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FUNCTIONAL SKILLS CERTIFICATE  
**Functional Mathematics**

Level 1

Mark Scheme

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4367

January 2017

Version/Stage: 1.0 Final

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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.

Further copies of this mark scheme are available from [aqa.org.uk](http://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
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1(a)	1000 g	B1 Aa	
	<b>Additional Guidance</b>		

1(b)	1 (+) 48 ÷ 24 or 1 (+) 2	M1 Ra	
	3	A1 Aa	SC1 ingredients for 3 batches with up to 2 errors  600 g margarine 750 g flour 300 g sugar 6 eggs 3 teaspoons baking powder
	<b>Additional Guidance</b>		

1(c)	their 3 × 2 or their 6	1 + 2 × their 2	M1 Rb	
	5		A1ft Aa	ft their 3 or their 2 from (b)
	<b>Additional Guidance</b>			

Q	Answer	Mark	Comments
1(d)	<b>Alternative method 1</b>		
	$32 \div 16 = 2$ and $72 \div 24 = 3$ and $5 \times 1.92 = 9.6(0)$ or $9.6(0) \div 1.92 = 5$	B2 Aa /	B1 $32 \div 16 = 2$ and $72 \div 24 = 3$ or $5 \times 1.92 = 9.6(0)$ or $9.6(0) \div 1.92 = 5$
	<b>Alternative method 2</b>		
	$32 \div 16 = 2$ and $72 \div 24 = 3$ and $2 \times 1.92 = 3.84$ and $3 \times 1.92 = 5.76$ and $3.84 + 5.76 = 9.6(0)$	B2 Aa /	B1 $32 \div 16 = 2$ and $72 \div 24 = 3$ or $2 \times 1.92 = 3.84$ and $3 \times 1.92 = 5.76$ or $3.84 + 5.76 = 9.6(0)$
	<b>Additional Guidance</b>		
Alternative method 2, e.g. $32 \div 16 \times 1.92 = 3.84$ and $72 \div 24 \times 1.92 = 5.76$ $3.84 + 5.76 = 9.6(0)$		B2	

Q	Answer	Mark	Comments
1 (e)	<b>Alternative method 1</b>		
	32 ÷ 4 or 8 bags of large cookies or 72 ÷ 12 or 6 bags of small cookies	M1 Ra	
	their 8 × 1.15 or 9.20	M1 Rc	their 8 or their 6 ≠ 4, 12, 32 or 72 M1 their 6 × 1.15 or 6.90 and their 8 × 2.60 or 20.80
	their 6 × 2.60 or 15.60	M1 Rc	
	their 9.20 + their 15.60 or 24.80	M1 Aa	not 1.15 + 2.6(0)
	their 24.80 – 9.60 or 15 + 9.60 or their 24.80 – 15	M1 Aa	
	15.2(0) and Yes or 24.6(0) and 24.8(0) and Yes or 9.8(0) and 9.6(0) and Yes	A2 / /	A1 15.2(0) or 24.6(0) and 24.8(0) or 9.8(0) and 9.6(0) or A1ft correct conclusion for their values Must see 4th and 5th M1 for their income > 15 or 4th M1 for their income < 15

Q	Answer	Mark	Comments
1(e)	<b>Alternative method 2</b>		
	32 ÷ 4 or 8 bags of large cookies or 72 ÷ 12 or 6 bags of small cookies	M1 Ra	
	1.92 ÷ 4 or 0.48 or 1.92 ÷ 2 or 0.96	M1 Rc	
	1.15 – their 0.48 or 0.67 or 2.6(0) – their 0.96 or 1.64	M1 Rc	
	their 8 × their 0.67 or 5.36 and their 6 × their 1.64 or 9.84	M1 Aa	
	their 5.36 + their 9.84	M1 Aa	
	15.2(0) and Yes	A2 / /	A1 15.2(0) or A1ft correct conclusion for their values must score 4th and 5th M1
	<b>Additional guidance</b>		
	24.8(0) scores M4 Total income < 15 and No can score M4A1ft 32 ÷ 12 and 72 ÷ 4 (1st M1 with 12 and 4 swapped) can score M0M1M1M1M1A1ft		



Q	Answer	Mark	Comments
2(a)	100 used or seen	B1 <i>Rb</i>	
	their 100 + 140	M1 <i>Rc</i>	their 100 can be 10, 25, 120 and 140
	£240	A1ft <i>/</i>	Must see £ symbol (allow 240 pounds) SC2 £150, £165, £260 or £280 SC1 150, 165, 260, 280 SC1 £200
Check	Reverse calculation or alternative method, e.g. 240 – 140 = 100 or 240 – 100 = 140	B1ft <i>Ab</i>	
2(a)	<b>Additional Guidance</b>		
	<p><b>Check</b></p> <p>Must see initial method to award checking mark for reverse or alternative method</p> <p>If method not shown in main body mark if seen in checking space</p> <p>Mark check in main body if not seen in checking space</p> <p>Allow, e.g., 140 + 140 = 280 as an alternative to <math>2 \times 140 = 280</math></p> <p>Allow £ sign in check if not seen in main body</p>		
2(b)	75 (mpg)	B1 <i>Aa</i>	
	<b>Additional Guidance</b>		

Q	Answer	Mark	Comments
<b>2(c)</b>	<b>Alternative method 1</b>		
	60 × 5 or 300	M1 Ra	total miles per week
	their 300 ÷ their 75 or 4	M1 Rc	Step 1 their 300 ÷ 75 or 83 their 75 can be 83 or their 75 from <b>2(b)</b>
	their 4 × 4.9(0)	M1 Aa	Step 2
	(£)19(.60) and Yes	A2ft / /	ft their 75 from <b>2(b)</b> A1ft (£)19(.60) or A1ft correct conclusion for their (£)19(.60) must score M3
	<b>Alternative method 2</b>		
	60 ÷ 75 or 0.8	M1 Ra	
	0.8 × 4.9 or 3.92	M1 Rc	
	3.92 × 5	M1 Aa	
	(£)19(.60) and Yes	A2ft / /	ft their 75 from <b>2(b)</b> A1ft (£)19(.60) or A1ft correct conclusion for their (£)19(.60) must score M3

	<b>Additional Guidance</b>						
<b>2(c)</b>	<p>If their 75 = 83 can score M3A1ft unless in <b>2(b)</b> their 75 = 83</p> <p>If their 75 is from <b>2(b)</b> can score M3A2ft</p> <p>× 5, ÷ their 75 and × 4.9 can be done in any order, e.g.</p> <table><tbody><tr><td><math>60 \times 5 = 300</math></td><td>M1</td></tr><tr><td><math>300 \times 4.9 = 1470</math></td><td>M1</td></tr><tr><td><math>1470 \div 75 = 19.6</math></td><td>M1A1</td></tr></tbody></table>	$60 \times 5 = 300$	M1	$300 \times 4.9 = 1470$	M1	$1470 \div 75 = 19.6$	M1A1
$60 \times 5 = 300$	M1						
$300 \times 4.9 = 1470$	M1						
$1470 \div 75 = 19.6$	M1A1						

Q	Answer	Mark	Comments
2(d)	<b>Alternative method 1</b>		
	57 + 42 or 99 (min) or 1 (h) 39 (min) and 46 + 52 or 98 (min) or 1 (h) 38 (min) and 51 + 54 or 105 (min) or 1 (h) 45 (min) and 40 + 46 or 86 (min) or 1 (h) 26 (min) and 44 + 58 or 102 (min) or 1 (h) 42 (min)	M1 Aa	allow one error
	their 4 days (out of 5) $> 1\frac{1}{2}$ hours or their 1 day (out of 5) $< 1\frac{1}{2}$ hours or all their days except their Thursday $> 1\frac{1}{2}$ hours	M1 /	$> 1\frac{1}{2}$ hours or $< 1\frac{1}{2}$ hours can be implied e.g. one day the train takes longer on Thursday it is quicker by car on Thursday it is 4 min quicker by car
	Yes	A1 /	must score M2 with no errors SC1 ( $1\frac{1}{2}$ hours =) 90 min or 1 h 30 min
	<b>Alternative method 2</b>		
	57 + 42 + 46 + 52 + 51 + 54 + 40 + 46 + 44 + 58 or 99 + 98 + 105 + 86 + 102 or 490 (min)	M1 Aa	allow one error
	their 490 ÷ 5	M1 /	
	Yes and 98 (min) or 1 (h) 38 (min)	A1 /	SC1 ( $1\frac{1}{2}$ hours =) 90 min or 1 h 30 min

Q	Answer	Mark	Comments
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<b>2(d)</b>	<b>Alternative method 3</b>		
	57 + 42 + 46 + 52 + 51 + 54 + 40 + 46 + 44 + 58 or 99 + 98 + 105 + 86 + 102 or 490 (min) or 8(h) 10(min)	M1 Aa	allow one error
	$1\frac{1}{2} \times 5$ or $7\frac{1}{2}$ (h) or 450 (min)	M1 /	
	Yes and 8 (h) 10 (min) and $7\frac{1}{2}$ (h) or Yes and 490 (min) and 450 (min)	A1 /	SC1 ( $1\frac{1}{2}$ hours =) 90 min or 1 h 30 min

<b>2(d)</b>	<b>Additional Guidance</b>		
	For 1 (h) 39 (min) allow 1.39 (h) or 1:39 (h) <b>Beware!</b> There are two ways of obtaining 98 (min) or 1 (h) 38 (min) - 46 + 52 and $490 \div 5$		

Q	Answer	Mark	Comments																											
3(a)	Fully correct rota with all 5 criteria met	B3 Aa Aa /	B2 any 4 of the criteria met B1 any 3 of the criteria met																											
	<b>Additional Guidance</b>																													
	<p>The 5 criteria are</p> <ul style="list-style-type: none"> <li>• Nobody works more than one shift a day</li> <li>• Amy only works on Monday, Tuesday, Wednesday and Sunday</li> <li>• Brad does not work on Sunday</li> <li>• Cassie does not work on Wednesday</li> <li>• Del works on exactly 5 days</li> </ul> <p>Fully correct solution</p> <table style="margin-left: 40px;"> <tr><td>A</td><td>B</td><td>C</td><td>(any order)</td></tr> <tr><td>A</td><td>B</td><td>C</td><td>(any order)</td></tr> <tr><td>A</td><td>B</td><td>D</td><td>(any order)</td></tr> <tr><td>B</td><td>C</td><td>D</td><td>(any order)</td></tr> <tr><td>B</td><td>C</td><td>D</td><td>(any order)</td></tr> <tr><td>B</td><td>C</td><td>D</td><td>(any order)</td></tr> <tr><td>A</td><td>C</td><td>D</td><td>(any order)</td></tr> </table> <p>Award B0 if on any day more than one person is allocated to a shift</p> <p>Award B0 if &gt;1 blank shift</p> <p>Award B1 if 1 blank shift and 4 criteria met</p> <p>Treat any name that is not A, B, C or D as a blank</p>			A	B	C	(any order)	A	B	C	(any order)	A	B	D	(any order)	B	C	D	(any order)	B	C	D	(any order)	B	C	D	(any order)	A	C	D
A	B	C	(any order)																											
A	B	C	(any order)																											
A	B	D	(any order)																											
B	C	D	(any order)																											
B	C	D	(any order)																											
B	C	D	(any order)																											
A	C	D	(any order)																											

Q	Answer	Mark	Comments
<b>3(b)</b>	<b>Alternative method 1</b>		
	180 × 20 or 3600	M1 <i>Rb</i>	
	8 am → 3 pm = 7 hours	M1 <i>Aa</i>	implied by 6 seen
	their 7 × 60 or 420	M1 <i>Rc</i>	
	their 3600 ÷ (their 420 – 60) or their 3600 ÷ their 360	M1 <i>Aa</i>	their 420 – 60 can be 420
	10	A1 <i>I</i>	
	<b>Alternative method 2</b>		
	(8 am → 3 pm) = 7 (h)	M1 <i>Rb</i>	implied by 6 seen
	(their 7 – 1) × 60 or 360 or their 6 × 60 or 360	M1 <i>Aa</i>	their 7 – 1 can be 7
	their 360 ÷ 20 or 18	M1 <i>Rc</i>	their 18 can be 21 their 360 ≠ 180
	180 ÷ their 18	M1 <i>Aa</i>	
	10	A1 <i>I</i>	

Q	Answer	Mark	Comments		
<b>3(b)</b>	<b>Alternative method 3</b>				
	180 × 20 or 3600	M1 <i>Rb</i>			
	their 3600 ÷ 60 or 60	M1 <i>Aa</i>			
	8 am → 3 pm = 7 (h)	M1 <i>Rc</i>	implied by 6 seen		
	their 60 ÷ (their 7 – 1) or their 60 ÷ 6	M1 <i>Aa</i>	their 7 – 1 can be 7		
	10	A1 <i>I</i>			
	<b>Alternative method 4</b>				
	60 ÷ 20 or 3	M1 <i>Rb</i>	3 rooms per hour per cleaner		
	8 am → 3 pm = 7 (h)	M1 <i>Aa</i>	implied by 6 seen		
	(their 7 – 1) × 3 or their 6 × 3 or 18	180 ÷ (their 7 – 1) or 180 ÷ their 6 or 30	M1 <i>Rc</i>	180 ÷ their 3 or 60	their 7 – 1 can be 7
	180 ÷ their 18	their 30 ÷ their 3	M1 <i>Aa</i>	their 60 ÷ (their 7 – 1)	their 18 can be 21
	10	A1 <i>I</i>			



<b>Additional Guidance</b>		
<b>3(b)</b>	<b>Missing the 1-hour break</b>	
	This can score M4 max	
	e.g. Using <b>Alternative method 1</b>	
	180 × 20 = 3600	M1
	3600 ÷ 420 = 8.57	M1M1M1
	9 cleaners	A0
	<b>Using Alternative method 4</b>	
	3 rooms per hour	M1
	(8 am → 3 pm) = 7 (h)	M1
	7 × 3 = 21	M1
180 ÷ 21 = 8.57	M1	
9 cleaners	A0	
18 or 21 usually score M3		

Q	Answer	Mark	Comments
3(c)	<b>Alternative method 1</b>		
	$4+3+1+4+2+1+3+3+2+1 = 24$ and $24 \div 10 = 2.4$	B2 / /	B1 $4+3+1+4+2+1+3+3+2+1 = 24$ or $24 \div 10 = 2.4$
	<b>Alternative method 2</b>		
	$4+3+1+4+2+1+3+3+2+1 = 24$ and $2.4 \times 10 = 24$	B2 / /	B1 $4+3+1+4+2+1+3+3+2+1 = 24$ or $2.4 \times 10 = 24$
	<b>Additional Guidance</b>		

Q	Answer	Mark	Comments	
3(d)	<b>Alternative method 1</b>			
	3000 × 2.4 or 7200	3000 ÷ 120 or 25	M1 Rc	Allow × 2.4, ÷ 120 and × 6 in any order, e.g. 3000 × 6 or 18 000 18 000 ÷ 120 or 150 150 × 2.4 or 360
	their 7200 ÷ 120 or 60	25 × 2.4 or 60	M1 Rc	
	their 60 × 6		M1 Aa	
	Yes and (£)360	A2 / /	A1 (£)360 or A1ft correct conclusion for their (£)360 must × 2.4 (or 2 or 3 if rounded)	
	<b>Alternative method 2</b>			
	3000 × 2.4 or 7200		M1 Rc	
	their 7200 ÷ 120 or 60		M1 Rc	
	350 ÷ 6 or 58.3		M1 Aa	
	Yes and 60 and 58(.3 ...)		A2 / /	A1 60 and 58(.3 ...) or A1ft correct conclusion for their values must × 2.4 (or 2 or 3 if rounded)

	<b>Additional Guidance</b>
<b>3(d)</b>	<p>Rounding 2.4 can score M0M1M1A1ft max</p> <p>In alternative method 1      2.4 → 2 gives No and 300               2.4 → 3 gives Yes and 450</p> <p>In alternative method 2      2.4 → 2 gives No and 50 and 58(.3...)               2.4 → 3 gives Yes and 75 and 58(.3...)</p>

Q	Answer	Mark	Comments
4(a)	Side of box rectangle drawn with width 10 cm and height at least 15.2 cm	B2 Rb Aa	B1 Rectangle drawn with width 10 cm or height at least 15.2 cm
	Window Rectangle drawn with dimensions 6 cm by 4 cm and a vertical line of symmetry within their side of box and a horizontal line of symmetry within their side of box	B2ft Ra Aa	B1ft Rectangle drawn with dimensions 6 cm by 4 cm or a vertical line of symmetry within their side of box or a horizontal line of symmetry within their side of box
	<b>Additional Guidance</b>		
	For the side of box allow B1 for a length clearly > 15 cm Award B1ft for any size window with a vertical and/or horizontal line of symmetry within the side Allow any length of 10 cm (horizontal or vertical) for the width of the side of the box If a width and a length are drawn allow the outside of the grid to complete the sides of the box		

Q	Answer		Mark	Comments
<b>4(b)</b>	<b>Alternative method 1</b>			
	6 × 45 or 270 or 5 × 71 or 355		M1 <i>Ra</i>	
	6 × 45 or 270 and 5 × 71 or 355		M1 <i>Rc</i>	
	their 270 + their 355		M1 <i>Aa</i>	must add 2 values (can be 45 + 71)
	625 and No		A2 / /	A1 625 or A1ft correct conclusion for their 625 must score 1st and 3rd M1
	<b>Alternative method 2</b>			
	6 × 45 or 270	5 × 71 or 355	M1 <i>Ra</i>	
	600 – their 270 or 330	600 – their 355 or 245	M1 <i>Rc</i>	
	their 330 ÷ 71	their 245 ÷ 45	M1 <i>Aa</i>	
	[4.6, 4.7] and No	5.4 ... and No	A2 / /	A1 [4.6, 4.7] or 5.4 ... or A1ft correct conclusion for their value must score 1st and 3rd M1
	<b>Additional Guidance</b>			

Q	Answer	Mark	Comments
4(c)	<b>Alternative method 1</b>		
	270 ÷ 50	M1 Ra	
	5.4	A1 Aa	or $5\frac{2}{5}$ or 5 remainder 20
	6	A1ft /	ft their 5.4 rounded up to the nearest whole number
	<b>Alternative method 2</b>		
	attempts to add at least four 50's	M1 Ra	
	adds five 50's to give 250 and adds six 50's to give 300	A1 Aa	
6	A1ft /		
Check	reverse calculation e.g. $270 \div 5 = 54$ and $270 \div 6 = 45$ or alternative method e.g. $5 \times 50 = 250$ and $6 \times 50 = 300$	B1 Ab	
4(c)	<b>Additional Guidance</b>		
	A1ft in Alternative method 2 $4 \times 50 = 250$ $5 \times 50 = 300$ 5 boxes	M1 A0 A1ft	

Q	Answer	Mark	Comments	
4(d)	28 × 9 or 252	M1 <i>Ra</i>		
	their 252 ÷ 5 or 50.4	M1 <i>Ra</i>		
	their 50.4 + 32	M1 <i>Aa</i>		
	82(.4) and Yes	A2 <i>/</i> <i>/</i>	A1 82(.4) or A1ft correct conclusion for their 82(.4) must score M2	
	<b>Additional Guidance</b>			
	Using 85 instead of 28 can score M0M1M1A1ft			