gateway qualifications

Functional Skills

Maths – Level 2

Mark Scheme and Marking Guidance

Sample Assessment

The following documents are included in this marking guidance:

- General marking guidance and assessment principles.
- Mark schemes and guidance.

Assessment Code: FSML2AC/P

General Marking Guidance

- All candidates must receive the same treatment. You must mark the first candidate in exactly the same way as you mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- All the marks on the mark scheme are designed to be awarded. You should always award full marks if deserved, i.e. if the answer matches the mark scheme. You should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

Acceptable responses

All of the following are acceptable types of responses.

- Writing initials of objects
- Drawings or symbols
- Drawing lines to show position or matches
- Evidence of counting
- Marking in any way to indicate choices.

Applying the Mark Scheme

The mark scheme states the marks awarded for the process and the answer. In most questions the majority of marks are awarded for the process the candidate uses to reach an answer. The most likely processes used by candidates are given. However, if the candidate gives different evidence for a correct process you should award the mark(s).

- If working is crossed out and still legible, then it should be marked, as long as it has not been replaced by alternative work.
- If the candidate shows more than one set of working, then you should mark the one you consider to be closest to the mark scheme.
- If it appears that the candidate has misread the question, marks can still be awarded for applying the correct process.
- You will often see correct working followed by an incorrect decision, showing that the candidate can calculate but does not understand the demand of the functional question. The mark scheme will make clear how to mark these questions.
- Where transcription errors occur and the candidate presents a correct answer in working, but writes it incorrectly on the answer line, mark the better answer.
- **Error carried forward** marks (**ecf**) must only be awarded when explicitly allowed in the mark scheme. Where the process uses the candidate's answer from a previous step, this is clearly shown.
- Marks can usually be awarded where units are not shown. Where units, including money, are required this will be stated explicitly. For example, 5(m) or (£) 256.40 indicates that the units do not have to be stated for the mark to be awarded.

- **Correct money notation** (**cmn**) indicates that the answer, in money, must have correct notation to gain the mark. This means that money should be shown as £ or p, with the decimal point correct and 2 decimal places if appropriate.
  e.g. if the question working led to £12÷5,
  Mark as correct: £2.40 240p £2.40p
  Mark as incorrect: £2.4 2.40p £240p 2.4 2.40 240.
- Candidates may present their answers or working in many **equivalent ways**. This is denoted as '**oe'** – 'or equivalent'. Repeated addition for multiplication and repeated subtraction for division are common alternative approaches. The mark scheme will specify the minimum required to award these marks.
- **Parts of questions**: because most Functional Skills questions are unstructured and open, you should be prepared to award marks for answers that are not in their expected position e.g. an answer expected in a later part of a question may be given earlier in the candidate's response.

Using the mark scheme

- apply the mark scheme methodically
- most mark points are single. However, where required:
  - initially apply the unshaded section for each question
  - if this is not achieved, then work down the shaded rows until you find the right mark
  - if none of the shaded sections are met then award 0 for that part of the mark scheme.

Task 1 – Travelling to Work			
Item	**Answer**	**Marks**	**Skills**
1a	Total walking time = 12 + 6 = 18 mins Unit must be stated and correct for the mark	1	I
	Method applied to calculate the walking times by numerical reasoning e.g. 5km in 1 hour (or 60 mins) so 1km is 5 times less so 60 ÷ 5 = 12 mins; 0.5 km is half the distance so time is half = 6 mins OR 1 km at 5 km per hour is given by 60 ÷ 5 =12 AND 0.5 km = 60 ÷ 10 = 6 mins Showing any conversion of units	1	R
1b	Selection of time before 8:06 am Allow: written time format e.g. 5 past 8. Do not allow: Time shown in decimal format e.g. 8.06 or 8:06 without am or preceding zero, i.e. 08:06 Allow: suggested time between 8:00 am and 8:05 am to account for possible delays etc. with valid explanation (e.g. This would mean Rosa arrives at work at least 10 minutes before 8:55 am) *Only allow time that is 12+ minutes before 8:03 if accompanied with strong justification (e.g. Rosa needs to arrive very early for a new job)*	1	I
	Identifying that 8:18 am train is the best one for Rosa to catch Allow if implied in answer/calculations	1	I
	Recognising that journey time needs to be subtracted from time required to walk from station to workplace: 8:49 – 17 mins = 8:32 am Allow ecf from 1a	1	R
	Identifying the need to subtract 0.5 km walking time from 8:55 am: 8:55 – 6 mins = 8:49 (am) Allow ecf from 1a	1	R

1c	State an amount between £9 and £10 to offer Paul. with valid explanation, e.g. She should offer £9.50, which is just over half of the amount. cmn	1	I
	Representation of 3-day total divided by 2 to calculate equal share of costs associated with driving to work: (£)18.21 ÷ 2 = (£)9.105 Allow: ecf based on alternative or incorrect calculation of 3-day total	1	R
	Addition of car parking charges and petrol costs and multiplying these costs by 3 (days) to calculate the total car journey expenditure per week: ((£)4.50 x 3) + ((£)1.57 x 3) = £18.21 Allow: ecf for other correct calculations of litres of petrol used based on rounded totals.	1	A
	Calculating quantity of petrol used per day and multiplication of number of litres used by the price per litre 5/7 of £1.10 x 2 = £1.57 Allow ecf based on incorrect calculation of petrol used per day (or rounded figure)	2	A
	Multiplication of number of litres used by the price per litre (£1.10) (e.g. 1.43 x 1.1 = £1.57 per day) Allow ecf based on incorrect calculation of petrol used per day (or rounded figure) e.g. (1.4 x (£)1.1 = (£)1.54) (1.5 x 1.1 = 1.65)	(1)	(A)
	Calculating quantity of petrol used per day: $\frac{\text{total mileage}}{\text{number of miles per litre of petrol}}$ 10/7 = 1.43 (to 2 dp) Allow: rounding to 1.4. or 1.5 Allow: oe	(1)	(A)

1d	Interpretation that the cost of the train fare over the 5-week period would not cover the cost of the bike Allow: ecf based on error in calculation of train fare and/or bike	1	I
	Calculation that 1/5th off the price of the bike is £79.20 Allow: any correct method for calculating price of bike	1	A
	Calculation of train fares for 5 weeks: (2 x (£)7.80) x 5 = £78	1	A
1ei	Complete valid check of any original calculation shown in 1(d) using a different method, e.g. inverse calculation or addition of 1/5th of bike cost to reduced price.	1	A
1eii	Explains why check was effective: e.g. I reversed the calculation for the train fare for 5 weeks and it made the single daily rate. e.g. I added 1/5th of the cost of the bike to the reduced cost and it added up to the original price.	1	A
		Total Marks for Task 1 = **16**	

Task 2 – The Election			
Item	**Answer**	**Marks**	**Skills**
2ai	Addition of both volume calculations: 3 000 + 375 = 3 375 cm^3	1	I
	Calculating the volume of the upper space (triangular prism shape): $\frac{5 \times 10 \times 15}{2}$ = 375 cm^3	1	A
	Calculating the volume of the regular cuboid space: 15 x 10 x 20 = 3 000cm^3 Allow: calculating volume of space as if it were a regular cuboid (25 x 15 x 10 = 3 750cm^3)	1	A
	Identifying that the volume calculation of this irregular shape needs to be undertaken as 2 separate calculations Allow: an attempt to calculate volumes of regular cuboid shape and upper space separately	1	R
2aii	Calculating the minimum volume of the box based on the volume of 100 ballot papers: 300 x 11 = 3 300 cm^3	1	A
	Identifying that the total number of students needs to be divided by 100: 1 100/100 = 11	1	R
2aiii	Interpretation, e.g. Yes, the box is 75 cm^3 bigger than it needs to be. Allow similar wording which makes reference to comparison between volume of box and required volume size. Allow ecf based on incorrect calculation of box volume and/or volume required for ballot papers.	1	I

<table>
<tr><td>2b</td><td>All pie chart portions calculated and represented accurately

<table><tr><td>Candidate</td><td>No of degrees</td></tr><tr><td>Darius</td><td>190</td></tr><tr><td>Jo</td><td>80</td></tr><tr><td>Stefan</td><td>44</td></tr><tr><td>Milly</td><td>46</td></tr></table>
Allow: tolerance of +/- 2º</td><td>2</td><td>A, I</td></tr>
<tr><td></td><td>Allow: 1 mark for 3 portions represented accurately</td><td>(1)</td><td>A</td></tr>
<tr><td></td><td>Appropriate labels/key used to indicate what the portions represent</td><td>1</td><td>R</td></tr>
<tr><td></td><td>Recognition that the number of students needs to be added together to give total = 720 students

This total could be shown in table and/or working out box</td><td>1</td><td>R</td></tr>
<tr><td>2c</td><td>Interpretation, e.g. The organisers are right because there was a higher proportion of students who took part in the election

Allow correct interpretation based on ecf</td><td>1</td><td>I</td></tr>
<tr><td></td><td>Calculating that last year, the turnout was 60% and this year the turnout is 65%

Allow: other similar comparison, e.g. using decimal equivalent

Allow: ecf from miscalculated number of voters in (b)</td><td>1</td><td>A</td></tr>
<tr><td></td><td>Identifying a suitable method for making a comparison between the voter turnouts, e.g. calculating the percentage of voters out of the total number of students</td><td>1</td><td>R</td></tr>
</table>

2d	An explanation that makes reference to **both** of the following points: The combined scores of all ratings gave (Issue a) a lower rating than any other issue, but more students awarded it 10 than any other rating. **AND** The combined scores of all ratings gave (Issue b) a higher rating than any other issue, but more students awarded it 6 than any other rating.	3	I
	An explanation which refers to one of these points	(2)	I
	A partial explanation of either of the points, e.g. More students awarded (Issue a) a 10 than any other rating	(1)	I
		Total Marks for Task 2 = **17**	

Task 3 – Penalty Shootout			
Item	**Answer**	**Marks**	**Skills**
3a	Use ratio to calculate penalty spot distance: 5.5 x 1.5 = 8.25m Allow: 5.5/2 x 3 = 8.25m Unit must be stated and correct for the mark	1	A
	Identifying that the relationship between the width of the full-sized goal and the penalty spot on a full-sized pitch is 1:1.5 Allow: 2:3	1	I
3b	Multiplication of length and width measures to find total area to show area is less than 300m² 17.5 x 16.25 = 284.375m² (to 3 dp) Allow: 284m² to nearest m² Allow: ecf based on incorrect multiplication of calculated dimensions	1	I
	Addition of combined distances between goalposts and perimeter line in order to calculate the length of the horizontal sides (width): (2 x 6) + 5.5 = 17.5(m)	1	A
	Addition of combined distances to calculate length of the vertical sides (length): 8.25 + 3 + 5 = 16.25(m) Allow: ecf for penalty spot distance calculated in (a)	1	A

3c	Penalty spot accurately positioned in relation to the centre of the goal Allow: tolerance of +/- 2mm	1	R
	Application of scale to width of goalpost Allow: tolerance of +/- 2mm	1	R
	Application of scale to distance of penalty spot from goal Allow: ecf from (a) Allow: tolerance of +/- 2mm	1	R
	Perimeter lines of activity area drawn accurately in relation to the scale used Allow: tolerance of +/- 2mm	1	R
	Selection of appropriate scale for the plan, e.g. 1cm = 2m or 1:200 and stated	1	I
3d	Interpretation that this ball would be suitable to use because it is **approximately** the correct weight (within 2 grams of required weight).	1	I
	Application of conversion rate given to convert weight from ounces to grams 11.25 x 28.35 = 318.94g (to 2dp) Unit must be stated and correct for the mark	1	R
	Application of method to calculate suggested weight of ball: 15 x 0.75 = 11.25(g)	1	R

3e	Calculating that there is a 1 in 8 chance of scoring all 3 penalties oe – representing correct probability as a percentage or decimal = 12.5% or 0.125	2	A,R
	Attempt to show that the probability is based on identifying all the possible outcomes from taking the penalties, e.g. tree diagram drawn	(1)	R
3f	Interpretation that Emma thinks correctly, e.g. 24% this year is a lower percentage than 40% last year	1	I
	Calculate the percentage that missed the goal this year: 64/264 = 24.24% (24% to nearest whole number) Allow: oe for calculating number of penalties missed as % of total penalties taken	1	A
		Total Marks for Task 3 = **17**	
		Total Marks for Task 1, 2, and 3 = **50**	

Item breakdown

Item	Skills standard	Coverage and range	Marks
1a	Representing 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	a) Understand and use positive and negative numbers of any size in practical contexts; b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	2
1b	Representing 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	a) Understand and use positive and negative numbers of any size in practical contexts; b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	4
1c	Representing 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places h) Use, convert and calculate using metric and, where appropriate, imperial	5

	solve them. 3. Choose from a range of mathematics to find solutions. Analysing 4. Apply a range of mathematics to find solutions.	measures; d) Understand and use equivalences between fractions, decimals and percentages;	
1d	Analysing 4. Apply a range of mathematics to find solutions. 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places d) Understand and use equivalences between fractions, decimals and percentages; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	3
1e	Analysing 4. Apply a range of mathematics to find solutions. 5. Use appropriate checking procedures and evaluate their effectiveness at each stage.	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places d) Understand and use equivalences between fractions, decimals and percentages; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	2

2ai	Representing 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Analysing 4. Apply a range of mathematics to find solutions. Interpreting . 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	a) Understand and use positive and negative numbers of any size in practical contexts; b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; c) Understand, use and calculate ratio and proportion, including problems involving scale; f) Recognise and use 2D representations of 3D objects; g) Find area, perimeter and volume of common shapes; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	4
2aii	Representing 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Analysing 4. Apply a range of mathematics to find solutions.	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; g) Find area, perimeter and volume of common shapes; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	2
2aiii	Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications	a) Understand and use positive and negative numbers of any size in practical contexts; b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; g) Find area, perimeter and volume of common shapes;	1
2b	Representing	a) Understand and use positive	4

	1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Analysing 4. Apply a range of mathematics to find solutions. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	and negative numbers of any size in practical contexts b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; c) Understand, use and calculate ratio and proportion, including problems involving scale; d) Understand and use equivalences between fractions, decimals and percentages; e) Understand and use simple formulae and equations involving one- or two-step operations; i) Collect and represent discrete and continuous data, using ICT where appropriate; j) Use and interpret statistical measures, tables and diagrams, for discrete and continuous data, using ICT where appropriate;	
2c	Representing 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Analysing 4. Apply a range of mathematics to find solutions. 5. Use appropriate checking procedures and evaluate their effectiveness at each stage. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; c) Understand, use and calculate ratio and proportion, including problems involving scale; d) Understand and use equivalences between fractions, decimals and percentages;	3

	mathematical justifications.		
2d	Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	j) Use and interpret statistical measures, tables and diagrams, for discrete and continuous data, using ICT where appropriate; k) Use statistical methods to investigate situations;	3
3a	Analysing 4. Apply a range of mathematics to find solutions. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	a) Understand and use positive and negative numbers of any size in practical contexts; b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; c) Understand, use and calculate ratio and proportion, including problems involving scale; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	2
3b	Analysing 4. Apply a range of mathematics to find solutions. 5. Use appropriate checking procedures and evaluate their effectiveness at each stage. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; e) Understand and use simple formulae and equations involving one- or two-step operations; g) Find area, perimeter and volume of common shapes; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	3
3c	Representing 1. Understand routine and non-routine problems in familiar and	c) Understand, use and calculate ratio and proportion, including problems involving	5

	unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	scale; f) Recognise and use 2D representations of 3D objects; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	
3d	Representing 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; c) Understand, use and calculate ratio and proportion, including problems involving scale; d) Understand and use equivalences between fractions, decimals and percentages; e) Understand and use simple formulae and equations involving one- or two-step operations; h) Use, convert and calculate using metric and, where appropriate, imperial measures;	3
3e	Representing 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them.	a) Understand and use positive and negative numbers of any size in practical contexts; d) Understand and use equivalences between fractions, decimals and percentages; l) Use probability to assess the	2

	3. Choose from a range of mathematics to find solutions. Analysing 4. Apply a range of mathematics to find solutions. 5. Use appropriate checking procedures and evaluate their effectiveness at each stage.	likelihood of an outcome.	
3f	Analysing 4. Apply a range of mathematics to find solutions. 5. Use appropriate checking procedures and evaluate their effectiveness at each stage. Interpreting 6. Interpret and communicate solutions to multi-stage practical problems in familiar and unfamiliar contexts and situations. 7. Draw conclusions and provide mathematical justifications.	c) Understand, use and calculate ratio and proportion, including problems involving scale; b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; d) Understand and use equivalences between fractions, decimals and percentages;	2