FUNCTIONAL SKILLS CERTIFICATE
Functional Mathematics

Level 1

Mark Scheme

4367

November 2016

Version/Stage: 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:

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 $\frac{1}{2}$

Q	Answer	Mark	Comments
1(a)	Any 1 of patio or a flower bed shown with correct size	M1 *Ra*	Does not have to be in the correct position Does not have to be labelled
	Patio and both flower beds shown with correct sizes and in correct positions	A1 *Rb*	Do not have to be labelled Allow patio to be 4 by 10 or 10 by 4
	Vegetable patch and lawn shown with equal areas	M1 *Aa*	Do not have to be in the correct positions Do not have to be rectangles
	Vegetable patch and lawn with equal area and rectangular	A1 *Rb*	Do not have to be labelled One single rectangle for each of lawn and veg patch. Must be the biggest they can fit in their remaining space
	All garden used and all 5 items included and labelled	B1 *I*	
	Additional Guidance		
	Fully correct diagram with no labels M1A1M1A1B0 If the patio is put at the back of the garden then max 4 marks can still be awarded If the patio is 4 by 10 (4 at the front of the garden) then max 4 marks can still be awarded		

Q	Answer	Mark	Comments
1(b)	**Alternative method 1**		
	1000 cm or 1.25 m	B1 *Aa*	Seen or implied
	their 1000 ÷ 125 or 10 ÷ their 1.25 or 8	M1 *Rb*	Units must be compatible
	9	A1 *I*	SC2 8 SC2 he needs 5 more lights
	Alternative method 2		
	1000 cm or 1.25 m	B1 *Aa*	Seen or implied
	Shows multiples of their 1.25 to at least 8.75 or repeated subtraction of their 1.25 from 10 to at least their 1.25	M1 *Rb*	Can be cm
	9	A1 *I*	SC 2 8 SC 2 he needs 5 more lights
	Additional Guidance		
	The SC2 for he needs 5 more lights may be based on 8 or 9 lights. Further clarification may lead to full marks Examples He needs five more lights as he already has 4 B1 M1 A1 He needs 5 more lights as he needs 8 B1 M1 A0 He needs 5 more lights as there are 3 gaps B0 M0 A0		

Q	Answer	Mark	Comments
1(c)	40	B1 *Aa*	Ignore units

Q	Answer	Mark	Comments
1(c) **Check**	Reverse calculation eg 40 ÷ 10 = 4 or Alternative method eg Rectangle divided into 40 squares	B1ft *Ab*	

1(d)	**Alternative method 1**		
	their $40 \div 9$ or 4.4(...) or $9 \times 5 = 45$	M1 *Rc*	ft their 40 from (c)
	5	M1 *I*	their 4.4(...) rounded up to nearest integer Only ft their 40 from (c) May be seen in a calculation eg $9 \times 5 = 45$ and 5 then used
	their 5×152	M1 *Rb*	their 5 can be a decimal $n \times 152$ where $n > 1$ but not 750
	760 and Yes	A2ft *I*	Only ft their 40 from (c) A1ft 760 A1ft Correct conclusion for their value if 1st and 3rd method marks awarded
	Alternative method 2		
	$750 \div 152$ or 4.9(....)	M1 *Rc*	
	4 (packs can be bought)	M1 *I*	their 4.9(...) rounded down to nearest integer May be seen in a calculation
	their 4×9 or 36	M1 *Rb*	
	36 and their 40 and Yes	A2ft *I*	Only ft their 40 from (c) A1ft 36 A1ft Correct conclusion for their value if 1st and 3rd method marks awarded
	Additional Guidance		

Alt 1 Building up to the first multiple after 40 implies the 2nd M1

Use of 5 packs will usually gain M2 (unless from incorrect number rounded)

A common incorrect answer is $4.4 \times 152 = 668.8$ No This gains M1M0M1A0A1ft

Use of more decimal places eg 4.44 may also be seen

Alt 2 works out that £750 only buys enough full packs to cover 36m^2

	Use of perimeter of 28 in (c) can gain full ft marks in d		

	Alternative method 1		
2(a)	240 ÷ 0.5 or 240 × 2 or 480	M1 *Aa*	
	Identifies the 3 exits, 1120, 1080 and 800	B1 *Rb*	Ignores the widest exit (1150)
	100 + 200 + 200 or 500	M1 *Rc*	Allow 100 + 200 + 200 + 200 or 700 must be adding 3 or 4 doors oe taking two doors from their 480 and checking the third door is big enough for the rest their 480 or 450 can be used
	480 and 500 and Yes	A2 *I*	A1 480 and 500 or A1ft correct decision for their values
	Alternative method 2		
	240 ÷ 0.5 or 240 × 2 or 480	M1 *Aa*	
	Identifies the 3 exits, 1120, 1080 and 800	B1 *Rb*	Ignores the widest exit (1150)
	their 480 – 200 – 200 = 80 and 80 fits through smallest door or 450 – 200 – 200 = 50 and 50 fits though the smallest door	M1 *Rc*	May use 3 or 4 doors oe eg for 3 doors taking number of people for 2 of the doors away and checking remainder fits the third door
	480 and valid accurate check of doors and Yes	A2 *I*	A1 480 and valid check A1 ft correct decision for their values

	Additional Guidance
2(a)	If the 1150, 1120 and 1080 doors are chosen then the 3rd mark is for 200 + 200 + 200 or 600
	For the final A1 the decision must be based on both their values
	Examples
	1) 3 exits 1120, 1080 and 800 give 500 people allowed so Yes M0B1M1A0A0
	2) 240 ÷ 0.5 = 480 Yes more than 450 are allowed M1B0M0A0A0
	3) 240 ÷ 0.5 = 480, doors allow 200 + 200 + 100 + 100 = 600 so Yes she is correct M1B0M0A0A1ft (4 doors, one with the wrong size)
	Treat extra statements after 'Yes' as further working and ignore.
	Example 480 and 500 Yes a maximum of 500 people are allowed M1B1M1A2

Q	Answer	Mark	Comments
2(b)	**Alternative method 1**		
	750 ÷ 3 or 250	M1 *Ra*	
	750 – their 250 or 250 × 2 or 500	M1 *Rc*	their 250 cannot be 1/3
	Their 500 ÷ 4	M1 Rc	Their 500 cannot be 750
	(£)125	A1 *Aa*	
	Alternative method 2		
	$1 - \dfrac{1}{3}$ or $\dfrac{2}{3}$	M1 *Ra*	
	Their $\dfrac{2}{3} \div 4$ or $\dfrac{2}{12}$ or $\dfrac{1}{6}$	M1 *Rc*	
	750 ÷ 12 × 2 or 750 ÷ 6	M1 *Rc*	
	(£)125	A1 *Aa*	

Q	Answer	Mark	Comments
2(c)	750 + 320 + 250 + 120 + 70 or 1510	M1 *Ra*	
	300 × 8.5(0) or 2550	M1 *Rb*	
	Their 2550 – their 1510 or their 2550 – 1000 or 1550 or their 1510 + 1000 or 2510	M1 *Aa*	their 2550 – (750 + 320 + 250 + 120 + 70) implies M3 their 2550 must be from an attempt to work out total ticket sales their 1510 must be from an attempt to total at least 4 costs
	(£)1040 **and** Yes or 1550 **and** 1510 **and** Yes or 2550 **and** 2510 **and** Yes	A2 *I*	A1 (£)1040 or 1550 **and** 1510 or 2550 **and** 2510 or A1 ft correct decision for their values if 2 method marks scored

2(d)	**Alternative method 1**		
	5.20 + 1 hour 30 minutes or 6.50	M1 *Aa*	
	Their 6.50 + their 1 hour 15 minutes or 8.00 – their 6.50	M1 *Rc*	
	8.05 **and** No or 1 hour 10 minutes **and** No	A2 *I*	A1 8.05 or 1 hour 10 minutes or A1ft correct decision for their value providing both time periods have been used
	Alternative method 2		
	8.00 – 1 hour 30 minutes or 6.30	M1 *Aa*	8.00 – their 1 hour 15 minutes or 6.45
	Their 6.30 – their 1 hour 15 minutes	M1 *Rc*	Their 6.45 –1 hour 30 minutes
	5.15 and No	A2 *I*	A1 5.15 or A1ft correct decision for their value providing both time periods have been used
	Alternative method 3		
	8.00 – their 1 hour 15 minutes or 6.45	M1 *Aa*	
	5.20 + 1 hour 30 minutes or 6.50	M1 *Rc*	
	6.45 and 6.50 and No or She should leave at 5.15	A2 *I*	A1 6.45 and 6.50 or A1ft correct decision for their values providing both time periods have been used

2(d) cont'd	**Alternative method 4**		
	1 hour 30 minutes + their 1 hour 15 or 2 hours 45	M1 *Aa*	
	8.00 – 5.20 or 2 hours 40	M1 *Rc*	
	2 hours 45 and 2 hour 40 and No	A2 *I*	A1　2 hours 45 and 2 hour 40 or A1ft correct decision for their values providing both time periods have been used
	Additional Guidance		
	For No allow 'she will be (5 mins) late' or 'she should leave 5 mins earlier'		
	Their 1 hour 15 is an attempt to change one and a quarter hours to hours and minutes It cannot be just a quarter or just 15 minutes		
	To award the A1ft both time periods (1 h 30 and one and a quarter hours) must have been used Example 1.30 + 1.15 = 2.45 8 –2.45 = 5.55 no she can leave at 5.55 M1M1A0A1ft Example 8 – 1 h 30 = 6.30 No M1M0A0A0		

Q	Answer	Mark	Comments
3a	330	B1 *Aa*	

	Alternative method 1		
3b	$300 \div 900$ or $\frac{1}{3}$	M1 *Ra*	$900 \div 300 = 3$
	Their $\frac{1}{3} \times 60$	M1 *Rc*	$60 \div$ their 3
	20	A1 *Aa*	SC1 27.3 or 28 (from 660 used) SC1 15 (from 1200 used)
Check	reverse or alt method eg 20 × 3 = 60	B1 *Ab*	
3b Check	**Alternative method 2**		
	$900 \div 60$ or 15	M1 *Ra*	calories per minute
	$300 \div$ their 15	M1 *Rc*	or builds up to 300 in multiples of 15
	20	A1 *Aa*	SC1 27.3 or 28 (from 660 used) SC1 15 (from 1200 used)
	reverse or alt method eg 20 × 15 = 300	B1 *Ab*	
	Additional Guidance		
	Alt 1 For the second M1 their 1/3 cannot be ¼ worked out by halving and halving again		

Q	Answer	Mark	Comments
3c	works out correct calories for one machine	B1 *Aa*	time must not be one hour
	uses each of the 3 machines at least once	B1 *I*	must have ≥ one minute on each
	no more than 30 minutes on any machine	B1 *I*	
	total calories between 800 and 900	B1 *Aa*	correct total for their calories
	total time 60 minutes	B1 *Aa*	
	Full plan clearly communicated with correct calories for each machine shown	B1 *I*	Must use at least 2 machines

	Additional Guidance

Mark the table as their answer unless blank.

For the final B1 ignore total calories not within range or total minutes not 60 as these are penalised earlier

Example of correct plan

Treadmill	10 minutes	150 calories
Bike	30 minutes	330 calories
Rower	15 minutes	300 calories
Treadmill	5 minutes	75 calories

total calories 855

The 3 machines listed with no other columns completed is zero

If a machine is allocated as 0 minutes it is not being used

Q	Answer	Mark	Comments
3d	120 ÷ 2 or 60	M1 *Aa*	
	8 × 4 or 32	M1 *Aa*	
	their 60 + their 32 + 90 or 200 – their 60 – their 32 – 90	M1 *Rc*	can be 120 + 4 + 90
	182 and Yes or 18 and Yes	A2 *I*	A1 182 or 18 or A1ft correct conclusion for their values if 3 items added and 1st or 2nd method mark awarded

Q	Answer	Mark	Comments
4(a)	5 + 5 + 4 + 4 + 3 + 5 + 4 +5 + 5 + 5 or 45	M1 *Ra*	Step 1
	their 45 ÷ 10 or 4.5	M1 *Ra*	
	their 4.5 × 20	M1 *Rc*	Step 2
	90	A1 *Aa*	
	Additional Guidance		
	Step 1 and step 2 can be completed in reverse order. Ie multiply each value by 20 then find the mean Condone 'missing brackets when working out the mean. Gives 40.5 as the mean		

Q	Answer	Mark	Comments
4(b)	increased (by about their 12%) or went up (more than 10%) or reached 90 for the first time that year	B1ft *I*	oe ft their (a) or correct value of 90(%) seen Must be comparing May not clearly just the other 4 months
	Additional guidance		
	If there is a percentage in part a then ft this value If there is no percentage in part a but they have put a percentage in the box for May in b, ft the percentage in the box If part a has the answer 4.5 (for eg) then ft any percentage in the box in b but if the box is blank ft the value 4.5 (ie must say decreased) If part a is blank and there is no value put in the box in b then no mark can be awarded as there is no data to compare Ignore incorrect subtractions of their 90 – 78 Must be comparing May not just Jan to April Eg the customer rating increased but then went down again in April B0		

Q	Answer	Mark	Comments
4(c)	490 − 28 or 462	M1 *Rb*	
	their 462 ÷ 550 or 0.84	M1 *Ra*	their 462 can be any number
	their 0.84 × 100	M1 *Aa*	
	84(%)	A1 *Aa*	

Q	Answer	Mark	Comments
4(d)	**Alternative method 1**		
	878 ÷ 2 or 439	M1 *Aa*	
	439 and Yes	A1 *I*	
	Alternative method 2		
	440 × 2 or 880	M1 *Aa*	
	880 and Yes	A1 *I*	
	Alternative method 3		
	440 ÷ 878 or 0.5(01 …)	M1 *Aa*	
	0.5(01 …) and Yes	A1 *I*	
	Alternative method 4		
	878 – 440 or 438	M1 *Aa*	
	Yes over half replied/440 is over half or Yes 440 >438 or Yes 440 is over half	A1 *I*	