AQA

FUNCTIONAL SKILLS CERTIFICATE
Functional Mathematics

Level 2

Mark Scheme

4368
March 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:

- **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)	10 + 8 or 18	M1 *Rb*	score for frame 1
	27	A1 *Aa*	
	Additional Guidance		
	Mark holistically with 1(a) check		
	Marks can be awarded from the scorecard		
1(a) check	Reverse method eg 27 – 9 – 8 = 10	B1ft *Ab*	must reverse to 7, 3, 10, 18, 8, 1, 9 or 0
	Additional Guidance		
	Mark holistically with 1(a)		

Q	Answer	Mark	Comments
1(b)	**Alternative method 1**		
	(Frame 8) 75 + 10 + 10 or 95	M1 *Rb*	
	(Frame 9) their 95 + 10 + 5 or 110	M1 *Aa*	their 95 cannot be 75
	118 and Yes	A2 *Ib Ib*	A1 118 A1ft Correct conclusion for their value
	Alternative method 2		
	115 – 75 or 40	M1 *Rb*	
	10 + 10 + 10 + 5 + 5 + 3 or 43	M1 *Aa*	
	40 and 43 and Yes	A2 *Ib Ib*	A1 40 and 43 A1ft Correct conclusion for their values
	Additional Guidance		
	Marks can be awarded from the scorecard		
	Must score at least M1 for A1ft		
	118 may come from incorrect working (Frame 8) 75 + 10 = 85 (Frame 9) 85 + 10 + 10 = 105 105 + 13 = 118		M0 M0 A0
	75 + 10 + 10 + 8 = 103		M0 M0 A0

Q	Answer	Mark	Comments
1(c)	**Alternative method 1**		
	Attempt to analyse at least one set of data eg (Jamil) 2 (wins) out of 6 (games) or 4 (losses) out of 6 (games) or (Tom) 3 (wins) out of 8 (games) or 5 (losses) out of 8 (games)	M1 *Rb*	(Jamil) $\frac{2}{6}$ (wins) or $\frac{4}{6}$ (losses) or (Tom) $\frac{3}{8}$ (wins) or $\frac{5}{8}$ (losses) or (Jamil) 2 : 4 or (Tom) 3 : 5
	Converts data to comparable form and makes conclusion eg (Jamil) $\frac{8}{24}$ and (Tom) $\frac{9}{24}$ and Yes or (Jamil) 33.(...%) and (Tom) 37(.5%) or 38(%) and Yes or (Jamil) 0.33(..) and (Tom) 0.37(5…) or 0.38 and Yes or (Jamil) 1 : 2 and (Tom) 1 : 1.6(6…) or 1 : 1.7 and Yes	A2 *Ib Ib*	A1 (Jamil) $\frac{8}{24}$ and (Tom) $\frac{9}{24}$ or (Jamil) 33.(...%) and (Tom) 37(.5%) or 38(%) or (Jamil) 0.33(..) and (Tom) 0.37(5...) or 0.38 or (Jamil) 1 : 2 and (Tom) 1 : 1.6(6…) or 1 : 1.7 A1ft Correct conclusion for their comparable values

Mark scheme for 1(c) continues on next page

Q	Answer	Mark	Comments
1(c)	**Alternative method 2**		
	Attempt to analyse at least one set of data eg (Jamil) 2 (wins) out of 6 (games) or 4 (losses) out of 6 (games) or (Tom) 3 (wins) out of 8 (games) or 5 (losses) out of 8 (games)	M1 *Rb*	(Jamil) $\frac{2}{6}$ (wins) or $\frac{4}{6}$ (losses) or (Tom) $\frac{3}{8}$ (wins) or $\frac{5}{8}$ (losses) or (Jamil) 2 : 4 or (Tom) 3 : 5
	Converts data to comparable form and makes conclusion eg (scaling and comparing number of wins) ($\frac{2}{6}$ × 8 =) 2.6(6…) or 2.7 and 3 and Yes or ($\frac{3}{8}$ × 6 =) 2.2(5) or 2.3 and 2 and Yes	A2 *Ib Ib*	A1 2.6(6…) or 2.7 and 3 or 2.2(5) or 2.3 and 2 A1ft Correct conclusion for their values
	Additional Guidance		
	Must score M1 for A1ft		
	Jamil plays 6 and wins 2		M1

Q	Answer	Mark	Comments
1(d)	**Alternative method 1 (means)**		
	(Jamil) 155 + 147 + 216 + 182 + 179 + 177 or 1056 or (Tom) 191 + 160 + 134 + 210 + 182 + 202 + 159 + 146 or 1384	M1 *Ra*	
	their 1056 ÷ their 6 or 176 or their 1384 ÷ their 8 or 173	M1 *Aa*	
	176 and 173 and Yes	A2 *Ib Ib*	A1 176 and 173 A1ft Correct conclusion for their means
	Alternative method 2 (medians)		
	(Jamil) 147 155 177 179 (182 216) or (147 155) 177 179 182 216 or (Tom) 134 146 159 160 182 (191 202 210) or (134 146 159) 160 182 191 202 210	M1 *Ra*	list may be in reverse order
	$\frac{\text{their } 177 + \text{their } 179}{2}$ or 178 or $\frac{\text{their } 160 + \text{their } 182}{2}$ or 171	M1 *Rc*	must have attempted to order the data
	178 and 171 and Yes	A2 *Ib Ib*	A1 178 and 171 A1ft Correct conclusion for their medians

Mark scheme for 1(d) continues on next page

Q	Answer	Mark	Comments
1(d)	**Alternative method 3 (scaling totals)**		
	(Jamil) 155 + 147 + 216 + 182 + 179 + 177 or 1056 or (Tom) 191 + 160 + 134 + 210 + 182 + 202 + 159 + 146 or 1384	M1 *Ra*	
	their 1056 ÷ 6 × 8 or 1408 or their 1384 ÷ 8 × 6 or 1038	M1 *Aa*	176 × 8 or 173 × 6
	1408 and 1384 and Yes or 1056 and 1038 and Yes	A2 *Ib Ib*	A1 1408 and 1384 or 1056 and 1038 A1ft Correct conclusion for their scalings
	Additional Guidance		
	Must score M2 for A1ft		

Q	Answer		Mark	Comments
2(a)	**Alternative method 1**			
	300 ÷ 25 or 12	500 ÷ 25 or 20	M1 *Ra*	
	500 × their 12 or 6000	300 × their 20 or 6000	M1 *Rb*	
	their 6000 ÷ 1000 or 6 or 2.5 × 1000 or 2500		M1 *Aa*	must use 1000
	their 6 ÷ 2.5 or their 6000 ÷ their 2500 or 2.4 or 3 × 2.5 or 7.5 or 3 × 2500 or 7500		M1 *Rc*	
	3 with no incorrect working		A1 *Ib*	
	Alternative method 2			
	300 ÷ 1000 or 0.3		M1 *Ra*	must use 1000
	their 0.3 ÷ 25 or 0.012	500 ÷ 25 or 20	M1 *Ra*	
	500 × their 0.012 or 6	their 20 × their 0.3 or 6	M1 *Rb*	
	their 6 ÷ 2.5 or their 6000 ÷ their 2500 or 2.4 or 3 × 2.5 or 7.5 or 3 × 2500 or 7500		M1 Rc	
	3 with no incorrect working		A1 *Ib*	

Mark scheme for 2(a) continues on next page

Q	Answer	Mark	Comments
2(a)	**Alternative method 3**		
	2.5 × 1000 or 2500	M1 *Ra*	must use 1000
	their 2500 ÷ 300 or 8.3(3...)	M1 *Ra*	
	their 8.3(3...) × 25 or 208(.3...)	M1 *Rb*	
	500 ÷ their 208(.3...) or 2.4	M1 Rc	
	3 with no incorrect working	A1 *Ib*	
	Alternative method 4		
	2.5 × 1000 or 2500 / 300 ÷ 1000 or 0.3	M1 *Ra*	must use 1000
	300 ÷ their 2500 or 0.12 / 0.3 ÷ 2.5 or 0.12	M1 *Ra*	
	their 0.12 ÷ 25 or 0.0048	M1 *Rb*	
	their 0.0048 × 500 or 2.4	M1 Rc	
	3 with no incorrect working	A1 *Ib*	
	Additional Guidance		
	Allow mixed units for M marks eg Alt 1 For 6 ÷ 2.5 allow 6000 ÷ 2.5		

Q	Answer	Mark	Comments
2(b)	90 ÷ 15 or 6 or 25 ÷ 12 or 2.(0...) or 2.1 or 18 ÷ 5 or 3(.6)	M1 *Rb*	6 × 15 = 90 or 2 × 12 = 24 or 3 × 5 = 15
	their 6 and their 2 and their 3	M1 *Aa*	must be integers, rounded down when necessary
	their 6 × their 2 × their 3	M1 *Ib*	their values can be decimals
	36 with no incorrect working	A1 *Aa*	
	Additional Guidance		
	Only uses division of volumes (answer 45)		Zero
2(c)	4.5	B1 *Aa*	
	Additional Guidance		

Q	Answer	Mark	Comments
2(d)	(Shop →) A → D → B → C → Shop and 8.8 (miles) or (Shop →) C → B → D → A → Shop and 8.8 (miles)	B3 *Rc Aa Ia*	B2 (Shop →) A → D → B → C and 8.8 (miles) or (Shop →) C → B → D → A and 8.8 (miles) B1 Any valid route and correct distance for their route eg1 (Shop →) D → C → B → A → Shop and 9.8 (miles) eg2 (Shop →) A → B → D → C → Shop and 9.1 (miles) SC2 (Shop →) A → D → B → C → Shop with incorrect or no distance or (Shop →) C → B → D → A → Shop with incorrect or no distance SC1 (Shop →) A → D → B → C with incorrect or no distance or (Shop →) C → B → D → A with incorrect or no distance SC1 (0.9 + 2.4 + 2.1 + 2.3 + 1.1 =) 8.8 (miles)

Additional Guidance	
Condone a route shown unambiguously on the diagram	
(Shop →) D → B → C → Shop → A → Shop and 8.9 (miles)	B1
(Shop →) C → B → D → Shop → A → Shop and 8.9 (miles)	B1
(Shop →) A → B → C → D → Shop and 9.8 (miles)	B1
(Shop →) C → D → B → A → Shop and 9.1 (miles)	B1
(Shop →) D → A → B → C → Shop and 10.6 (miles)	B1
(Shop →) C → B → A → D → Shop and 10.6 (miles)	B1

Q	Answer	Mark	Comments
3(a)	Exactly three squares with side 1 cm	B1 *Ra*	three sinks
	Exactly four circles with radius 1 cm	B1 *Ia*	four chairs
	Exactly three sinks at least 2 cm apart, against the same wall and exactly four chairs in a line, 2 cm from one wall	B1 *Ia*	three sinks and four chairs in correct positions do not have to be the correct shape or size may be implied by labelling
	(reception desk) rectangle 2 cm by 1 cm or (display cabinet) rectangle 4 cm by 2 cm or (waiting area) rectangle 4 cm by 3 cm	B1 *Aa*	
	(reception desk) rectangle 2 cm by 1 cm and (display cabinet) rectangle 4 cm by 2 cm and (waiting area) rectangle 4 cm by 3 cm	B1 *Aa*	
	All 10 items attempted and labelled and door can open fully	B1 *Ia*	no item in the 8 squares in the top-left (2 squares horizontal by 4 squares vertical)
	Additional Guidance		
	Condone circles and rectangles drawn freehand if intention is clear		
	All shapes must be drawn (apart from 3rd B1) and on the grid		
	Only mark 1st grid if 2nd grid blank		
	Correct label on one sink can imply correct labels on other two sinks		
	Correct label on one chair can imply correct labels on other three chairs		

Q	Answer	Mark	Comments
3(b)	Erik works exactly 8 shifts and Wendy works exactly 4 afternoon shifts	B1 *Aa*	juniors must be in the Junior columns no blanks in Junior columns
	Jenny and Mia each work exactly 8 different shifts and Craig and Fay each work exactly 5 different shifts	B1 *Aa*	stylists must be in the Stylist columns no blanks in Stylist columns
	Craig does not work on Saturday	B1 *Ia*	Saturday row must be complete
	Each stylist has at least 1 full day off	B1 *Ia*	grid must be complete for Stylists
	Additional Guidance		
	Only mark 1st grid if 2nd grid blank		
	Mark any shaded boxes that are completed		

Q	Answer	Mark	Comments
3(c)	**Alternative method 1**		
	35 × 33 or 1155 or 15 × 60 or 900	M1 *Ra*	income from cut and blow dries or income from cut and colours
	their 1155 + their 900 or 2055	M1 *Rb*	total income from appointments
	33 × 0.1 or 3.3(0) or 60 × 0.1 or 6	M1 *Rc*	10% of one cut and blow dry or 10% of one cut and colour
	(5 + 4 + 16) × their 3.3(0) or 25 × their 3.3(0) or 5 × their 3.3(0) and 4 × their 3.3(0) and 16 × their 3.3(0) or 16.5(0) and 13.2(0) and 52.8(0) or 82.5(0) or (2 + 3 + 4) × their 6 or 9 × their 6 or 2 × their 6 and 3 × their 6 and 4 × their 6 or 12 and 18 and 24 or 54 or 136.5(0)	M1 *Aa*	cut and blow dry payments to Craig, Fay and Mia or cut and colour payments to Craig, Fay and Mia or total payments to Craig, Fay and Mia
	their 2055 – their 82.5(0) – their 54 – 980 – 325 or 613.5	M1 *Rb*	(total) income – total costs
	(£)613.50	A1 *Aa*	

Mark scheme for 3(c) continues on next page

Q	Answer	Mark	Comments
3(c)	**Alternative method 2**		
	35 × 33 or 1155 or 15 × 60 or 900	M1 *Ra*	income from cut and blow dries or income from cut and colours
	their 1155 + their 900 or 2055	M1 *Rb*	total income from appointments
	33 × 0.1 or 3.3(0) or 60 × 0.1 or 6	M1 *Rc*	10% of one cut and blow dry or 10% of one cut and colour
	5 × their 3.3(0) or 16.5(0) and 2 × their 6 or 12 or 28.5(0) or . 4 × their 3.3(0) or 13.2(0) and 3 × their 6 or 18 or 31.2(0) or 16 × their 3.3(0) or 52.8(0) and 4 × their 6 or 24 or 76.8(0) or 136.5(0)	M1 *Aa*	total payments to Craig or total payments to Fay or total payments to Mia or total payments to Craig, Fay and Mia
	their 2055 – their 28.5(0) – their 31.2(0) – their 76.8(0) – 980 – 325 or 613.5	M1 *Rb*	(total) income – total costs
	(£)613.50	A1 *Aa*	

Mark scheme for 3(c) continues on next page

Q	Answer	Mark	Comments
3(c)	**Alternative method 3**		
	35 × 33 or 1155 or 15 × 60 or 900	M1 *Ra*	income from cut and blow dries or income from cut and colours
	their 1155 + their 900 or 2055	M1 *Rb*	total income from appointments
	(5 + 4 + 16) × 33 or 25 × 33 or 5 × 33 and 4 × 33 and 16 × 33 or 165 and 132 and 528 or 825 or (2 + 3 + 4) × 60 or 9 × 60 or 2 × 60 and 3 × 60 and 4 × 60 or 120 and 180 and 240 or 540 or 1365	M1 *Aa*	cut and blow dry payments for Craig, Fay and Mia or cut and colour payments for Craig, Fay and Mia or total payments for Craig, Fay and Mia
	their 825 × 0.1 or 82.5(0) or their 540 × 0.1 or 54 or their 1365 × 0.1 or 136.5(0)	M1 *Rc*	10% of cut and blow dry payment(s) or 10% of cut and colour payment(s) or 10% of total payments their 825 can be 165 or 132 or 528 their 540 can be 120 or 180 or 240
	their 2055 – their 82.5(0) – their 54 – 980 – 325 or 613.5	M1 *Rb*	(total) income – total costs their 2055 can be their 1365
	(£)613.50	A1 *Aa*	

Mark scheme for 3(c) continues on next page

Q	Answer	Mark	Comments
3(c)	**Alternative method 4**		
	35 × 33 or 1155 or 15 × 60 or 900	M1 *Ra*	income from cut and blow dries or income from cut and colours
	their 1155 + their 900 or 2055	M1 *Rb*	total income from appointments
	5 × 33 or 165 and 2 × 60 or 120 or 285 or 4 × 33 or 132 and 3 × 60 or 180 or 312 or 16 × 33 or 528 and 4 × 60 or 240 or 768 or 1365	M1 *Aa*	total payments for Craig or total payments for Fay or total payments for Mia or total payments for Craig, Fay and Mia
	their 285 × 0.1 or 28.5(0) or their 312 × 0.1 or 31.2(0) or their 768 × 0.1 or 76.8(0) or their 1365 × 0.1 or 136.5(0)	M1 *Rc*	10% of payment(s) for Craig or Fay or Mia or 10% of total payments their 285 can be 165 or 120 their 312 can be 132 or 180 their 768 can be 528 or 240
	their 2055 – their 28.5(0) – their 31.2(0) – their 76.8(0) – 980 – 325 or 613.5	M1 *Rb*	(total) income – total costs their 2055 can be their 1365
	(£)613.50	A1 *Aa*	

Mark scheme for 3(c) continues on next page

Q	Answer	Mark	Comments
3(c)	**Alternative method 5**		
	(35 – 5 – 4 – 16) × 33 + (15 – 2 – 3 – 4) × 60 or 10 × 33 + 6 × 60 or 330 + 360 or 690	M1 *Ra*	Jenny's income from cut and blow dries and cut and colours
	(5 + 4 + 16) × 33 or 25 × 33 or 5 × 33 and 4 × 33 and 16 × 33 or 165 and 132 and 528 or 825 or (2 + 3 + 4) × 60 or 9 × 60 or 2 × 60 and 3 × 60 and 4 × 60 or 120 and 180 and 240 or 540 or 1365	M1 *Aa*	cut and blow dry payments for Craig, Fay and Mia or cut and colour payments for Craig, Fay and Mia or total payments for Craig, Fay and Mia
	their 825 × 0.9 or 742.5(0) or their 540 × 0.9 or 486 or their 1365 × 0.9 or 1228.5(0)	M1 *Rc*	90% of cut and blow dry payment(s) or 90% of cut and colour payment(s) or 90% of total payments their 825 can be 165 or 132 or 528 their 540 can be 120 or 180 or 240
	their 1228.5(0) + their 690 or 1918.5(0)	M1 *Rb*	total income from appointments their 1228.5(0) cannot be 742.5(0) or 486
	their 1918.5(0) – 980 – 325 or 613.5	M1 *Rb*	(total) income – total costs
	(£)613.50	A1 *Aa*	
	Additional Guidance		

Mark scheme for 3(c) continues on next page

Q	Answer	Mark	Comments
3(c)	**Alternative method 6**		
	(35 – 5 – 4 – 16) × 33 + (15 – 2 – 3 – 4) × 60 or 10 × 33 + 6 × 60 or 330 + 360 or 690	M1 *Ra*	Jenny's income from cut and blow dries and cut and colours
	5 × 33 or 165 and 2 × 60 or 120 or 285 or 4 × 33 or 132 and 3 × 60 or 180 or 312 or 16 × 33 or 528 and 4 × 60 or 240 or 768 or 1365	M1 *Aa*	total payments for Craig or total payments for Fay or total payments for Mia or total payments for Craig, Fay and Mia
	their 285 × 0.9 or 256.5(0) or their 312 × 0.9 or 280.8(0) or their 768 × 0.9 or 691.2(0) or their 1365 × 0.9 or 1228.5(0)	M1 *Rc*	90% of payment(s) for Craig or Fay or Mia or 90% of total payments their 285 can be 165 or 120 their 312 can be 132 or 180 their 768 can be 528 or 240
	their 1228.5(0) + their 690 or 1918.5(0)	M1 *Rb*	total income from appointments their 1228.5(0) cannot be 256.5(0) or 280.8(0) or 691.2(0)
	their 1918.5(0) – 980 – 325 or 613.5	M1 *Rb*	(total) income – total costs
	(£)613.50	A1 *Aa*	
	Additional Guidance		

Q	Answer	Mark	Comments
4(a)	**Alternative method 1**		
	2 × 6 (× 1) or 12 or 1.5 × 5 × 4 or 30 or (1 ×) 3 × 2 or 6	M1 *Ra*	
	2 × 6 (× 1) or 12 and 1.5 × 5 × 4 or 30 and (1 ×) 3 × 2 or 6	M1 *Ra*	
	their 12 + their 30 + their 6 or 48	M1 *Rc*	must add 3 components
	their 48 × 15.5	M1 *Aa*	
	(£)7.44 and Yes or 744p and Yes or 744 and 1000 and Yes	A2 *Ib Ib*	A1 (£)7.44 or 744(p) A1ft Correct conclusion for their value(s)

Mark scheme for 4(a) continues on next page

Q	Answer	Mark	Comments
4(a)	**Alternative method 2**		
	2 × 6 (× 1) or 12 or 1.5 × 5 × 4 or 30 or (1 ×) 3 × 2 or 6	M1 *Ra*	
	2 × 6 (× 1) or 12 and 1.5 × 5 × 4 or 30 and (1 ×) 3 × 2 or 6	M1 *Ra*	
	their 12 × 15.5 or 186 and their 30 × 15.5 or 465 and their 6 × 15.5 or 93	M1 *Rc*	
	their 186 + their 465 + their 93	M1 *Aa*	must add 3 components
	(£)7.44 and Yes or 744p and Yes or 744 and 1000 and Yes	A2 *Ib Ib*	A1 (£)7.44 or 744(p) A1ft Correct conclusion for their value(s)
	Additional Guidance		
	Must score 1st, 3rd and 4th M1 for A1ft		
	Working in watts can score a maximum of M4 A0		

Q	Answer	Mark	Comments
4(b)	2 × 4 × 89 or 8 × 89 or 178 × 4 or 712 or 7.12 or £7.12p	M1 *Ra*	Allow 7 × 89 or 623 or 6.23 or £6.23p or 9 × 89 or 801 or 8.01 or £8.01p
	£7.12 or 712p	A1 *Ia*	Allow £6.23 or 623p or £8.01 or 801p Must see £ or p
	Additional Guidance		
	Mark holistically with 4(b) check		
4(b) check	Alternative method eg1 89 + 89 + 89 + 89 + 89 + 89 + 89 + 89 = 712 eg2 178 + 178 + 178 + 178 = 712 or reverse calculation eg 712 ÷ 8 = 89 or uses approximation to nearest 10p eg 8 × 90 = 720	B1ft *Ab*	Must reverse to 89 or 8 or 4 or 0
	Additional Guidance		
	Mark holistically with 4(b)		

Q	Answer	Mark	Comments
4(c)	**Alternative method 1 (4 years)**		
	100 ÷ 1000 or 0.1	M1 *Ra*	power of ordinary bulbs in kW
	their 0.1 × 240 × 4 or 96	M1 *Rb*	units of electricity for ordinary bulbs their 0.1 can be 100
	their 96 × 15.5 or 14.88	M1 *Rc*	cost of electricity for ordinary bulbs their 96 can be 24 or 240 their 96 must be a time
	their 14.88 + their 7.12 or 22	M1 *Aa*	their 7.12 from (b) total cost for ordinary bulbs their 14.88 cannot be 96 or 15.5
	0.2 × their 14.88 or 2.97(6) or 2.98	M1 *Ra*	cost of electricity for low energy bulbs their 14.88 cannot be 96 or 15.5
	their 2.97(6) + 13.88 or 16.85(6) or 16.86	M1 *Aa*	total cost for low energy bulb
	16.85(6) or 16.86 and 22 and Yes	A2ft *Ib Ib*	ft their 7.12 from (b) A1ft 16.85(6) or 16.86 and 22 A1ft Correct conclusion for their values

Mark scheme for 4(c) continues on next page

Q	Answer	Mark	Comments
4(c)	**Alternative method 2 (4 years)**		
	100 ÷ 1000 or 0.1	M1 *Ra*	power of ordinary bulbs in kW
	their 0.1 × 240 × 4 or 96	M1 *Rb*	units of electricity for ordinary bulbs their 0.1 can be 100
	their 96 × 15.5 or 14.88	M1 *Rc*	cost of electricity for ordinary bulbs their 96 can be 24 or 240 their 96 must be a time
	0.2 × their 14.88 or 2.97(6) or 2.98	M1 *Aa*	cost of electricity for low energy bulb their 14.88 cannot be 96 or 15.5
	their 14.88 – their 2.97(6) or 11.90(4)	M1 *Ra*	difference in cost of electricity their 14.88 cannot be 96 or 15.5
	13.88 – their 7.12 or 6.76	M1 *Aa*	their 7.12 from (b) difference in cost of bulbs
	11.90(4) and 6.76 and Yes	A2ft *Ib Ib*	ft their 7.12 from (b) A1ft 11.90(4) and 6.76 A1ft Correct conclusion for their values

Mark scheme for 4(c) continues on next page

Q	Answer	Mark	Comments
4(c)	**Alternative method 3 (1 year)**		
	100 ÷ 1000 or 0.1	M1 *Ra*	power of ordinary bulbs in kW
	their 0.1 × 240 or 24	M1 *Rb*	units of electricity for ordinary bulbs their 0.1 can be 100
	their 24 × 15.5 or 3.72	M1 *Rc*	cost of electricity for ordinary bulbs their 24 can be 240 their 24 must be a time
	their 3.72 + $\frac{1}{4}$ × their 7.12 or their 3.72 + 1.78 or 5.50	M1 *Aa*	their 7.12 from (b) total cost for ordinary bulbs their 3.72 cannot be 24 or 15.5
	0.2 × their 3.72 or 0.74(4)	M1 *Ra*	cost of electricity for low energy bulbs their 3.72 cannot be 24 or 15.5
	their 0.74(4) + $\frac{1}{4}$ × 13.88 or their 0.74(4) + 3.47 or 4.21(4)	M1 *Aa*	total cost for low energy bulb
	4.21(4) and 5.50 and Yes	A2ft *Ib Ib*	ft their 7.12 from (b) A1ft 4.21(4) and 5.50 A1ft Correct conclusion for their values

Mark scheme for 4(c) continues on next page

Q	Answer	Mark	Comments
4(c)	**Alternative method 4 (1 year)**		
	100 ÷ 1000 or 0.1	M1 *Ra*	power of ordinary bulbs in kW
	their 0.1 × 240 or 24	M1 *Rb*	units of electricity for ordinary bulbs their 0.1 can be 100
	their 24 × 15.5 or 3.72	M1 *Rc*	cost of electricity for ordinary bulbs their 24 can be 240 their 24 must be a time
	0.2 × their 3.72 or 0.74(4)	M1 *Aa*	cost of electricity for low energy bulb their 3.72 cannot be 24 or 15.5
	their 3.72 – their 0.74(4) or 2.97(6)	M1 *Ra*	difference in cost of electricity their 3.72 cannot be 24 or 15.5
	$\frac{1}{4}$ × 13.88 – $\frac{1}{4}$ × their 7.12 or 3.47 – 1.78 or 1.69	M1 *Aa*	their 7.12 from (b) difference in cost of bulbs
	2.97(6) and 1.69 and Yes	A2ft *Ib Ib*	ft their 7.12 from (b) A1ft 2.97(6) and 1.69 A1ft Correct conclusion for their values
	Additional Guidance		
	Working in minutes can score a maximum of M6 A0		
	Must score 2nd, 3rd, 4th, 5th and 6th M1 for A1ft		