilling all the constraints. For example, rectangles with the longest side not against the wall and rectangles less than 2 metres, (1 cm), from the bandstand. The last case could have been avoided if they had drawn an exclusion zone around the bandstand as a few sensible learners did. Rectangles 15 cm by 12 cm were seen too often.

Learners should be aware that if a scale is not stated it must because you need to work out the scale for yourself. This was not difficult to do as, for example, the actual dimensions of the garden were given and they were drawn to scale on the diagram and the scale was straightforward, 1 cm to 2 m, but it appeared to be beyond the understanding of many of those who did make an attempt. There were many blank sheets. Centres need to give learners more exposure to this type of question, where a scale is used but not stated to partly complete a scale drawing and objects need to be added.

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