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4748-119 (Online Evolve) and 4748-219 (Paper based)

Functional Skills Mathematics Level 1

Chief Examiners' report – October 2021

Contents

1 Introduction

The purpose of this document is to provide centres with feedback on the performance of candidates for 4748-119 and 4748-219 Functional Skills Mathematics Level 1.

The Chief Examiners' Report has been reintroduced as a result of feedback from centres, to give them guidance in preparing candidates for examination.

2 Overall Performance

This report covers the period from April 2020 to October 2021. During this period there has been considerable disruption to learning and assessment opportunities for many candidates because of the Covid pandemic. It is to the credit of both centres and their learners that, despite the problems presented, so many candidates have been able to successfully complete their assessments.

The new assessment format for Functional Skills Mathematics was implemented in 2019, a response to Ofqual's new requirements and specifications.
Ofqual requires the distinct identification of underpinning knowledge and problem solving skills, within the assessment, and for candidates to complete part of the assessment without a calculator. Candidates are therefore required to undertake a two part assessment.

	Part 1 Calculator not permitted (25minutes)	**Part 2 Calculator permitted (1 hour 20minutes)**
Underpinning knowledge (15marks = 25%)	10 single mark context free questions	5 single mark context free questions
Problem solving (45marks = 75%)	between 2 to 5 problem solving questions with practical context (total 5 marks)	1 single mark check (for sense of result) 9 problem solving questions with practical context (mark tariff between 2 and 6 marks each, total 39 marks)

Although many candidates have coped well with the new assessment requirements and have been well prepared for the level at which they have been entered, a very significant percentage of candidates have performed extremely poorly. Slightly more than 10% of candidates have achieved 10 marks or less which suggests that they were entered for assessment well before they could reasonably cope with Level 1 requirements. For example, some candidates were unable to complete very basic calculations involving fractions and/or percentages and failed to even attempt the majority of problem solving questions in Part 2 of the assessment.

2.1 Areas of good performance

A large number of candidates cope very well with the assessment formats, both paper based and online versions, producing well worked solutions to the problems set.
Well prepared candidates are coping well with both the isolated, context free questions and using their knowledge and skills to recognise and obtain a solution or solutions to a number of complex problems. Overall these candidates achieved correct answers to most of the underpinning knowledge items and scored well in the non-calculator section.
Most of these candidates cope with calculation requirements and understand the principles of basic operations (addition, subtraction, multiplication, division and BIDMAS) and can deal with fractions, decimals, percentages, ratios/proportion and scaling within both types of question.
Statistical problems have been dealt with competently by these candidates, who can generally at least calculate averages and ranges accurately. Probability questions using word descriptions were also completed well. Successful candidates have given sensible explanations of their results and demonstrated understanding of the problem contexts.
It is pleasing to note that candidates are increasingly coping well with the subject content that was added to the legacy specifications, including probability using numeric descriptions; sorting data into groups; interpreting plans and elevations; and use of basic geometry.

2.2 Areas for development

2.2.1 General observations

Although many candidates have been well prepared for the assessment, script marking still shows that some candidates are, unprepared for, or simply unable to cope with, the demands of the Level 1 papers, particularly the need to make accurate calculations using fractions, percentages and ratios; rounding to given numbers of decimal places; reading and applying scales; and making statistical calculations including probability. The need to prepare candidates for a problem solving approach involving not only calculation but also the selection of relevant data and the presentation and explanation of results, cannot be over emphasised.

Candidates are expected to show their working in order to be eligible for compensation marks in cases where they have not achieved a fully correct answer. This has been a particularly important issue for some online candidates who are clearly doing their working out on paper and neglecting to transfer some or all of their working to the online script. Also some online candidates do not appear to have had sufficient practice in using the diagram or chart tools and have therefore lost a significant number of marks.

2.2.2 Underpinning knowledge questions

There are a total of fifteen underpinning knowledge questions, generally with no contextual setting. Ten of these questions are in the non-calculator section. Here candidates have very restricted time (just under two minutes per question) and therefore need to be aware that they should move quickly between questions.

Many of the questions are straightforward calculations involving an understanding of fractions, percentages and ratios. Some will involve basic geometry (calculation of angles); calculations of areas, perimeters and volumes; and simple statistics questions including probability.

The following are examples of calculations that are not understood by some candidates:

- **percentages: e.g.** recognition of 20 out of 50 (customers) is 40%
  e.g. recognition that 30% is the same as 3/10
- **fractions: e.g.** calculation of one fifth as a price reduction
  NB one third is not 30%, nor 0.3
- **ratio: e.g.** use of ratio 1 : 2
- **time**: **e.g.** additions of hours and minutes
  e.g. recognition that 38.5 hours is 38 hours 30 minutes
  NB some candidates confuse decimal hours with minutes
- **weight conversions: e.g.** 1.25kg = 1250g
- **calculation of area: e.g.** of rectangle 5m x 7m = 35m^2
- **scaling: e.g.** use of 1cm represents 1m
- **linear conversion: e.g.** recognition that 10mm = 1cm , 1000m = 1km
- **decimal places:** some candidates are losing marks (even when using a calculator) by misplacing decimal points

Specific questions causing difficulty (selected from a number of versions)

The following questions were poorly attempted by more than half the candidates sitting particular assessment versions.

- multiplication of whole number by a fraction e.g. ¾ x 4400
- increasing a whole number by a percentage e.g. increase 800 by 25%
- using ratio e.g. number of over 60's in area from given total and ratio
- volume of cube given one side
- rounding to 2 decimal places
- number of lines of symmetry for a regular (named) polygon

2.2.3 Problem solving questions

The subject content of the new qualification is, with a few exceptions, broadly similar to that required in the legacy qualification. However, many candidates have, understandably, found difficulty coping with the style of problem solving questions that are formatted differently to those in the legacy qualification.

Candidates must understand that problem solving (as defined by Ofqual) will mean that they will have to identify mathematical processes required for solutions to problems. There will be little or no scaffolding within a question and little guidance given beyond a start point and a finish point. This is a very challenging dimension, incorporated in the new specifications, both for centres and their candidates.

Introduction to questions. In order to tackle questions, candidates need to carefully access the instructions given in the introduction and select relevant data from the data given. A number of candidates appeared to neglect to read the detail of the requirements of each question and its overall purpose, and some clearly failed to access all required data (information given, e.g. in tables or charts, will be there for the purpose of answering the question), with some candidates completely ignoring given data.

Format. Problem-solving questions will generally not have specific instructions that give the method like 'Work out the total cost.' or 'What is the volume of paint required?' or 'Work out the mean and range of the data'
The challenge for candidates is to infer the calculations and method required to find a solution to a problem couched in terms such as:

> *e.g.* A cook needs to know what time to start preparing a meal. She decides to start at 4pm
> Times and cooking instruction data given. Time for meal to be ready given.
> Will the cook have enough time? Explain your decision using figures.

Subject matter Questions may involve measures such as money, time, weight, liquid measure and calories. Candidates are expected to extract information from text and a variety of other formats including tables, timetables, invoices and receipts, diagrams, plans, elevations, recipes, price lists and advertising material.
Some questions focus on scale and candidates need to be familiar with both reading measurements from scale diagrams and constructing simple diagrams and plans to scale.
Some further developments of the contexts typically involve calculation of areas or volumes or the application of ratio.

Common errors are often related to

- insufficient attention given to reading the text content of questions carefully for detail, e.g. discounts given on *cheapest* item;
- functional aspects, e.g. purchase of *whole* packs rather than fractions of packs;
- interpretation of source documents, e.g. timetables, receipts with discounts
- ability to calculate, e.g. fractions, reduction by $\frac{1}{3}$; calculating $\frac{1}{5}$ of a value, 20% deposit or 15% off, ratio
- formula in words, e.g. final amount = original investment + interest
- misunderstanding scale on scale diagrams
- scaling up and scaling down

Other questions may be statistics based, where candidates are expected to extract information from tables of data with additional information shown in various text formats. They are expected to calculate means and ranges, but are not expected to use other averages. When calculating means, some candidates make calculation errors by misreading the number of items, eg by ignoring zero values or making assumptions about times, and therefore dividing incorrectly. A few candidates confuse the calculation of means and/or range with other averages, eg with median or mode, neither of which are required at Level 1. Probability needs to be understood both in word and numeric format.

Explanations. Problem solving questions may specify a requirement for explanation (comments). Candidates must be aware that, although marks will be awarded for relevant calculations, full marks will require suitable explanation using their results, preferably with reference to numerical values calculated: The explanation should link with (refer back to) the problem stated. Simple explanations are all that is required.

- e.g. **Problem**: a customer wants to buy the best value paint
  Result of calculation: option A £19.00 option B £23.50
  Answer: customer should buy option A

Explanation: option A is cheaper by £4.50

- e.g. **Problem**: a holidaymaker wants to choose the warmest place to go
  Result of calculation: mean temperature for place A is 26°C and place B is19°C
  Answer: the holidaymaker should choose place A
  Explanation: A is warmer than B average temperature for A is 26°C > 19°C for B

Checking for sense: candidates must also be prepared to explain why a given answer is sensible (or not) based on mathematical process/understanding rather than calculated results.

e.g. a student works out that the average temperature in Manchester for December is 165°C
Response: The answer is not sensible**,** 165°C is far too high

- e.g. recognise whether an interpretation of data presented as a chart is accurate (bar charts not starting at zero on the vertical scale may distort differences)
- **Example response:** Sales in May are not twice as much as in June as bar scale does not start at zero
- e.g. recognise whether (or not) appropriate amounts or units are used
  Example responses: 100m is too big for the width of a door, wrong units used, cm not m

Presentation of results

Most tasks require some graphical support for, and/or summary of results. Although most candidates produce good presentations, a number of candidates lose marks for the following reasons:

Tables:
Candidates lose marks for the following reasons:

- inadequate / no headings
- poor layout
- data inconsistent with results

Scale diagrams:

- misunderstanding of scale
- failure to label items

Charts / graphs:

- failure to label axes, particularly the vertical axis
- do not construct a continuous linear scale on the vertical axis
- failure to start the vertical scale at zero (bar chart only)
- do not draw bar heights, plots or sectors accurately

Units. Misunderstanding units, particularly relating to linear dimensions (mm, cm, m and km) and those of time, prevents some candidates from successfully completing questions. Many candidates do not show units either in their answers or workings. Although a candidate will not be repeatedly penalised for this, the absence of units can lead to confusion for the candidate as her/his answer develops, e.g. when dealing with scale plans. Many candidates ignore the need to make use of the £ sign and some give answers in incorrect money format, eg an answer £107.30 written as £107.3 will be penalised.

Questions where some candidates performed less well – (notes from examples in various assessment versions)

- **number calculations (some involving negative numbers)-** eg additions of scores that may be positive or negative;
  e.g. division of large number by smaller number, word formula given, some candidates have difficulty with 60000 ÷ 300 without a calculator
- e.g. number of events per day from year total **–** some candidates do not know 365 days in one year
- **money calculations –** generally well done by most candidates but a mark often lost for absence of explanation, eg accurate calculation of money spent over 3 days for one person, compared to daily spend of second person, but simple explanation that A spent less than B omitted;
- e.g. cost of furniture items with discount (some candidates unsure of % discount methods, expectation at this level for multiplying using fractions or decimal fractions);
- e.g. calculation of simple interest on two loans to find affordability, many candidates do not understand simple interest and cannot therefore work out the total repayments and/or the consequent monthly repayments
  e.g. cost of event, hire of rooms and hospitality, generally well done, some candidates found difficulty with discount calculation
- e.g. taxi fare requiring calculation of mileage from table and understanding fixed rate plus extra miles, given word formula – some candidates unable to read mileage table with different town distances, some misunderstanding of fixed amount in formula
- e.g. weight of food goods that can be purchased for given amount of money given cost per kg, many candidates are unaware that fractions of kg can be purchased, e.g. 2.5kg of potatoes costing 80p per kg can be bought for £2

- **income tax calculation –** understand tax is on total – free pay, e.g. 20% tax on salary of £20 000 with no tax on first £12 000 is £1600 not £4000. Some candidates have **added** the tax to the salary, thereby working out that tax is greater than the salary

- **National Insurance calculation –** some candidates unable to calculate weekly salary and / or neglect to give answer for a year (52 weeks). Again some candidates make a percentage calculation on the total salary despite having information (in word formula form) that amount is charged on part of total

- **calculations using simple business accounts tables –** e.g. finding range over year's monthly totals (many candidates ignore or do not understand negative amount);
- e.g. completing a monthly profit and loss table to determine whether a profit has been made at the end of the period, many candidates do not calculate with negative (loss) figures accurately

- **problems involving symmetry –** e.g. drawing squares on diagram and lines of symmetry (some candidates drew shapes other than squares); eg floor design with different coloured tiles (some candidates draw symmetry in one dimension only when two lines of symmetry required)
- **NB** candidates should know lines of symmetry in a regular polygon is equal to the number of its sides

- **percentage additions –** e.g. money in savings account after one year given annual simple percentage interest. Some candidates give only interest as answer.

- **use of fractions –** e.g. calculation of recommended daily intake of calories to identify suitability of food intake

- **calculations to determine if targets met-** many candidates do not fully understand concept of target, e.g. sales visits weekly target based on numbers per day, few candidates relate number of daily targets to a weekly total

- **proportion calculations and use of ratio -** e.g. number of products made from given large quantity of material;
- e.g. as a fraction from pie chart data;
- e.g. determination of numbers of one item from given total numbers of items and ratio
- e.g. calculation of fruit required to increase number of drinks needed for event, some candidates unable to link number of fruits needed to make one drink to new total number;
- e.g. survey response totals from table data, some candidates do not check that the total number of responses tallies with the individual categories and many do not produce accurate charts to represent results (pie chart construction is not well done – most candidates would be better drawing a bar chart if the question allows choice); e.g. hourly rate of wage from total wage, many mistakes are due to misunderstanding of decimal point position
- e.g. quantities and cost of materials mixed in a given ratio, order form to complete for calculated quantities, some candidates omitted to work out both material quantities, a few divided by 3 rather than 4 for 3:1 ratio calculation

- **time calculations –** many candidates have difficulty with time concepts particularly where hours and/or minutes and/or seconds are mixed, eg number of appointments between two times of day;
- e.g. construction of a timetable for an entertainments event, generally well done but some candidates do not construct a logical timetable (there are many acceptable formats) or pay attention to detail (finish time required, consistent use of time format)

- **meeting time targets –** e.g. 85% delivery to customers in given time tested, data from table – some candidates unable to find relevant values (on time / not on time) and evaluate percentage. Simple explanation of result often omitted (eg meets target because 87% on time is more than 85%)

- **questions with scale plans-** e.g. number of lengths to swim a given distance, some candidates cannot read scale on given scale plan, many cannot convert kilometres to metres accurately
- e.g. arrangement and fitting office furniture **–** some not understanding scale diagram is elevation (i.e. wall not floor plan) and some unable to interpret scale – therefore incorrect numbers of items fitted, mm to m conversions inaccurate
- **calculation of savings (car share) –** some candidates not interpreting scale plan distances accurately, many forgetting to apply x2 for return journeys. Explanations sometimes miss the point of the context – need to state if / how much saving made

- **identification of angles-** e.g. estimate angle in diagram, recognise 175° as almost straight line
  e.g. read angle from protractor (diagram) to check if angle is within given limits, some explanations do not refer to both ends of limits
  e.g. work out angle for pie chart sector**, 3**0 items in a total of 120 items will be represented as 90°

- **conversions between metric linear measure –** e.g. measurement of amount of material cut. Common error decimal metres to centimetres (0.25m ≠ 250cm and similar)

- **calculations using perimeter–** e.g. costing paint required for fencing perimeter many candidates inaccurately read from diagram (many miss gap distance), some omit area calculation from height of fence, and many candidates unable to link given paint coverage per m^2 with area to be painted;
- e.g. quantity of edging material using given diagram measurements, some candidates not calculating distances not given or confusing metres and centimetres

- **calculations using area-** e.g. finding areas of walls from 3-D representation of room given dimensions and word formula, many candidates do not understand which dimensions will give areas of walls, some calculate volume of room;
- e.g. returfing sports pitch given scale plan of pitch, many candidates do not read from scale plan accurately particularly taking account of small squares on graph paper, many candidates work out and use perimeter rather than area;
- e.g. finding cheapest option for floor covering – most able to calculate area from diagram dimensions, but some misunderstanding about numbers of packs of items required (whole numbers required, not fractions). Some found percentage discount calculation challenging
- e.g. calculation of area of circular space (word formula given) and cost for covering, many candidates failed to square radius, some failed to round value to nearest whole number

- **calculations using capacity (volume)-** e.g. identifying largest vehicle capacity, many candidates add dimensions rather than multiplying them, approximate check not done by most

- **packing boxes in container –** spatial awareness but many candidates calculate number by dividing container volume by box volume. Some unable to convert mm to metres accurately

- **grouping data –** question usually specifies number of groups required (ignored by a few candidates). Common errors: are overlapping boundaries, failure to clearly state boundaries (e.g. 1-10, 11-20 etc), failure to check total number from addition of grouped data, and inappropriate group sizes (generally there is an expectation that group sizes will be equal). Results often required to be presented in chart form (most candidates will find a bar chart the easiest option) e.g. repair times, different age groups, maths test results

- **extraction of data from table –** identification of suitable item from required criteria, e.g. suitable accommodation based on price and facilities

- **graph construction (line graph only required at Level 1)-** e.g. graphs showing sales of two items, explanations often omitted (simple reference to sales going up or down is all that is required)
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- **calculation of average (mean only required at Level 1) and range –** questions usually require some interpretation of results, e.g. sales per month over one year, explanations generally poor, particularly an understanding that range is not an average but gives a measure of the consistency of the results, i.e. by how much the number of cars sold per month varies month by month.
e.g. running times in minutes and seconds, many candidates unable to calculate average accurately, omission and misunderstanding of units, many do not calculate range, explanations poor (all that is required is a reference to running faster consistent with average calculated)
Candidates should be aware that references to variation or consistency in a question is usually a prompt to calculate range, e.g. variation in a shop's monthly profit and loss accounts will be highest profit – lowest profit (which might be a loss, ie a negative number)
- **one event probability – use of word descriptors** e.g. identifying, from table data, the chances of selecting a person at random who has been waiting for more than 2 minutes is certain if data shows no one has had call answered in under 2 minutes, e.g. unlikely that a person who does eat meat is chosen from group, if given seven out of ten are vegetarians
- **one event probability – express results as fractions** (i.e. not always word descriptors), e.g. one throw of dice, ½ is chance of throwing odd number, some candidates have difficulty in expressing fractions in simplest form
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3 Recommendations/Advice for centres

The assessment, and therefore the Teaching and learning required, is based on the ***DfE Subject content functional skills: mathematics (February 2018)***
Centres should understand that the assessment is based not only on the 31 Subject Content Specifications (SCS), but also on the general descriptions preceding each section and that the content at Level 1 subsumes and builds upon the content at all the lower levels (i.e. Entry 1 to 3).

Centres should carefully consider whether a candidate is operating at an appropriate level for entry at Level 1. Unfortunately there have been a small number of candidates who were clearly not anywhere near the standard required (e.g. in a recent paper, a number of candidates failed to give a correct answer to 4/5 as a percentage).

There are two platforms, paper based and online, available for this assessment. Centres should ensure that an appropriate choice of platform is made for candidates based on each candidate's need and preference. A few online candidates have actually indicated on their scripts that their preference for working on paper has been ignored by centres.

Centres should advise candidates about appropriate 'exam technique' particularly with regard to attempting Tasks in order. Candidates may attempt Tasks in any order and it may be to a candidate's advantage to start with Task 2 or 3 rather than Task 1.

Candidates who choose to access assessment online need to be prepared not only in terms of the prescribed Functional Skills Standards, but also in terms of using the E-volve platform. They must be well practised in the use of the presentation tools (tables, diagrams, charts and graphs) but also understand how to insert sufficient text, e.g. to show calculations and working, so that potential compensation marks, in the event of incorrect answers, are accessible.

The importance of showing working in paper based assessment should be stressed for the same reason. Paper based presentations are more likely to be accurate if candidates use a ruler.

4 Additional Information

Centres should be aware that pass marks may vary from paper to paper as a result of an awarding process undertaken by City & Guilds. Any difference in pass marks reflects the perceived and actual difference in demand of the exam papers, including the source materials and the questions themselves. Therefore, it is possible that two candidates with the same score may have different overall results (pass or fail) if they have taken different versions of papers.

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About City & Guilds

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We believe in a world where people and organisations have the confidence and capabilities to prosper, today and in the future. So we work with like-minded partners to develop the skills that industries demand across the world.

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