AQA

Functional Skills
Functional Mathematics

Level 1
Mark scheme

4367
March 2018

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Glossary for Mark Schemes

Examinations are marked to award positive achievement.

Marks are awarded for demonstrating the following interrelated **process skills**.

Representing   Selecting the mathematics and information to model a situation.

R.1	Candidates recognise that a situation has aspects that can be represented using mathematics.
R.2	Candidates make an initial model of a situation using suitable forms of representation.
R.3	Candidates decide on the methods, operations and tools, including ICT, to use in a situation.
R.4	Candidates select the mathematical information to use.

Analysing   Processing and using mathematics.

A.1	Candidates use appropriate mathematical procedures.
A.2	Candidates examine patterns and relationships.
A.3	Candidates change values and assumptions or adjust relationships to see the effects on answers in models.
A.4	Candidates find results and solutions.

Interpreting   Interpreting and communicating the results of the analysis.

I.1	Candidates interpret results and solutions.
I.2	Candidates draw conclusions in light of situations.
I.3	Candidates consider the appropriateness and accuracy of results and conclusions.
I.4	Candidates choose appropriate language and forms of presentation to communicate results and solutions.

In particular, individual marks are mapped onto the following **skills standards**.

Representing   Making sense of the situations and representing them.
A learner can:

  Ra   Understand routine and non-routine problems in familiar and unfamiliar contexts and situations.

  Rb   Identify the situation or problems and identify the mathematical methods needed to solve them.

  Rc   Choose from a range of mathematics to find solutions.

Analysing   Processing and using the mathematics.
A learner can:

  Aa   Apply a range of mathematics to find solutions.

  Ab   Use appropriate checking procedures and evaluate their effectiveness at each stage.

Interpreting   Interpreting and communicating the results of the analysis.
A learner can:

  Ia   Interpret and communicate solutions to multistage practical problems in familiar and unfamiliar contexts and situations.

  Ib   Draw conclusions and provide mathematical justifications.

To facilitate marking, the following categories are used:

  M   Method marks are awarded for a correct method which could lead to a correct answer.

  A   Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.

  B   Marks awarded independent of method.

  ft   Follow through marks. Marks awarded following a mistake in an earlier step.

  SC   Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.

  oe   Or equivalent. Accept answers that are equivalent.
eg, accept 0.5 as well as $\frac{1}{2}$

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Q	Answer	Mark	Comments
	Alternative method 1		
	4 × 45 or 180	M1 *Ra*	
	5 × 20 or 100	M1 *Rc*	
	51 + their 180 + their 100 + 54.5(0) or 400 – (51 + their 180 + their 100 + 54.5(0))	M1 *Aa*	must include exactly one of each train cost and at least one £45 or at least one £20
	385.5(0) and Yes or 14.5(0) and Yes	A2 *I*	A1　385.5(0) or 14.5(0) or A1ft　correct decision for their value must score 3rd M1
1 (a)	**Alternative method 2**		
	51 + 45 + 20 or 116 or 45 + 20 or 65 or 54.5(0) + 20 or 74.5(0)	M1 *Ra*	
	51 + 45 + 20 or 116 and 45 + 20 or 65 and 54.5(0) + 20 or 74.5(0)	M1 *Rc*	
	their 116 + 3 × their 65 + their 74.5(0) or 400 – (their 116 + 3 × their 65 + their 74.5(0))	M1 *Aa*	5 days totalled their 65 must be from 45 + 20 their 116 is train + stay + daily cost their 74.5(0) is train + daily cost
	385.5(0) and Yes or 14.5(0) and Yes	A2 *I*	A1　385.5(0) or 14.5(0) or A1ft　correct decision for their value must score 1st M1 and include the 2 trains and at least one £45 or one £20

	Additional Guidance
1(a)	Condone 54 instead of 54.5(0) as a misread. Award any method marks but not the first A1 the A1ft can also be awarded eg Using 54 throughout with answer of 385.5(0) and Yes gains 6 marks (M5A0A1ft) Omitting the 5 × 20 altogether can score a maximum of 3 marks for an answer of 285.5(0) and Yes M1M0M1A0A1ft Just adding the 4 values from the table 51 + 45 + 20 + 54.5(0) = 170.5(0) and Yes gains M0M0M1A0A1ft

1 (b)	Greystoke and 77 or Penrith and 89	B1 *Rb*	day 1 row completed correctly
	same start for Wednesday as their finish for Tuesday	B1 *I*	
	correct distance for Wednesday	B1ft *Aa*	ft their starting place for Wednesday unless it is Whitehaven

Additional Guidance

Fully correct answers

Tues	Whitehaven	**Greystoke**	**77**
Wed	**Greystoke**	Stanhope	**79**

or

Tues	Whitehaven	**Penrith**	**89**
Wed	**Penrith**	Stanhope	**67**

Examples of ft

Tues	Whitehaven	**Melmerby**	103
Wed	**Melmerby**	Stanhope	53

B0B1B1ft

Tues	Whitehaven	**Greystoke**	77
Wed	**Penrith**	Stanhope	67

B1B0B1ft

If the start place for Wednesday is blank allow a correct distance for their finish place on Tuesday for max 2 marks

eg Tuesday Penrith   89   Wednesday …………..67 gains B1B0B1

eg Tues Melmerby 103   Wed ………….   53 gains B0B0B1

Q	Answer	Mark	Comments
1 (c)	225 – 156 or 69	M1 *Ra*	
	69 km	A1 *Aa*	must see km
Check	Reverse or alt process, eg 156 + 69 = 225	B1ft *Ab*	
1(c)	**Additional Guidance**		
	Mark holistically. Units can be seen in main answer lines or check. eg 225 – 156 = 69 check 225km – 69km = 156km		

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Q	Answer	Mark	Comments
	Alternative method 1		
	206 – 156 or 50	M1 *Ra*	works out km to cycle Allow statements eg he has to cycle 50 km
	(11 – 9) × 25	M1 *Aa*	2 hours × speed Allow 1 hour is 25, 2 hours is 50
1 (d)	206 – 156 = 50 and 2 × 25 = 50 and Yes	A2 *I*	A1 206 – 156 =50 and 2 × 25 = 50 or A1 correct decision for their value if at least one method mark scored
	Alternative method 2		
	206 – 156 or 50	M1 *Ra*	works out km to cycle Allow statements eg he has to cycle 50 km
	their 50 ÷ 2	M1 *Aa*	
	206 – 156 = 50 and 50 ÷ 2 = 25 and Yes	A2 *I*	A1 206 – 156 = 50 and 50 ÷ 2 = 25 or A1 correct decision for their value if at least one method mark scored

1(d) cont'd	**Alternative method 3**		
	206 – 156 or 50	M1 *Ra*	works out km to cycle Allow statements eg he has to cycle 50 km
	their 50 ÷ 25	M1 *Aa*	
	206 – 156 = 50 and 50 ÷ 25 = 2 and Yes	A2 *I*	A1 206 – 156 = 50 and 50 ÷ 25 = 2 or A1 correct decision for their value if at least one method mark scored
	Alternative method 4		
	156 + 25 or 181 (by 10 am)	M1 *Ra*	
	their 181 + 25 (by 11am)	M1 *Aa*	
	206 and Yes	A2 *I*	A1 206 (from 156 + 25 + 25) or A1ft correct decision for their value must score both M marks Must see working to justify 2 lots of 25 added
	Additional Guidance		
	Clear statements can be used throughout instead of the mathematical operations eg He has to travel 50 km He travels 25 km per hour so in 2 hours he can complete 50km so he is correct M1M1A1A1		

Q	Answer	Mark	Comments
2 (a)	£200	B1 *Rb*	
	Additional Guidance		

Q	Answer	Mark	Comments
2 (b)	(Ken) 2017 – 1932 or 84 or 85 or (Tom) 2017 – 1951 or 65 or 66 or 2017 – 80 = 1937	M1 *Aa*	
	Ken (£)200 and Tom (£)100	A2 *Rb,I*	A1 Ken (£)200 or Tom (£)100 SC2 both ages incorrect but with Ken over 80 → 200 and Tom under 80 →100
	Additional Guidance		
	Ages are not required but do not award A2 if any incorrect age is seen example Ken is 84 Tom is 76 M1 and Ken gets £200 Tom gets £100 A1 only Subtracting 80 from 2017 means that they can see that Ken is over 80 and Tom is under 80		

Q	Answer	Mark	Comments
	Alternative method 1		
	3 x 140	M1 *Rc*	
	420 and No or he is £30 short	A2 *I I*	A1 420 or 30 A1ft Correct conclusion for their value
	Alternative method 2		
	450 ÷ 3	M1 *Rc*	
2 (c)	150 and No	A2 *I I*	A1 150 A1ft Correct conclusion for their value
	Alternative method 3		
	450 ÷ 140	M1 *Rc*	
	3.2(…) and No or 3.2(..) and it will take more than 3 years	A2 *I I*	A1 3.2(..) A1ft Correct conclusion for their value
	Additional Guidance		
	An answer only of 'He loses £30' gains full marks An answer only of 'He saves an extra £30 is M1A1A0		

2 (d)	9 × 8 = 72 or 72 ÷ 9 = 8 or 72 ÷ 8 = 9	B1 *I*	ignore units

Additional Guidance
Ignore attempts at sq units also eg $9 \times 8 = 72^2$ (take this as meaning square metres)
Allow other methods of multiplying eg by repeated addition

Q	Answer	Mark	Comments
2 (e)	**Alternative method 1**		
	72 ÷ 6 or 12	M1 *Rc*	
	their 12 × 25 or 300	M1 *Ra*	
	(their 12 ÷ 4) × 79 or 237	M1 *Rc*	cost of rolls using special offer their 12 > 4 or 79 ÷ 4 or 19.75
	their 300 – their 237	M1 *Aa*	or their 300 – (their 12 × their 19.75) or (their 12 × 25) – (their 12 ×19.75) their 300 and their 237 must be for a consistent number of rolls
	63	A1 *Aa*	
	Alternative method 2		
	72 ÷ 6 or 12	M1 *Rc*	
	79 ÷ 4 or 19.75	M1 *Ra*	cost per roll with special offer
	25 – their 19.75 or 5.25	M1 *Rc*	
	their 12 × their 5.25	M1 *Aa*	their 12 > 4
	63	A1 *Aa*	

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Q	Answer	Mark	Comments
2(e) cont'd	**Alternative method 3**		
	$72 \div 6$ or 12	M1 *Rc*	
	25×4 or 100	M1 *Ra*	cost of 4 rolls without using offer
	their $100 - 79$ or 21	M1 *Rc*	saving on 4 rolls using offer
	(their $12 \div 4$) $\times$ their 21	M1 *Aa*	their $12 > 4$
	63	A1 *Aa*	
	Additional Guidance		
	Alt 1 £300 gains M1M1

(£)237 gains 1st and 3rd M1's

Alt 2 5.25 gains 2nd and 3rd M1's

Alt 3 21 gains 2nd and 3rd M1's

Alts 2 and 3 can only be used for multiples of 4 rolls.

Using the incorrect number of rolls may gain 3 marks.

If the number of rolls is a multiple of 4 follow the scheme and award up to M0M1M1M1A0

eg 8 rolls used

$8 \times 25 = 200$

$(8 \div 4) \times 79 = 158$

$200 - 158 = 42$ M0M1M1M1A0

If the number of rolls is not a multiple of 4 they must use the special offer plus the cost of any extra rolls

eg using 6 rolls

 $6 \times 25 = 150$

$79 + 25 + 25 = 129$ (1 set of 4 rolls on special offer plus 2 extra rolls at full price)

$150 - 129 = 21$ M0M1M1M1A0 | | |

Q	Answer	Mark	Comments
3 (a)	43 × 9 or 387	M1 *Ra*	step 1
	their 387 ÷ 5 or 77.4	M1 *Aa*	step 2 their 387 must be their previous answer
	their 77.4 + 32	M1 *Aa*	step 3 their 77.4 must be their previous answer
	109.4 (degrees Fahrenheit)	A1 *Aa*	
	Additional Guidance		
	Answer 109 with 109.4 seen M3A1 Answer 109 seen without 109.4 is M3A0 If they miss out a step just ft their values eg misses first step 43 ÷ 5 = 8.6 8.6 + 32 = 40.6 M0M1M1A0 the steps must follow on to gain credit eg 43 × 9 = 387 43 ÷ 5 = 8.6 43 + 32 = 75 They clearly do not understand how to apply the steps. Award M1M0M0A0		

| **3 (b)** | 27 | B1
Rb | |

Q	Answer	Mark	Comments
3 (c)	**Alternative method 1**		
	60 ÷ 12 or 5 or 26 ÷ 8 or 3.(25)	B1 *Ra*	
	their 5 × their 3	M1 *I*	must be integers, with any decimals rounded down
	5 × 3 =15 and Yes	A2 *I*	A1 5 × 3 = 15 or A1ft correct conclusion for their value if M1 gained
	Alternative method 2		
	draws one row of 5 boxes or shows multiples of 12 to 60 or draws one column of 3 boxes or shows multiples of 8 to 24	B1 *Ra*	must fit along with no space for other boxes can be a small space left (< 1 box)
	draws one row of 5 boxes and draws one column of 3 boxes or their 5 × their 3	M1 *I*	must be complete boxes with no space horizontally their 5 boxes along and their 3 boxes up (must be integers) or their 5 multiples of 12 x their 3 multiples of 8
	15 boxes drawn and Yes or 5 × 3 = 15 and Yes	A2 *I*	Must fill the space horizontally. A1 15 boxes drawn or 5 × 3 = 15 or A1ft correct conclusion for their value if M1 gained

		Additional Guidance
18		Use of area ÷ area (1560 ÷ 96 = 16(.25)) gains no marks
		if they clearly do area × area in the working lines then ignore any attempt to draw boxes on the diagram.
		Method on working lines takes precedence but the diagram may help to see what they are doing.
		Boxes drawn do not have to be equal sizes
		Beware 60 ÷ 8 = 7.5 and 26 ÷ 12 = 2(.16) so its possible they would then do 7.5 x 2 = 15
		This gains B0 M0A0 but rounding down to 7 giving 7 x 2 = 14 would gain the M1and could also gain the A1ft for No

Q	Answer	Mark	Comments
3(d)	25 × 3.50 or 87.5(0)	M1 *Ra*	
	48 × 1.10 or 52.8(0)	M1 *Ra*	
	25 × 3.50 + 48 × 1.10 or their 87.5(0) + their 52.8(0) or 140.3(0)	M1 *Rc*	their 87.5(0) and their 52.8(0) must be from attempts at 25 × 3.5(0) and 48 × 1.1(0) adding 2 sets of income only
	40.15 + 12.25 + 14.7 or 67.10	M1 *Aa*	adding exactly 3 costs (no extras) check for total under table
	their 140.3(0) – their 67.1(0) or their 140.3(0) – 40.15 –12.25 – 14.7(0) or their 67.1(0) + 70 or their 140.3(0) – 70	M1 *Aa*	total income – total costs their 140.3(0) must be from n × 3.5(0) + m × 1.1(0) where n and m are both greater than 1 their 61.7(0) must be an attempt at totalling the three costs
	73.2(0) and Yes or it is 3.2(0) more or 137.1(0) and 140.3(0) and Yes or 70.3(0) and 67.1(0) and Yes	A2 *I*	A1 73.2(0) or 3.2(0) or 137.1(0) and 140.3(0) or 70.3(0) and 67.1(0) or A1 ft correct decision for their value if 5th method mark gained
	Additional Guidance		
	140.3(0) implies M3		

Q	Answer	Mark	Comments
4 (a)	115 ÷ 5	M1 *Rc*	
	23	A1 *Aa*	
Check	23 × 5 = 115 or 115 ÷ 23 = 5	B1ft *Ab*	
	Additional Guidance		
	Mark holistically Embedded answers eg 23 × 5 =115 M1A0		

Q	Answer	Mark	Comments
4 (b)	**Alternative method 1**		
	52 + 45 + 54 + 51 or 202 or 56 + 48 + 50 + 54 or 208	M1 *Aa*	
	202 and 208 and Yes or 6 more and Yes	A2 *I*	compares totals A1 202 and 208 or A1ft correct decision for their values
	Alternative method 2		
	52 + 45 + 54 + 51 or 202 or 56 + 48 + 50 + 54 or 208	M1 *Aa*	
	50.5 and 52 and Yes	A2 *I*	compares means A1 50.5 and 52 or A1ft correct decision for their values
	Alternative method 3		
	Orders Kim's scores to 45, 51, 52, 54 or median = 51.5 or Orders Ellie's scores to 48, 50, 54, 56 or median = 52	M1 *Aa*	
	51.5 and 52 and Yes	A2 *I*	A1 51.5 and 52 or A1ft correct decision for their values

	Alternative method 4		
4(b) cont'd	(Elle) (+) 4, (+)3, - 4, (+)3 or 10 – 4 or (Kim)) - 4, - 3, (+)4, - 3 or -10 + 4	M1 *Aa*	
	(Ellie) 6 and Yes or (Kim) -6 and Yes	A2 */*	A1 (Ellie) 6 or (Kim) -6
	Additional Guidance		

	163.75 and 167.5 implies M1 on alt 2 and scores M1A0A1ft with Yes
	
	If totals are found and then they divide by an incorrect **consistent** value to find the mean they can gain M1 for a correct total and A1ft for a correct conclusion
	
	eg 202 ÷ 2 =101
	
	    208 ÷ 2 = 104 yes M1A0A1
	
	If they divide each total by a different value they can only gain M1
	
	eg 202 ÷ 4 = 50.5
	
	    208 ÷ 5 = 41.6 No gains M0 only		

Q	Answer	Mark	Comments

4 (c)	$\dfrac{1}{5}$ or 0.2 or 20%	B1 *Aa*	
	Additional Guidance		
	incorrect notation can be ignored if the correct value is also given eg Answer 1 in 5 or Answer 1 out of 5 B0 eg Answer 1 in 5 or 1/5 B1		

	Ratio is an incorrect mathematical answer so B0 whatever is given with it
	eg Answer 1:5 and 1/5 both given is choice since 1:5 is incorrect B0

Q	Answer	Mark	Comments
	Alternative method 1		
4 (d)	9 × 5 or 45 or 2 × 6 or 12 or 57	M1 *Rb*	
	(5 – 2) × –1 or –3	M1 *Rb*	
	their 45 + their 12 – their 3 or their 57 – their 3 or their 45 + their 9	M1 *Aa*	3 non-zero values points from qu1-10 + positive points from Qu11-15 + negative points from qu11-15
	54 and No	A2 *I*	A1 54 or A1 ft correct decision for their value if 2 method marks scored

	Additional Guidance
4(d)	The most likely error is thinking that 11-15 is 4 questions eg $9 \times 5 = 45$ $6 \times 2 = 12$ $2 \times -1 = -2$ $45 + 12 - 2 = 55$ No Scores M1M0M1A0A1ft Just stating the points scored eg 'she scored 54' does not gain the decision mark They must state No (or yes if necessary for their ft answer) or a statement such as 'She only scored 54' 'She scored less than 55' Or for incorrect answers eg Answer 55 –'she scored exactly 55' Answer 61 'she scored over 55'

	Alternative method 1		
	68 000 ÷ 100 × 30 or 68 000 × 0.3 or 20 400	M1 *Rc*	M2 for 68 000 ÷ 2 or 34 000 and their 34 000 × 0.3
	their 20 400 ÷ 2 or 10 000 × 2 or 20 000	M1 *Aa*	
	10 200 and Yes or it's 200 more or 20 400 and 20 000 and Yes	A2 *I*	A1 10 200 or 20 400 and 20 000 or A1ft correct decision for their value(s) if 1st method mark scored
	Alternative method 2		
4 (e)	30 ÷ 2 or 15	M1 *Rc*	
	68 000 ÷ 100 × their 15 or 68 000 × 0.15	M1 *Aa*	0.15 seen implies first M1
	10 200 and Yes	A2 *I*	A1 10 200 or A1ft correct decision for their value if 2nd method mark scored
	Alternative method 3		
	10 000 × 2 or 20 000	M1 *Rc*	
	20 000 ÷ 30 × 100	M1 *Aa*	
	66 666 and Yes or 66 667 and Yes	A2 *I*	A1 66 666 or 66 667 or A1ft correct decision for their value if 2nd method mark scored