



AQA Qualifications

GCSE

Mathematics

93651H Methods in Mathematics

Unit 1: Higher Tier

Mark scheme

9365/1H

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Version 1.0 Final Mark Scheme

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

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

- M** Method marks are awarded for a correct method which could lead to a correct answer.
- M dep** A method mark dependent on a previous method mark being awarded.
- 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.
- B dep** A mark that can only be awarded if a previous independent mark has been awarded.
- 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 $\frac{1}{2}$
- [a, b]** Accept values between a and b inclusive.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q	Answer	Mark	Comments
1(a)	5	B1	
1(b)	Plots points correctly	M1	Ignore their point if it cannot be plotted
	Smooth curve through correct points	A1ft	ft if their answer to (a) is greater than 4 and less than or equal to 6
	Additional Guidance		
	Ignore other points plotted if the curve is correct.		
	Ignore the curve for $x < -3$ and $x > 3$ and $y < -4$		
	The curve must not clearly cross the lines $x = -3$ or $x = 3$ in the range $-3 \leq x \leq 3$		

Q	Answer	Mark	Comments
2(a)	$\frac{25}{60}$	B1	oe $\frac{5}{12}$ or 0.41 $\dot{6}$ or 41.6%
	Additional Guidance		
	For all parts of this question, do not accept an answer in ratio form, although it is possible that the M mark in 2(c) could come from a ratio.		
	For all parts of this question, ignore descriptive words such as 'likely'.		
	For all parts of this question, ignore incorrect attempts to cancel a correct fraction or convert it to decimal or percentage form.		
For all parts of this question, accept an answer given in words if it is also seen in a correct format.			
2(b)	$\frac{11}{60}$	B1	oe 0.18 $\dot{3}$ or 18.3%
	Additional Guidance		
	If otherwise correct answers to (a) and (b) are only given in words withhold the first mark only. For example, '25 in 60' in (a) and '11 in 60' in (b)		B0B1
2(c)	$\frac{6}{60}$ or 6 or 9 seen	M1	excluding 9 seen in $\frac{9}{10}$
	$\frac{9}{60}$	A1	oe $\frac{3}{20}$ or 0.15 or 15%
	Additional Guidance		
	If otherwise correct answers to (a) and/or (b) and (c) are given in words withhold the first mark only. For example, '25 in 60' in (a) and '11 in 60' in (b) and '9 in 60' in (c) '14 in 60' in (a) and '11 in 60' in (b) and '9 in 60' in (c)		B0B1M1A1 B0B0M1A1

Q	Answer	Mark	Comments
3	Alternative method 1		
	0.96×625 or 0.04×625	B1	oe correct method to find 96% of 625 or 4% of 625
	$\sqrt{625} = 25$ or $25^2 = 625$	B1	
	$0.96 \times 625 = 600$ and $625 - 600 = 25$ or $0.04 \times 625 = 25$ and $\sqrt{625} = 25$ or $25^2 = 625$	Q1	oe Strand (ii) Fully correct proof with all working shown SC1 25
	Alternative method 2		
	$\sqrt{625} = 25$ or $25^2 = 625$	B1	
	$\frac{25}{625} \times 100$ or $\frac{600}{625} \times 100$	B1	
	$\sqrt{625} = 25$ or $25^2 = 625$ and $\frac{25}{625} \times 100 = 4$ or $\frac{600}{625} \times 100 = 96$ and $100 - 96 = 4$	Q1	oe Strand (ii) Fully correct proof with all working shown SC1 25
	Additional Guidance		
	4% of 625 = 25 = $\sqrt{625}$ oe	B0B1Q0	
It is impossible to score the Q mark without B1B1			

Q	Answer	Mark	Comments
4	$x^2 + 3x - 4x + 20$	M1	Four terms with at least three correct
	$x^2 + 3x - 4x + 20$	A1	
	$x^2 - x + 20$	A1ft	ft if M1 awarded, a term in x^2 and no further errors SC2 $x^2 - x - 20$
	Additional Guidance		
	Allow, for example, $-1x$ for $-x$		
	$x^2 + 3x - 4x - 20$ followed by $x^2 - x - 20$		M1A0A1
	Ignore further attempts to simplify the expression by combining two or all of the terms for the first A mark, but not for the second. For example, $x^2 + 3x - 4x + 20$ followed by $x^2 - x + 20$ followed by $x + 20$ $x^2 + 3x - 4x - 20$ followed by $x^2 - x - 20$ followed by $x - 20$ However, ignore attempts to factorise an expression worth A2 or A1ft or SC2		M1A1A0 M1A0A0
	For the first mark accept the terms given individually, but for the second and third marks the terms must be presented correctly as an expression.		
	Ignore attempts to 'solve' their expression by equating it to 0		
5(a)	$50 - 17 - 20$ or 13	M1	oe
	$\frac{13}{50}$ or 0.26 or 26%	A1	oe $\frac{52}{200}$ SC1 $\frac{163}{200}$ or (0).815 or 81.5%
	Additional Guidance		
	$\frac{13}{200}$		M1A0

Q	Answer	Mark	Comments
5(b)	0.39 or 200 spins and indicates that more trials usually results in better estimates	B1	oe
	Additional Guidance		
	'more reliable' or 'more accurate' on their own 'more trials' or 'most trials' on their own		B0 B1
6(a)	$5x(2x + 3y)$	B2	B1 $5(2x^2 + 3xy)$ or $x(10x + 15y)$
6(b)	$150x^3y$	B2	B1 for any two of 150 x^3 y in a multiplication string
	Additional Guidance		
	Ignore any \times signs in their expression However, a $+$ sign indicates no marks		B0

Q	Answer	Mark	Comments
7	Alternative method 1		
	$4x + 8y (= 11y - 5)$	M1	
	$4x = 11y - 8y - 5$ or $4x = 3y - 5$	M1	their $8y - 11y + 5 = -4x$ or $-3y + 5 = -4x$
	$x = \frac{3y-5}{4}$ or $x = \frac{3y}{4} - \frac{5}{4}$ or $x = \frac{-3y+5}{-4}$ or $x = \frac{-3y}{-4} + \frac{5}{-4}$	A1ft	oe ft on M1M0 or M0M1 with only one expansion or rearrangement error SC2 $\frac{3y-5}{4}$ or $\frac{3y}{4} - \frac{5}{4}$ or $\frac{-3y+5}{-4}$ or $\frac{-3y}{-4} + \frac{5}{-4}$ or $x = \frac{9y-5}{4}$ or $x = \frac{9y}{4} - \frac{5}{4}$
	Alternative method 2		
	$x + 2y = \frac{11y}{4} - \frac{5}{4}$	M1	oe $x + 2y = 2.75y - 1.25$
	$x = \frac{11y}{4} - 2y - \frac{5}{4}$	M1	oe $2y - \frac{11y}{4} + \frac{5}{4} = -x$
	$x = \frac{3y-5}{4}$ or $x = \frac{3y}{4} - \frac{5}{4}$ or $x = \frac{-3y+5}{-4}$ or $x = \frac{-3y}{-4} + \frac{5}{-4}$	A1ft	oe ft on M1M0 or M0M1 with only one rearrangement error SC2 $\frac{3y-5}{4}$ or $\frac{3y}{4} - \frac{5}{4}$ or $\frac{-3y+5}{-4}$ or $\frac{-3y}{-4} + \frac{5}{-4}$ or $x = \frac{9y-5}{4}$ or $x = \frac{9y}{4} - \frac{5}{4}$
	Additional Guidance		
	All like terms must be collected for the A mark		
If they attempt to simplify further, eg $x = -0.5y$, withhold the A mark			
Ignore attempts to 'solve' their equation			

Q	Answer	Mark	Comments
8(a)	Any two of 1, 5 and 6	B2	B1 Any one of 1, 5 and 6 or finds the correct pattern for any value of a
	Additional Guidance		
	The correct patterns are: 2: 2, 4, 8, 6 repeat 3: 3, 9, 7, 1 repeat 4: 4, 6 repeat 7: 7, 9, 3, 1, repeat 8: 8, 4, 2, 6 repeat 9: 9, 1 repeat	1: $1^2 = 1$ and $1^3 = 1$ 5: $5^2 = 25$ and $5^3 = 125$ 6: $6^2 = 36$ and $6^3 = 216$	
	If the answers are given as bases with indices, or the evaluation of them, the only mark that can be achieved is B1 for a correct pattern.		
8(b)	4	B1	Do not accept as 4 to a power, eg 4^2
9	Alternative method 1		
	288 \div 0.4 or 720 or 288 \div 1.2 or 240	M1	oe
	Their 720 \div 1.2 or their 240 \div 0.4	M1	oe
	600	A1	
	Alternative method 2		
	1.2 \times 0.4 or 0.48	M1	oe
	288 \div their 0.48	M1dep	oe
	600	A1	
	Additional Guidance		
	Trial and improvement is 3 or 0		

Q	Answer	Mark	Comments
10	Alternative method 1		
	Draws line with equation $y = x + 4$ or shows equation $y = x + 4$ or draws line with equation $y = -x + 1$ or shows equation $y = -x + 1$	M1	Accept correct line(s) of any length
	Draws line with equation $y = x + 4$ and draws line with equation $y = -x + 1$	A1	Lines can be of any length, but must intersect
	(- 1.5, 2.5)	A1ft	oe correct answer scores 3 marks ft their two straight lines with one correct Allow readings from their point of intersection $\pm \frac{1}{2}$ square (± 0.1)
	Alternative method 2		
	$y = x + 4$ or $y = -x + 1$	M1	
	$x + 4 = -x + 1$	A1	oe $2x = -3$ or $-2x = 3$ or $x = -1.5$ or $-x = 1.5$
	(- 1.5, 2.5)	A1ft	oe correct answer scores 3 marks ft correct solution for their two line equations with one correct
11	Alternative method 1		
	0.42 \div 0.6 or 0.7	M1	oe
	0.6 \times (1 – their 0.7) or 0.6 \times 0.3	M1	These values may be seen on a tree diagram
	0.18	A1	oe fraction, decimal or percentage
	Alternative method 2		
	Venn diagram with 0.42 in $A \cap B$	M1	0.6 – 0.42 as a full method gets M2 with or without a Venn diagram
	0.6 – 0.42	M1	
0.18	A1	oe fraction, decimal or percentage	

Q	Answer	Mark	Comments
12	Alternative method 1		
	$2(x - 1) = 6 - x^2$ or $2x - 2 = 6 - x^2$	M1	oe $3 - \frac{x^2}{2} = x - 1$ Correct method to eliminate one unknown
	$x^2 + 2x - 8 = 0$	A1	
	$(x + 4)(x - 2) (= 0)$	M1	Correct method to solve their quadratic equation $(x =) \frac{-2 \pm \sqrt{2^2 - (4 \times 1 \times -8)}}{2 \times 1}$ $(x + 1)^2 - 1 - 8 = 0$
	$x = -4 \quad y = -2.5$ $x = 2 \quad y = 0.5$	A2	A1 for both x values correct or one correct pair of x and y values SC2 both pairs of x and y values without correct working SC1 one pair of x and y values without correct working
	Alternative method 2		
	$4y = 6 - (2y + 1)^2$	M1	oe Correct method to eliminate one unknown
	$4y^2 + 8y - 5 = 0$	A1	
	$(2y + 5)(2y - 1) (= 0)$	M1	Correct method to solve their quadratic equation $(y =) \frac{-8 \pm \sqrt{8^2 - (4 \times 4 \times -5)}}{2 \times 4}$ $(y + 1)^2 - 1 - \frac{5}{4} = 0$
	$x = -4 \quad y = -2.5$ $x = 2 \quad y = 0.5$	A2	A1 for both x values correct or one correct pair of x and y values SC2 both pairs of x and y values without correct working SC1 one pair of x and y values without correct working

Q	Answer	Mark	Comments
13	$7x + x$ or $8x$ or $-x - 7x$ or $-8x$	M1	For M1M1 the rearrangements must be a correct pair: $7x + x$ or $8x$ and $3 - 1$ or 2 or $-x - 7x$ or $-8x$ and $1 - 3$ or -2
	$3 - 1$ or 2 or $1 - 3$ or -2	M1	
	$(0).25$ or $\frac{1}{4}$	A1ft	oe ft M1M0 or M0M1 with one rearrangement or arithmetic error
	Additional Guidance		
	It is possible that the M1 which scores may not be seen, but implied: $6x + 1 = 3$ followed by $x = \frac{1}{3}$ $7x = 4 - x$ followed by $x = \frac{1}{2}$		M0M1A1 M1M0A1
	$8x$ from $7x + 1$ or 2 from $3 - x$ score M0		
A correct embedded value of 0.25 (oe) scores		M1M1A0	

Q	Answer	Mark	Comments
14	Alternative method 1		
	$110 \div 2$ or 55(%) or (0).55 or $\frac{55}{100}$	M1	oe $(200 - 110) \div 2$ or 45 oe and $100 - 53$ or 47 oe
	Zac and 55(%) or Zac and $\frac{55}{100}$ or Zac and (0).55 and (0).53	A1	Zac and 45 and 47
	Alternative method 2		
	53×2 or 106 or $\frac{106}{200}$	M1	oe $(100 - 53) \times 2$ or 94 oe and $200 - 110$ or 90
	Zac and 106 or Zac and $\frac{106}{200}$	A1	Zac and 94 and 90
15	1 or 100%	B1	Condone 'Certain'
	Odd + even = odd	B1	
	Additional Guidance		
	For the first mark, accept a probability in the form $\frac{n}{n}$		
	To gain the second mark there must be some reference to odd + even = odd It is not sufficient simply to say the sum is always odd		

Q	Answer	Mark	Comments
16(a)	$-3 < x < 5$ or $5 > x > -3$	B2	B1 for either side correct SC1 $-3 \leq x \leq 5$ or $5 \geq x \geq -3$
	Additional Guidance		
	If the student writes this as two inequalities award one mark for either or both written correctly. eg $x > -3$ and $x < 5$ $x > -3$ and $x > 5$		B1 B1
16(b)	-1, 0, 1, 2	B2	B1 $\frac{-2}{2}, \frac{0}{2}, \frac{2}{2}, \frac{4}{2}$ or $-1.5 < \frac{x}{2} < 2.5$ or any two or three correct values with no incorrect values or all four correct values with one incorrect or $-1, -0.5, 0, 0.5, 1, 1.5, 2$ or $-1, -\frac{1}{2}, 0, \frac{1}{2}, 1, 1\frac{1}{2}, 2$ or $x = -2, 0, 2, 4$ or $x = -1, 0, 1, 2$

Q	Answer	Mark	Comments
17(a)	$24 \div 3 (\times 2)$ or $8 (\times 2)$ or 16	M1	
	40	A1	
	Additional Guidance		
	24 : 16		M1A0
17(b)	3 : 1	B1	oe any ratio where the first number is three times the second
	Additional Guidance		
	$\frac{3}{4} : \frac{1}{4}$ or $\frac{75}{100} : \frac{25}{100}$ or (0).75 : (0).25 or 6 : 2 etc		B1
	Do not allow the ratio reversed, eg 1 : 3		B0
18(a)	$(x + 8)(x - 2)$ or $(x - 2)(x + 8)$	B2	B1 for $(x + a)(x + b)$ where $a + b \neq 0$ and $a + b = 6$ or $ab = \pm 16$
	Additional Guidance		
	Ignore attempts to 'solve' the expression as an equation		
18(b)	$(x + 4)(x - 4)$ or $(x - 4)(x + 4)$	B1	
	Additional Guidance		
	Accept $(4 + x)(x - 4)$ or $(4 + x)(-4 + x)$ or $(x + 4)(-4 + x)$		
18(c)	$\frac{4}{x+3}$ or $\frac{4}{3+x}$	B1	Accept $\frac{4}{(x+3)}$ or $\frac{4}{(3+x)}$

Q	Answer	Mark	Comments												
19(a)	$\frac{7}{11}$ on Pink for bag A or $\frac{5}{8}$ on top Pink for bag B	B1	oe fractions, decimals or percentages for all probabilities $\frac{7}{11} = 0.\dot{6}\dot{3}$ or 63.63% $\frac{5}{8} = 0.625$ or 62.5%												
	All probabilities for bag A and B correct	B1	Withhold first appropriate mark if rounded values are used.												
	At least one combined probability correct for their probabilities	B1ft	Fully correct answer is												
	All combined probabilities correct for their probabilities	B1ft	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Bag A</th> <th style="text-align: left;">Bag B</th> <th style="text-align: left;">Probability</th> </tr> </thead> <tbody> <tr> <td>$\frac{7}{11}$</td> <td>$\frac{5}{8}$</td> <td>$\frac{20}{88}$</td> </tr> <tr> <td></td> <td>$\frac{3}{8}$</td> <td>$\frac{21}{88}$</td> </tr> <tr> <td></td> <td>$\frac{5}{8}$</td> <td>$\frac{35}{88}$</td> </tr> </tbody> </table>	Bag A	Bag B	Probability	$\frac{7}{11}$	$\frac{5}{8}$	$\frac{20}{88}$		$\frac{3}{8}$	$\frac{21}{88}$		$\frac{5}{8}$	$\frac{35}{88}$
	Bag A	Bag B	Probability												
$\frac{7}{11}$	$\frac{5}{8}$	$\frac{20}{88}$													
	$\frac{3}{8}$	$\frac{21}{88}$													
	$\frac{5}{8}$	$\frac{35}{88}$													
Additional guidance															
The third and fourth marks should not be awarded to a probability less than or equal to 0 or greater than or equal to 1															
19(b)	$\frac{41}{88}$	B1ft	oe fraction, decimal or percentage ft their probabilities												
	Additional Guidance														
For ft, both of the probabilities to be added, and the answer, must be greater than 0 and less than 1															
20	2.4×10^{-2}	B2	B1 24×10^{-3} or 0.024 SC1 2.4×10^n , where n is an integer												
21(a)	0.85	B1													

Q	Answer	Mark	Comments
21(b)	Alternative method 1		
	$\frac{11}{12} - \text{their } \frac{17}{20}$	M1	
	$\frac{110}{120} - \frac{102}{120}$	M1	Common denominators with at least one numerator correct 0.31 $\dot{6}$ chosen in (a) leads to $\frac{55}{60}$ and $\frac{19}{60}$ 0.850 $\dot{6}$ chosen in (a) leads to $\frac{50875}{55500}$ and $\frac{47212}{55500}$ 0.91 chosen in (a) leads to $\frac{275}{300}$ and $\frac{273}{300}$
	$\frac{8}{120}$ or $\frac{6}{90}$ or $\frac{4}{60}$ or $\frac{2}{30}$ or $\frac{1}{15}$	A1	oe fraction
	Alternative method 2		
	$10x = 0.\dot{6}$	M1	$100x = 6.\dot{6}$
	$9x = 0.6$ or $90x = 6$	M1	$99x = 6.6$ or $990x = 66$
	$\frac{8}{120}$ or $\frac{6}{90}$ or $\frac{4}{60}$ or $\frac{2}{30}$ or $\frac{1}{15}$	A1	oe fraction
	Alternative method 3		
	$0.\dot{6} = \frac{2}{3}$	M1	
	$\frac{2}{3} \div 10$	M1	
	$\frac{8}{120}$ or $\frac{6}{90}$ or $\frac{4}{60}$ or $\frac{2}{30}$ or $\frac{1}{15}$	A1	

Q	Answer	Mark	Comments
22	$G = \frac{k}{\sqrt{H}}$ or $3 = \frac{k}{\sqrt{25}}$ or $3 = \frac{k}{5}$	M1	oe
	$k = 15$	A1	
	$G = \frac{15}{\sqrt{H}}$	Q1ft	oe $G\sqrt{H} = 15$ Strand (i) Correct notation for a proportion equation ft their value of k with M1 scored

Q	Answer	Mark	Comments
23	Alternative method 1		
	$\frac{6 + \sqrt{48}}{\sqrt{12}} \times \frac{\sqrt{12}}{\sqrt{12}}$	M1	
	$\frac{6\sqrt{12} + \sqrt{48}\sqrt{12}}{12}$	M1	
	$\frac{6\sqrt{4}\sqrt{3} + \sqrt{4}\sqrt{12}\sqrt{12}}{12}$	M1	
	$2 + \sqrt{3}$ or $a = 2, b = 3$	A1	SC1 $\sqrt{48} = 2\sqrt{12}$ or $4\sqrt{3}$ or $\sqrt{12} = 2\sqrt{3}$
	Alternative method 2		
	$\frac{6\sqrt{12}}{\sqrt{12}\sqrt{12}} + \frac{\sqrt{48}}{\sqrt{12}}$	M1	
	$\frac{6\sqrt{12}}{12} + \sqrt{4}$	M1	
	$\frac{6\sqrt{4}\sqrt{3}}{12} + 2$	M1	
	$2 + \sqrt{3}$ or $a = 2, b = 3$	A1	SC1 $\sqrt{48} = 2\sqrt{12}$ or $4\sqrt{3}$ or $\sqrt{12} = 2\sqrt{3}$
	Alternative method 3		
	$\frac{6 + \sqrt{16}\sqrt{3}}{\sqrt{4}\sqrt{3}}$ or $\frac{6 + 4\sqrt{3}}{2\sqrt{3}}$	M1	
	$\frac{3 + 2\sqrt{3}}{\sqrt{3}}$	M1	
$\frac{3 + 2\sqrt{3}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$	M1		
$2 + \sqrt{3}$ or $a = 2, b = 3$	A1	SC1 $\sqrt{48} = 2\sqrt{12}$ or $4\sqrt{3}$ or $\sqrt{12} = 2\sqrt{3}$	
continued on the next page			

Q	Answer	Mark	Comments
23 cont	Alternative method 4		
	$\frac{\sqrt{36} + \sqrt{48}}{\sqrt{12}}$	M1	
	$\frac{\sqrt{3}\sqrt{12} + \sqrt{4}\sqrt{12}}{\sqrt{12}}$	M1	
	$\sqrt{3} + \sqrt{4}$	M1	
	$2 + \sqrt{3}$ or $a = 2, b = 3$	A1	SC1 $\sqrt{48} = 2\sqrt{12}$ or $4\sqrt{3}$ or $\sqrt{12} = 2\sqrt{3}$
	Alternative method 5		
	$\frac{6}{\sqrt{12}} + \sqrt{4}$	M1	
	$\frac{6\sqrt{12}}{12} + \sqrt{4}$	M1	
	$\frac{6 \times 2\sqrt{3}}{12} + 2$	M1	
	$2 + \sqrt{3}$ or $a = 2, b = 3$	A1	SC1 $\sqrt{48} = 2\sqrt{12}$ or $4\sqrt{3}$ or $\sqrt{12} = 2\sqrt{3}$
	Additional Guidance		
In each scheme, an equivalent process at each stage should be awarded the mark; eg, rationalising a denominator should be awarded one mark.			

Q	Answer	Mark	Comments
24	Alternative method 1		
	$a^2x^2 + axy + axy + y^2$ or $a^2x^2 - axy - axy + y^2$ (inside bracket) or $- a^2x^2 + axy + axy - y^2$ (with bracket removed)	M1	Condone ax^2 for a^2x^2 for this mark only
	$a^2x^2 + axy + axy + y^2 - (a^2x^2 - axy - axy + y^2)$ or $a^2x^2 + axy + axy + y^2 - a^2x^2 + axy + axy - y^2$	M1	
	$2axy + 2axy$ or $2axy - (-2axy)$	A1	
	$4axy$ with all brackets and expressions correctly presented	Q1	Strand (ii) Full and correct algebraic proof
	Alternative method 2		
	$(ax + y + ax - y)(ax + y - ax + y)$	M1A1	Allow two sign errors for M1
	$2ax \times 2y$	A1	
	$4axy$ with all brackets and expressions correctly presented	Q1	Strand (ii) Full and correct algebraic proof
	Additional Guidance		
$axy + axy$ can be written as $2axy$ at any stage			