



**General Certificate of Secondary Education
November 2012**

**Mathematics (Linear) B
Paper 1
Higher Tier**

4365

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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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.

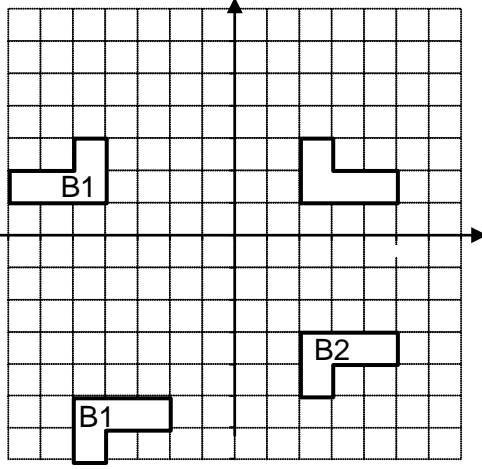
- M** Method marks are awarded for a correct method which could lead to a correct answer.
- M dep** A method mark dependent on a previous method mark being awarded.
- A** Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
- B** Marks awarded independent of method.
- B dep** A mark that can only be awarded if a previous independent mark has been awarded.
- Q** Marks awarded for quality of written communication. (QWC)
- 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.

Paper 1 Higher Tier

Q	Answer	Mark	Comments
1(a)	64	B1	
1(b)	116	B1	
1(c)	Corresponding	B1	
2(a)	Fills in totals on grid for at least 3 correct 9s	M1	
	9	A1	
Alt 2(a)	Identifies 9 as most likely total eg (1, 8), (2, 7), (7, 2) etc.. for at least 3 totals	M1	
	9	A1	8/64 is A0 even if 9 stated
2(b)	Fills in 4, 5 or 6 correct totals on grid for 2, 3, 15 and 16	M1	Identifies at least 4 of (1, 1), (1, 2), (2, 1), (7, 8), (8, 7) or (8, 8) with no wrong pairs. Need not be as a bracket, 1 + 1 is OK for example. Totals need not be seen.
	Denominator of 64 or numerator of 6	M1	64 choices identified
	$\frac{6}{64}$	A1	Any equivalent fraction, decimal (0.9375) or percentage to $\frac{6}{64}$ is M2, A1
Alt 2(b)	$\frac{1}{8} \times \frac{1}{8}$	M1	
	$6 \times \frac{1}{8} \times \frac{1}{8}$	M1	oe
	$\frac{6}{64}$	A1	oe

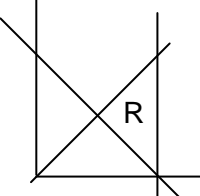
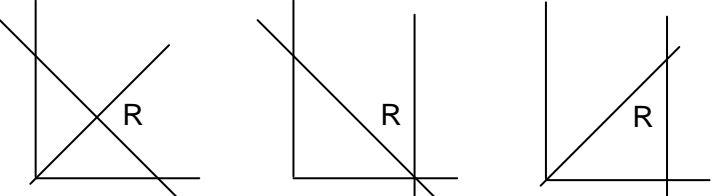
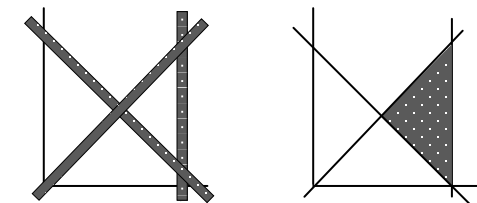
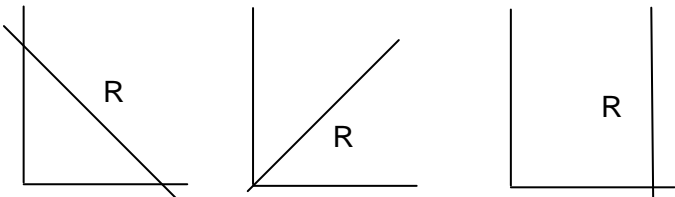
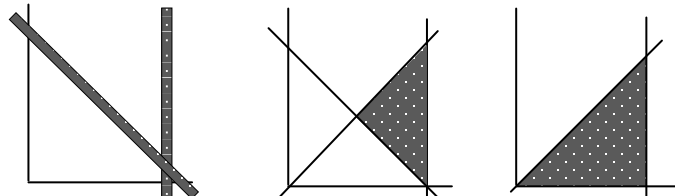
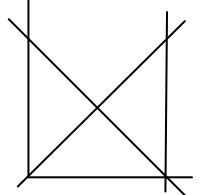
Q	Answer	Mark	Comments
3	Fully labelled diagram with angles Half-Marathon 90° 5K 126° 10K 72° Marathon 72° tolerance ± 2° for drawing	B4	B3 Angles correct but not labelled or wrongly labelled or angles correctly calculated and labelled but wrongly drawn. Part Marks to maximum of 3 B1 Half Marathon 90° and labelled B1 10K and Marathon equal angles or equal angles stated but drawn wrongly and labelled. B1 5K 126° and labelled The following only to be awarded if nothing drawn, or if working scores more than the diagram. B1 Working to show each angle for women = 18°. B1 all correct numbers of women in each category calculated, ie 5 for HM, 7 for 5K, 4 each for 5K and M.

4(a)	Translation and 7 right, 2 down or $\begin{pmatrix} 7 \\ -2 \end{pmatrix}$	B2	B1 Translation B1 7 right or $7 \rightarrow$ or $\begin{pmatrix} 7 \\ y \end{pmatrix}$ B1 2 down $2 \downarrow$ or $\begin{pmatrix} x \\ -2 \end{pmatrix}$ B1 $\begin{pmatrix} -7 \\ 2 \end{pmatrix}$ or $\begin{pmatrix} -2 \\ 7 \end{pmatrix}$ or $(7, -2)$
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4(b)		B2	B1 For reflection of shape B in $x = -1$ B1 for reflection of shape A in $y = -1$ B1 for reflection of B in the bottom right quadrant, including reflection in the x -axis.
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Q	Answer	Mark	Comments
5	$9x - 4x$ or $17 + 3$	M1	
	$5x = 20$	A1	
	4	A1ft	ft On one error
6(a)	$7(x - 3)$	B1	
6(b)	$4y + 36$	B1	
7	$5x - 15 - 2x + 2$	M1	Attempt to expand both brackets to 4 terms with at least 3 correct
	$5x - 15 - 2x + 2$	A1	A1 if fully correct
	$3x - 13$	A1ft	ft on one error
8(a)	Evidence that 1 in 150 compared to 1 in 120 eg diagram or comparison of fractions 1 in 120	B1	
	1 in 120 or right side given as answer with some justification	Q1	Strand (ii)
8(b)	$2.5 \div 100$ or $100 \div 2.5$	M1	0.025
	(1 in) 40	A1	
Alt 8(b)	5×1 in 200	M1	oe
	(1 in) 40	A1	
9	$6x + 2x + 6x + 2x (=16x)$	M1	
	Their $16x = 24$	M1dep	$8x = 12$ is M2
	1.5	A1	oe SC1 $14x = 24$ leading to $x = 24/14$ oe

Q	Answer	Mark	Comments
Alt 9	Guess a value and multiplies correctly by 16	M1	$x = 1$ gives 16 $x = 2$ gives 32
	Guesses a second value nearer to or bracket the correct answer and multiplies correctly by 16	M1dep	
	1.5 (oe) or 9 after 1.5 seen	A1	oe

10	<p>3 marks</p> <p>All lines correct, drawn dashed/solid R marked</p>			
	<p>2 marks</p> <p>R marked correct relative to two correct, drawn dashed/solid lines 3rd line incorrect or missing</p>			
	<p>2 marks</p> <p>All lines correct, drawn dashed/solid</p>			
	<p>1 mark</p> <p>R marked correct relative to one correct, dashed/solid line other lines incorrect or missing</p>			
	<p>1 mark</p> <p>Two lines correct drawn dashed/solid</p>			
	<p>1 mark</p> <p>All lines correct, drawn dashed/solid No shading R not marked</p>			

Q	Answer	Mark	Comments
11(a)	(Angle $ADB =$) $90 - 50$ or $180 - (90 + 50)$ ($=40$)	M1	May be on diagram. Accept $D = 40$ or obtuse angle at D marked or labelled as 140.
	$(180 - \text{Their } CDB) \div 2$ or their $ADB \div 2$	M1dep	Their CDB must be from $180 -$ their ADB Must be complete method
	20	A1	May be on diagram
Alt 11(a)	$50 + y + y = 90$	M1	oe $90 + 50 + y + y = 180$
	$2y = 40$	M1	$y = (180 - 140) \div 2$
	20	A1	
11(b)	(tri) Angle in semi-circle ($= 90^\circ$) or (tri) Angle on diameter is 90°	Q1	Strand (i)
12(a)	2.5 or $\frac{5}{2}$	B1	oe accept $1 : 2.5$ or $2 : 5$ Incorrect cancelling of $15/6$ is B0.
12(b)	60	B1	
12(c)	$20 \div \text{their } 2.5, \frac{6 \times 20}{15}$	M1	oe eg $AB \times \text{their } 2.5 = 20$ ft from their (a)
	8	A1ft	Accuracy to 1 dp or better
13(a)	27	B1	
13(b)	Comparison 1 on median	B1	eg length are about same as medians are similar. Greenhouse cucumbers are longer on average/as they have a higher median.
	Comparison 2 on interquartile range or range	B1	Greenhouse cucumbers are more consistent as range (or IQR) smaller. Garden cucumbers are more varied as range (or IQR) larger.
	Use of relevant values from both box plots for at least one comment. Medians 28 and their 27 IQR 11 and 15 Range 26 and 33	B1dep	eg medians are 1cm different Greenhouse cucumbers are more consistent with an IQR of 11 compared to 15

Q	Answer	Mark	Comments						
14(a)	$(x - 3)(x + 3)$	B1							
14(b)	$(ax \pm c)(bx \pm d)$	M1	$ab = 2, cd = \pm 3$						
	$(2x + 1)(x - 3)$	A1							
	$\frac{x + 3}{2x + 1}$	A1ft	ft their (a) and factorisation of the denominator providing there is a common factors that can be cancelled Contradictory further work award A0.						
15(a)	4.5 or 7.5 or 5.5 as lower limit	B1							
	$\frac{1}{2} \times (\text{their } 4.5 + \text{their } 7.5) \times \text{their } 5.5$ $\frac{1}{2} \times (4.5 + 7.5) \times 6$	M1	Only award if consistent use of an 'lower limit', eg $\frac{1}{2} \times (4.9 + 7.9) \times 5.9$						
	33	A1ft	ft on a consistent use for all 3 values of a sensible lower limit $> .5$ and given to at least 3 sf. [Unlikely as this is a non-calc paper] For example .. .6 34.16 .. .9 37.76 .. .95 38.3775 whole numbers 4, 7, 5 lead to 27.5						
15(b)	2A as numerator	B1							
	$a + b$ as part of denominator	B1	$h =$ is not essential						
16	<table border="1"> <thead> <tr> <th>Office staff</th> <th>Drivers</th> <th>Mechanics</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>5</td> <td>1</td> </tr> </tbody> </table>	Office staff	Drivers	Mechanics	2	5	1	B3	B2 for two correct B2 for 1 correct and total of 8 The following for a maximum of 1 B1 for total of 8 B1 for 1 correct B1 for $12 \div 5$ or $24 \div 5$ or $4 \div 5$ B1 for 2.4, 4.8 or 0.8 seen
Office staff	Drivers	Mechanics							
2	5	1							

Q	Answer	Mark	Comments
17	$2\sqrt{3}$ or $5\sqrt{3}$ seen	M1	
	$7\sqrt{3}$	A1	
18	B1 for $64^{\frac{1}{3}} = 4$ B1 for $4^{\frac{3}{2}} = 8$ B1 for $27^{\frac{2}{3}} = 9$	B3	
19	$\frac{1}{3} \times \frac{1}{2} \times x \times x \times 2x$ or $\frac{1}{3} \times \frac{1}{2} \times CB \times DB \times AB$ (2 BC)	M1	$\frac{1}{2} \times x \times x \times 2x = 24$ is M1 by implication.
	$x^3 = 216$	M1	
	6	A1	6 from T&I is 3 marks 6 without verification or working is 1 mark.
20	$(x - 2)$ or $(x - 4)$	M1	$(x + 2)$ and $(x + 4)$
	$(x - 2)(x - 4)$	M1dep	$(x + 2)(x + 4)$
	Evidence that brackets are expanded, ie $(x^2 - 2x - 4x +)$ 8 or that the product of constant terms is taken.	M1dep	Dependent on $(x - 2)(x - 4)$
	8	A1	But not from $(x + 2)(x + 4)$ SC2 Answer only of 8. Minimum working for full marks is $-2 \times -4 = 8$

Q	Answer	Mark	Comments
Alt 1 20	$0 = 2^2 + 2a + b$ or $0 = 4^2 + 4a + b$	M1	oe eg $-4 = 2a + b$
	Evidence that variable is eliminated eg $2a + 12 = 0$	M1dep	Evidence of balancing a eg $0 = 8 + 4a + 2b$
	Evidence of substituting back into an equation eg $0 = 4 + -12 + b$	M1dep	Dependent on second M1 only. Subtracting equations to eliminate a
	8	A1	