



FUNCTIONAL SKILLS CERTIFICATE
Functional Mathematics

Level 2

Mark Scheme

4368

November 2017

Version: 1.0 Final

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.

Further copies of this mark scheme are available from aqa.org.uk

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:

- la** Interpret and communicate solutions to multistage practical problems in familiar and unfamiliar contexts and situations.
- lb** 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 $\frac{1}{2}$

Q	Answer	Mark	Comments
1(a)	2.21 (pm) or 14 21	B2 Aa Aa	B1 2.01(pm) or 14 01 seen or B1ft correct time for their 2.01(pm) SC1 2.41 (pm) or 1421 or 3.01 (pm) or 1501
	Additional Guidance		
	Allow any representation of correct times. E.g. 2:21 or 14.21 or 21 minutes past 2		

Q	Answer	Mark	Comments			
1(b)	Alternative method 1					
	$56 + 43 + 39 + (56 - 39) + (43 - 18) + 18$ or $56 + 43 + 39 + 17 + 25 + 18$ or $(43 + 56) \times 2$ or 198	M1 Aa	allow up to two errors or omissions or one additional length			
	their 198 \times 4 or 792	M1 Ra	or their 198 \div 150 or 1.32 their 198 must be a length			
	their 792 \div 150	5 \times 150 or 750	M1 Rc	their 1.32 \times 4	their 792 \div 5	their 750 \div 4
	5.2(8 ...) or 5.3 or 6 and No or 792 and 750 and No or 158.4 and No or 187.5 and No	A2 <i>lb</i> <i>lb</i>	A1 5.2(8 ...) or 5.3 or 792 and 750 or 158(.4) or 187.5 or A1ft correct decision for their value(s) for A1ft must score M1M1M1 or M1MOM1 or MOM1M1 - their 198 must be a length			

Q	Answer	Mark	Comments
1(b)	Alternative method 2		
	$56 + 43 + 39 + (56 - 39) + (43 - 18) + 18$ or $56 + 43 + 39 + 17 + 25 + 18$ or $(43 + 56) \times 2$ or 198	M1 Aa	allow up to two errors or omissions or one additional length
	150 × 5 or 750	M1 Ra	
	their 750 ÷ their 198	M1 Rc	their 198 must be a length
	3.78 and No	A2 lb lb	A1 3.78 or A1ft correct decision for their value(s) must score M1M1M1 or M0M1M1 or M1M0M1
	Additional Guidance		
	Award first M1 for any evidence of trying to find the total perimeter. '(He will need) 6 rolls' implies 'No'		
	750 – 792 and need another 42 m	M3A2	
	$150 - 39 - 25 - 17 - 18 - 56 - 43$ or -48 4 × their -48 or -192 150 – 192 or -42 42 m short with 5 rolls so needs 6 rolls	M1 M1 M1 A2	
	If their $198 < 198$ can score M3 A1ft (allow 4×150 instead of 5×150). E.g.		
	$39 + 18 + 56 + 43 = 156$ $4 \times 156 = 624$ $4 \times 150 = 600$ Yes	M1 M1 M1 A1ft	

1(c)	Alternative method 1
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Q	Answer		Mark	Comments
	any appropriate area calculated, eg 56 × 43 or 2408 or (56 – 39) × (43 – 18) or 17 × 25 or 425 39 × 43 or 1677 or 18 × (56 – 39) or 18 × 17 or 306 18 × 56 or 1008 or (43 – 18) × 39 or 25 × 39 or 975		M1 Ra	
	their 2408 – their 425 or their 1677 + their 306 or their 1008 + their 975 or 1983		M1 Aa	
	their 1983 × 1.196 or [2371, 2371.7]		M1 Rb	2371.668 their 1983 must be an area
	4840 ÷ 2 or 2420	their [2371, 2372] × 2	M1 Rc	or their [2371, 2372] ÷ 4840
	[2371, 2372] and 2420 and No or [4742, 4744] and No		A2 lb lb	A1 [2371, 2372] and 2420 or [4742, 4744] or 0.48(9 ...) or 0.49 or A1ft correct decision for their value(s) must score M3 and use 1.196

1(c)	Alternative method 2		
	any appropriate area calculated, eg	M1	

Q	Answer	Mark	Comments	
	56×43 or 2408 or $(56 - 39) \times (43 - 18)$ or 17×25 or 425 39×43 or 1677 or $18 \times (56 - 39)$ or 18×17 or 306 18×56 or 1008 or $(43 - 18) \times 39$ or 25×39 or 975			
	their 2408 – their 425 or their 1677 + their 306 or their 1008 + their 975 or 1983	M1 Aa		
	$4840 \div 2$ or 2420	$4840 \div 1.196$ or 4046.8 ...	M1 Rb	
	their 2420 \div 1.196	their 1983 \times 2 or their 4046.8 \div 2	M1 Rc	2023.411 ... or their 1983 \div their 4046.8 ...
	2023.4 ... and 1983 and No or 4046.8 ... and 3966 and No	A2 lb lb	A1 2023.4 ... and 1983 or 4046.8 ... and 3966 or 0.48(9 ...) or 0.49 or A1ft correct decision for their value(s) must score M3 and use 1.196	

1(c)	Additional Guidance
	Use of perimeter instead of area can score M1 max for $4840 \div 2$ or 2420 Error in calculation of area can score M1M0M1M1A1ft max

Q	Answer	Mark	Comments
	Misread of 1.196 (e.g. 1.96) can score M1M1M0M1A0 max Not using 1.196 or misread of 1.196 can score M1M1M0M1A0 max Examples		
	Area = 1983 $1983 \div 1.196 = 1658$ 2420 Compares 1658 and 2420 and states or implies No Scores A1ft as M3 scored and 1.196 used		M2 M0 M1 A1ft
	Area = 2408 $2408 \div 1.196 = 2013.4$ 2420 Compares 2013.4 and 2420 and states or implies No Does not score A1ft as only M2 scored even though 1.196 used		M1 M0 M1 A0ft
	Area = 2408 $2408 \times 1.96 = 4719.68$ 2420 Compares 4719.68 and 2420 and states or implies Yes Would have scored M4A1ft with correct area		M1 M1 (mr) M1 A1ft
	Area = 1983 $4840 \times 1.196 = 5788.64$ $5788.64 \div 2 = 2894.32$ (5788.64 is their 4046.8 ...) Compares 1983 with 2894.32 and states or implies No Scores A1ft as M3 scored and 1.196 used (even though used incorrectly)		M2 M0 M1 A1ft

2(a)	rota completed with criteria for workers required correct	B1 <i>la</i>	
	rota completed with criteria for when workers are available correct	B1 <i>la</i>	maximum of 2 shifts per worker per day

Q	Answer	Mark	Comments																																																				
	rota clearly communicated for all shifts for all days and all names	1a	SC1 Workers 'correctly' allocated with shifts not specified																																																				
Additional Guidance																																																							
<p>B1B1B1 responses</p> <p>Example 1 (tabulated list)</p> <table border="1" data-bbox="261 568 1142 1249"> <tbody> <tr> <td>Monday</td> <td>Evening</td> <td>Amy</td> <td></td> </tr> <tr> <td>Tuesday</td> <td>Evening</td> <td>Amy</td> <td></td> </tr> <tr> <td>Wednesday</td> <td>Evening</td> <td>Amy</td> <td></td> </tr> <tr> <td>Thursday</td> <td>Morning</td> <td>Cathy</td> <td>Ben</td> </tr> <tr> <td>Thursday</td> <td>Afternoon</td> <td>Cathy</td> <td>Ben</td> </tr> <tr> <td>Thursday</td> <td>Evening</td> <td>Amy</td> <td>Eva</td> </tr> <tr> <td>Friday</td> <td>Morning</td> <td>Ben</td> <td>Eva</td> </tr> <tr> <td>Friday</td> <td>Afternoon</td> <td>Ben</td> <td>David</td> </tr> <tr> <td>Friday</td> <td>Evening</td> <td>David</td> <td>Amy</td> </tr> <tr> <td>Saturday</td> <td>Morning</td> <td>David</td> <td>Cathy</td> </tr> <tr> <td>Saturday</td> <td>Afternoon</td> <td>Ben</td> <td>David</td> </tr> <tr> <td>Saturday</td> <td>Evening</td> <td>Ben</td> <td>Amy</td> </tr> <tr> <td>Sunday</td> <td>Afternoon</td> <td>Cathy</td> <td></td> </tr> </tbody> </table> <p>Example 2 (non-tabulated list)</p> <p>Amy – Mon, Tue, Wed, Thu, Fri and Sat Evenings Ben – Thu Morning and Afternoon, Fri Morning and Afternoon, Sat Afternoon and Evening Cathy – Thu Morning and Afternoon, Sat Morning, Sun Afternoon David – Fri Afternoon and Evening, Sat Morning and Afternoon Eva – Thu Evening and Fri Morning</p>				Monday	Evening	Amy		Tuesday	Evening	Amy		Wednesday	Evening	Amy		Thursday	Morning	Cathy	Ben	Thursday	Afternoon	Cathy	Ben	Thursday	Evening	Amy	Eva	Friday	Morning	Ben	Eva	Friday	Afternoon	Ben	David	Friday	Evening	David	Amy	Saturday	Morning	David	Cathy	Saturday	Afternoon	Ben	David	Saturday	Evening	Ben	Amy	Sunday	Afternoon	Cathy	
Monday	Evening	Amy																																																					
Tuesday	Evening	Amy																																																					
Wednesday	Evening	Amy																																																					
Thursday	Morning	Cathy	Ben																																																				
Thursday	Afternoon	Cathy	Ben																																																				
Thursday	Evening	Amy	Eva																																																				
Friday	Morning	Ben	Eva																																																				
Friday	Afternoon	Ben	David																																																				
Friday	Evening	David	Amy																																																				
Saturday	Morning	David	Cathy																																																				
Saturday	Afternoon	Ben	David																																																				
Saturday	Evening	Ben	Amy																																																				
Sunday	Afternoon	Cathy																																																					

2(a)	Example 3 (2-way table)							
		Mon	Tue	Wed	Thu	Fri	Sat	Sun
	Amy	Evening	Evening	Evening	Evening	Evening	Evening	
Ben				Morning Afternoon	Morning Afternoon	Afternoon Evening		

Q	Cathy	Answer		Mark	Comments			
					Morning	Afternoon		
				Afternoon				
	David				Afternoon Evening	Morning Afternoon		
	Eva			Evening	Morning			
Example 4 (2-way table)								
		Mon	Tue	Wed	Thu	Fri	Sat	Sun
	Morning				B and C	B and E	C and D	
	Afternoon				B and C	B and D	B and D	C
	Evening	A	A	A	A and E	A and D	A and B	
<p>For B1B1B1 there must be a total of 22 “worker allocations”</p> <p>Same worker allocated to the same shift more than once could score B0B0B1 max</p> <p>Same worker with more than 2 shifts a day could score B1B0B1 max</p> <p>Specifying shifts for Thu, Fri and Sat only could score B1B1B0</p> <p>No shifts specified - final mark for communication must be B0</p> <p>The final communication mark can be scored for</p> <ul style="list-style-type: none"> a fully labelled 2-way table completed incorrectly an incorrect list including all names, all shifts and all days 								

Alternative method 1				
2(b)	1800 – 6 × 20	(1800 – 20) ÷ 5	M1	or dimensions correctly converted to cm
	or	or	Rb	
	1800 – 120	356		
	or			
	1680			

Q	Answer	Mark	Comments
	their $1680 \div 5$ their $356 - 20$	M1 Aa	their 1680 cannot be 1800
	336 and Yes	A2 <i>lb</i> <i>lb</i>	A1 336 or A1ft correct decision from their value must score M2 or M1M0 or M0M1 with 5 shelves instead of 6 or 6 spaces instead of 5
Alternative method 2			
	320×5 or 1600 or 6×20 or 120	M1 <i>Rb</i>	or dimensions correctly converted to cm
	their 1600 + their 120	M1 Aa	
	1720 and Yes	A2 <i>lb</i> <i>lb</i>	A1 1720 or A1ft correct decision from their value must score M2 or M1M0 or M0M1 with 5 shelves instead of 6 or 6 spaces instead of 5

2(b)	Alternative method 3		
	$1800 - 6 \times 20$ or $1800 - 120$ or 1680	M1 <i>Rb</i>	or dimensions correctly converted to cm
	320×5	M1 Aa	$1680 \div 320$

Q	Answer	Mark	Comments
	1680 and 1600 and Yes or 5.25 and Yes	A1 <i>lb</i> <i>lb</i>	1680 and 1600 or 5.25 or A1ft correct decision from their value must score M2 or M1M0 or M0M1 with 5 shelves instead of 6 or 6 spaces instead of 5
Additional Guidance			
Starting with $1800 \div 6$ scores zero Mixing up 5 and 6 can occur once only for A1ft Examples that score M1M0A1ft or M0M1A1ft			
Alt 1 1680 $1680 \div 6 = 280$ No			M1 M0 A1ft
Alt 2 $320 \times 6 = 1920$ and $5 \times 20 = 100$ $1920 + 100 = 2020$ Yes Uses 5 shelves and 6 spaces so mixes up 5 and 6 twice			M0 M1 A0
Alt 3 $1800 - 5 \times 20 = 1700$ $320 \times 5 = 1600$ Yes			M0 M1 A1ft

2(c)	$550 \div 260$ or 2.1(1...) or 2.12 or 2 or $470 \div 155$ or 3.0(3...) or 3 or $390 \div 65$ or 6	M1 <i>Ra</i>	Allow $155 \times 3 = 465$ etc or $470 - 155 - 155 - 155 (= 5)$ etc
	their 2 and their 3 and their 6	M1 <i>lb</i>	their values rounded down award M2 if first M1 scored and 11 seen

Q	Answer	Mark	Comments
	their 2 × their 3 × their 6	Rc	multiplying their values allow if incorrectly rounded or not rounded
	36	A1 Aa	
Additional Guidance			
<p>These attempts are common and score zero</p> <ul style="list-style-type: none"> • $(470 \times 390 \times 550) \div (155 \times 65 \times 260)$ or 38 • $(470 + 390 + 550) \div (155 + 65 + 260)$ or 3 			

Q	Answer	Mark	Comments	
2(d)	Alternative method 1			
	11.41 ÷ 1000 or (£) 0.01141 or 1.141 p	M1 <i>Ra</i>	allow subsequent use of 0.01 or 1 if method seen	
	their 0.01141 × 384 or 4.38144 or 0.05 × 384 or 19.2	their 1.141 × 384 or 438.144 or 5 × 384 or 1920	M1 <i>Rc</i>	
	their 19.2 – their 4.38144 or 14.81856	their 1920 – their 438.144 or 1481.856	M1 <i>Aa</i>	units must be consistent
	their 14.81856 × 0.8	their 1481.856 × 0.8	M1 <i>Aa</i>	
	£11.85 or £11.86 or 1185 p or 1186 p	A1 <i>la</i>	must see £ or p	
	Alternative method 2			
	11.41 ÷ 1000 or (£) 0.01141 or 1.141 p	M1 <i>Ra</i>	allow subsequent use of 0.01 or 1 if method seen	
	0.05 – 0.01141 or 0.03859	5 – 1.141 or 3.859	M1 <i>Rc</i>	profit on one bag in £ or p units must be consistent
	384 × their 0.03859 or [14.81, 14.82]	384 × their 3.859 or [1481, 1482]	M1 <i>Aa</i>	profit on 384 bags in £ or p
	their [14.81, 14.82] × 0.8	their [1481, 1482] × 0.8	M1 <i>Aa</i>	
	£11.85 or £11.86 or 1185 p or 1186 p	A1 <i>la</i>	must see £ or p	

Q	Answer		Mark	Comments
2(d)	Alternative method 3			
	11.41 ÷ 1000 or (£) 0.01141 or 1.141 p		M1 <i>Ra</i>	allow subsequent use of 0.01 or 1 if method seen
	their 0.01141 × 384 or 4.38144 or 0.05 × 384 or 19.2	their 1.141 × 384 or 438.144 or 5 × 384 or 1920	M1 <i>Rc</i>	
	their 19.2 × 0.8 or 15.36 or their 4.38144 × 0.8 or 3.505 ...	their 1920 × 0.8 or 1536 or their 438.144 × 0.8 or 350.5	M1 <i>Aa</i>	units must be consistent
	their 15.36 – their 3.505	their 1536 – their 350.5	M1 <i>Aa</i>	
	£11.85 or £11.86 or 1185 p or 1186 p		A1 <i>la</i>	must see £ or p
	Alternative method 4			
	0.05 × 1000 or (£)50	5 × 1000 or 5 000 p	M1 <i>Ra</i>	
	their 50 – 11.41 or (£)38.59	their 5 000 – 1141 or 3 859 p	M1 <i>Rc</i>	profit on 1000 bags in £ or p units must be consistent
	384 ÷ 1000 × their 38.59 or [14.81, 14.82]	384 ÷ 1000 × their 3859 or [1481, 1482]	M1 <i>Aa</i>	
	their 0.8 × their [14.81, 14.82]	their 0.8 × their [14.81, 14.82]	M1 <i>Aa</i>	
	£11.85 or £11.86 or 1185 p or 1186 p		A1 <i>la</i>	must see £ or p

Q	Answer		Mark	Comments
2(d)	Alternative method 5			
	11.41 ÷ 1000 or (£) 0.01141 or 1.141 p		M1 <i>Ra</i>	allow subsequent use of 0.01 or 1 if method seen
	0.05 – 0.01141 or 0.03859	5 – 1.141 or 3.859	M1 <i>Rc</i>	profit on one bag in £ or p units must be consistent
	their 0.03859 × 0.8 or 0.030872	their 3.859 × 0.8 or 3.0872	M1 <i>Aa</i>	80% of profit on one bag in £ or p
	their 0.030872 × 384	their 3.0872 × 384	M1 <i>Aa</i>	
	£11.85 or £11.86 or 1185 p or 1186 p		A1 <i>la</i>	must see £ or p
	Alternative method 6			
	11.41 ÷ 1000 or (£) 0.01141 or 1.141 p		M1 <i>Ra</i>	allow subsequent use of 0.01 or 1 if method seen
	their 0.01141 × 0.8 or 0.009128 or 0.05 × 0.8 or 0.04	their 1.141 × 0.8 or 0.9128 or 5 × 0.8 or 4	M1 <i>Rc</i>	
	their 0.009128 × 384 or 3.5051 ... or their 0.04 × 384 or 15.36	their 0.9128 × 384 or 350 51 ... or their 4 × 384 or 1536	M1 <i>Aa</i>	
	their 15.36 – their 3.5051 ...	their 1536 – their 3505.1	M1 <i>Aa</i>	
	£11.85 or £11.86 or 1185 p or 1186 p		A1 <i>la</i>	must see £ or p

Q	Answer	Mark	Comments	
2(d)	Additional Guidance			
	Incorrect answer caused by premature or incorrect rounding or truncation can score M4A0 Award M1 for the correct method for working out 80% of any sum of money or 80% of 384			
	There are other less obvious methods. E.g. Working out the profit as a fraction of the cost multiplied by 80% of the cost from $[(50 - 11.41) \div 50] \times 19.2 \times 0.8$			
	2 marks can be scored for <u>only</u> working out the total sales of 384 bags (£15.36) 3 marks can be scored for <u>only</u> working out the total sales (£15.36) plus the unit cost per bag (£0.01141) 3 marks can be scored for only working out the total cost of 384 bags (£[3.50.3.51]) Note that £15.36 can also be obtained from the profit per bag if the unit cost per bag has been rounded to 1p (giving a profit per bag of 4p) Examples			
	11.41 \div 1000 = 0.01 0.05 – 0.01 = 0.04 0.04 \times 384 = 15.36 0.8 \times 15.36 = £12.29	M1 M1 M1 M1A0	0.01 (rounded down - no method) 0.05 – 0.01 = 0.04 0.04 \times 384 = 15.36 0.8 \times 15.36 = £12.29	M0 M1 M1 M1A0

Q	Answer		Mark	Comments	
3(a)	225 litres		B1 Aa		
3(b)	3 × 77 or 231		M1 Ra	water used for 3 baths	
	216 ÷ 6 × 3 or 108		M1 Rc	water used for 3 showers 123 implies M2	
	1.5 × 30 or 45		M1 Ra	water saved for 30 flushes or (288 ÷ 32) × 30 – ((288 ÷ 32) – 1.5) × 30 or their 9 × 30 – their 7.5 × 30 or their 270 – their 225	
	their 231 – their 108 + their 45 or their 123 + their 45 or (270 + 231) – (225 + 108) or 501 – 333 or 168		M1 Rc	total water saved	
	1200 ÷ 6	their 168 × 6	M1 Aa	1 ÷ 6 = 0.16(6 ...) and their 168 ÷ 1200	1200 ÷ their 168
	168 and 200 and No or 1008 and No or 0.16(6 ...) or 0.17 and 0.14 and No or 7.14 ... and No		A2 lb lb	A1 168 and 200 or 1008 or 0.16(6 ...) or 0.17 and 0.14 or 7.14 or A1ft correct conclusion for their value(s) must score M4 including 4th and 5th M1	

Q	Answer	Mark	Comments
3(b)	Additional Guidance		
	<p>1032 (from 1200 – 168) implies M4 and could score full marks, e.g. 1032 compared with 1000</p> <p>$\frac{168}{1200}$ simplified to $\frac{7}{50}$ with correct conclusion scores full marks with no further work <u>misread of 288 (e.g. 228)</u></p> <p>This should still give 45 litre saving for toilet flushes but there could be rounding errors, e.g. $228 \div 32 = 7.13$ (should be 7.125)</p> <p>with misread (with or without rounding errors) can score M5A1 or M5 A1ft</p>		

Q	Answer	Mark	Comments
3(c)	$450 \times \text{their } 365 \div 1000$ or $0.45 \times \text{their } 365$ or $\text{their } 164\,250 \div 1000$	M1 <i>Ra</i>	their 365 can be 364, 366 or 360 $364 \rightarrow 163.8$ $366 \rightarrow 164.7$ $360 \rightarrow 162$
	164.25	A1 <i>Aa</i>	allow 164 if with method
	an appropriate reverse method, e.g; $164.25 \times 1000 \div \text{their } 365 = 450$	B1ft <i>Ab</i>	allow either of these following estimations $500 \times 400 \div 1000 = 200$ or $400 \times 400 \div 1000 = 160$
Additional Guidance			
3(c)	163.8 or 164.7 or 162 scores M1A0 Mark holistically, e.g. if there is an incorrect answer with no method in the main body mark the method and/or answer in the check (and vice versa) The correct reverse method is only a valid check if the original method is shown Using approximations can score the checking mark without any other method All values used to calculate their 164.25 must be used for a reverse method to score the checking mark If the original method is not shown fully but the correct answer is obtained, do not award the checking mark for a reverse method unless it is complete e.g $450 \times 365 = 164\,250 \text{ litres} = 164.25 \text{ m}^3$ (division by 1000 not shown) followed by $164\,250 \div 450 = 365$ scores M1A1B0 $450 \times 365 = 164\,250 \text{ litres} = 164.25 \text{ m}^3$ (division by 1000 not shown) followed by $164.25 \times 1000 \div 450 = 365$ scores M1A1B1		

Q	Answer	Mark	Comments
3(d)	2.96 × their 164.25 or 486.18 or 2.96 × their 164 or 485.44	M1 <i>Rc</i>	ft their 164(.25) from 3(c)
	their 486.18 + 134 or 620.18 or their 485.44 + 134 or 619.44	M1 <i>Aa</i>	
	12 × 53.5(0) or 642	M1 <i>Aa</i>	
	620.18 and 642 or 21.82 and Yes or 619.44 and 642 or 22.56 and Yes	A2ft <i>lb</i> <i>lb</i>	A1ft 620.18 and 642 or 21.82 or 619.44 and 642 or 22.56 or A1ft correct conclusion for their values must score M3 ft their 164(.25) from 3(c)
	Additional Guidance		
'With a water meter is cheaper' implies Yes ft from 3(c) – allow rounding or truncation of their value Common examples scoring full follow through marks			
If their 164(.25) = 163.8 $2.96 \times 163.8 = 484.85$ $484.85 + 134 = 618.85$ $12 \times 53.5 = 642$ Yes	If their 164(.25) = 164.7 $2.96 \times 164.7 = 487.51$ $487.51 + 134 = 621.51$ $12 \times 53.5 = 642$ Yes	If their 164(.25) = 162 $2.96 \times 162 = 479.52$ $479.52 + 134 = 613.52$ $12 \times 53.5 = 642$ Yes	

Q	Answer	Mark	Comments
4(a)	Alternative method 1		
	the fastest 8 swimmers chosen	B2 <i>Ra</i> <i>Rb</i>	B1 7 of the fastest 8 swimmers chosen
	all of their 8 in correct lanes	B2ft <i>Rc</i> <i>Aa</i>	B1ft the fastest of their 8 in lane 4 or Jack in lane 4
	Alternative method 2 (only times given)		
	B3 the 8 fastest times in 'correct' lanes	B3 <i>Ra</i> <i>Rb</i> <i>Rc</i>	B2 the 8 fastest times in time order or B1 the 8 fastest times given

Q	Answer	Mark	Comments																																																																									
4(a)	Additional Guidance																																																																											
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Q	Answer	Mark	Comments
4(b)	0.37 secs	B1 Aa	
	an appropriate reverse method, e.g. $51.91 + 0.37 = 52.28$ or $52.28 - 0.37 = 51.91$	B1ft Ab	or this estimation $51.9 - 52.3 = 0.4$ or alternative methods, e.g. $52.28 - 51.91 = 0.37$ and $51.91 \rightarrow + 0.09 \rightarrow 52 \rightarrow + 0.28 \rightarrow 52.28$ and $0.09 + 0.28 = 0.37$
	Additional Guidance		
	must see method for 0.37 to score checking mark using reverse or alternative method an alternative correct answer is 370 milliseconds		

Q	Answer	Mark	Comments
4(c)	Alternative method 1		
	Beth $65.7 + 66.6 + 67.4 + 63.6 + 65.2 + 64.8 + 66.5 + 64.9 + 68.5 + 66.8$ or 660 or Daisy $62.5 + 63.2 + 67.4 + 62.6 + 64.2 + 66.2 + 64.8 + 65.9$ or 516.8	M1 Ra	
	their $660 \div 10$ or 66 or their $516.8 \div 8$ or 64.6	M1 Aa	
	66 and 64.6 and Daisy	A2 lb lb	A1 66 and 64.6 or A1ft correct conclusion for their values must score M2
	Alternative method 2		
	Beth $63.6, 64.8, 64.9, 65.2, 65.7, \downarrow 66.5, 66.6, 66.8, 67.4, 68.5$ or Daisy $62.5, 62.6, 63.2, 64.2, \downarrow 64.8, 65.9, 66.2, 67.4$	M1 Ra	Arranges in order and indicates middle
	$(65.7 + 66.5) \div 2$ or 66.1 or $(64.2 + 64.8) \div 2$ or 64.5	M1 Aa	
	66.1 and 64.5 and Daisy	A2 lb lb	A1 66.1 and 64.5 or A1ft correct conclusion for their values must score M2

Q	Answer	Mark	Comments
4(c)	Alternative method 3		
	compare proportion of times under 65 seconds Beth $\frac{3}{10}$ or Daisy $\frac{5}{8}$	M1 <i>Ra</i>	can also compare under 66 seconds ($\frac{5}{10}$ and $\frac{6}{8}$)
	Beth $\frac{3}{10}$ and Daisy $\frac{5}{8}$	M1 <i>Aa</i>	
	30% and 62.5% and Daisy or $\frac{12}{40}$ and $\frac{25}{40}$ (oe) and Daisy or clear explanation that 5 out of 8 is better than 3 out of 10 and chooses Daisy	A2 <i>lb</i> <i>lb</i>	A1 30% and 62.5% or $\frac{12}{40}$ and $\frac{25}{40}$ (oe) or A1ft correct conclusion for their values must score M2
	Alternative method 4		
	correct comparison of at least two of fastest and/or slowest times with no average used and Daisy	B2 <i>Ra</i> <i>lb</i>	B1 comparison of the fastest or the slowest and Daisy or correct comparison of at least two fastest and Beth
	Additional Guidance		
one correct average (mean or median) scores M2A1 correct method with incorrect means can score M2A1ft 'Daisy has better time' implies Daisy should be chosen			

Q	Answer	Mark	Comments
4(d)	Alternative method 1		
	(46.95 + 6.50 + 62.95) × 6 or 116.4 × 6 or 698.4	M1 <i>Ra</i>	(46.95 + 6.50 + 62.95) ÷ 100 × 15 or 116.4 ÷ 100 × 15 or 17.46 or 1 – 0.15 or 0.85
	their 698.4 ÷ 100 × 15 or 104.76 or 1 – 0.15 or 0.85	M1 <i>Rc</i>	their 116.4 – 17.46 or their 116.4 × 0.85
	their 698.4 – their 104.76 or their 698.4 × 0.85 or 593.64	M1 <i>Rc</i>	or their 98.94 × 6 or 593.64
	their 593.64 + 370 = their 963.64 or 1000 – 370 = 630 and their 593.64	M1 <i>Aa</i>	their 593.64 must be their 85% of their 698.4 cannot be their 104.76
	593.64 + 370 = 963.64 or 1000 – 370 = 630 and 593.64	A1 <i>lb</i>	allow rounding or truncating of their 963.64 or their 593.64 to nearest £ or 10 p if method shown

Q	Answer	Mark	Comments
4(d)	Alternative method 2		
	$46.95 \times 6 + 6.50 \times 6 + 62.95 \times 6$ or $281.7 + 39 + 377.7$ or $698.4(0)$	M1 <i>Ra</i>	or $46.95 \div 100 \times 15$ or 7.0425 or $6.50 \div 100 \times 15$ or 0.975 or $62.95 \div 100 \times 15$ or 9.4425 or $1 - 0.15$ or 0.85
	their $698.40 \div 100 \times 15$ or 104.76 or $1 - 0.15$ or 0.85	M1 <i>Rc</i>	or $46.95 - 7.0425$ or 46.95×0.85 or 39.9075 or $6.5 - 0.975$ or 6.5×0.85 or 5.525 or $62.95 - 9.4425$ or 62.95×0.85 or 53.5075
	their $698.40 - \text{their } 104.76$ or their 698.40×0.85 or 593.64	M1 <i>Rc</i>	or $(39.9075 + 5.525 + 53.5075) \times 6$ or 593.64
	their $593.64 + 370 = \text{their } 963.64$ or $1000 - 370 = 630$ and their 593.64	M1 <i>Aa</i>	their 593.64 must be their 85% of their 698.4 cannot be their 104.76
	$593.64 + 370 = 963.64$ or $1000 - 370 = 630$ and 593.64	A1 <i>lb</i>	allow rounding or truncating of their 963.64 or their 593.64 to nearest £ or 10 p if method shown

Q	Answer	Mark	Comments	
4(d)	Additional Guidance			
	allow $46.95 + 6.50 + 62.95 \times 6 = 431.15$ for first M1			
	to score M4A1 the full method must be shown apart from the method for deducting 15% <u>deducting 15%</u>			
	can score M1M1 if			
	<ul style="list-style-type: none"> rounded or truncated values for 15% are given or used with no method 			
	e.g. $10\% = 69.8$			
	$5\% = 34.9$			
	$15\% = 69.8 + 34.9 = 104.7$			M1
	$698.4 - 104.7 = 593.7$			M1
	$593.7 + 370 = 963.7$			M1A0
	can score M0M1 if			
	<ul style="list-style-type: none"> an incorrect method for finding 15% is given (not + 15) 			
e.g. $698.4 \div 15 = 46.56$			M0	
$698.4 - 46.56 = 651.84$			M1	
scores M0M0 if				
<ul style="list-style-type: none"> an incorrect value for 15% is given with no method shown 				
e.g. $15\% = 46.56$			M0	
$698.4 - 46.56 = 651.84$			M0	
15% not deducted can score M1M0M0M1A0				
<u>adding 370</u>				
if 370 is added to their 698.4 before deducting 15%				
<ul style="list-style-type: none"> do not award the mark for adding 370 award any marks for deducting 15% 				
e.g. $281.6 + 39 + 377.7 + 370 = 1068.4$			M1 (method for 698.4 embedded)	
1068.4×0.85 or $1068.4 - \text{their } 106.26 = 908.14$			M2A0	