

General Certificate of Secondary Education November 2012

Mathematics (Linear) B Paper 1 Higher Tier

Final

Mark Scheme

4365

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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	
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	
		<u>6</u> 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	
	$6 imes rac{1}{8} imes rac{1}{8}$	M1	ое
	$\frac{6}{64}$	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)	Translationand7 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 $(7, -2)$
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 <i>x</i> -axis.

Q	Answer	Mark	Comments
5	9x - 4x or $17 + 3$	M1	
	5 <i>x</i> = 20	A1	
	4	A1ft	ft On one error
6(a)	7(x-3)	B1	
U(u)			
6(b)	4 <i>y</i> + 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
	3 <i>x</i> – 13	A1ft	ft on one error
8(a)	Evidence that 1 in 150 compared to 1 in 120	B1	
	eg diagram or comparison of fractions 1 in 120		
	1 in 120 or right side given as answer with some justification	Q1	Strand (ii)
8(b)	2.5 ÷ 100 or 100 ÷ 2.5	M1	0.025
	(1 in) 40	A1	
L	<u> </u>		
Alt 8(b)	5 × 1 in 200	M1	oe
0(0)	(1 in) 40	A1	
9	6x + 2x + 6x + 2x (=16 x)	M1	
	Their $16x = 24$	M1dep	8 <i>x</i> = 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	ое
10	3 marks All lines correct, drawn dashed/solid R marked		R
	2 marks R marked correct relative to two correct, drawn dashed/solid lines 3rd line incorrect or missing		R R R
	2 marks All lines correct, drawn dashed/solid		
	1 mark R marked correct relative to one correct, dashed/solid line other lines incorrect or missing	R	R
	1 mark Two lines correct drawn dashed/ solid		
	1 mark All lines correct, drawn dashed/solid No shading R not marked		

IQR 11 and 15

Range 26 and 33

•	A	Maria	Commonto
Q	Answer	Mark	Comments
11(a)	(Angle <i>ADB</i> =) 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 – Their <i>CDB</i>) ÷ 2 or their <i>ADB</i> ÷ 2	M1dep	Their <i>CDB</i> must be from 180 – their <i>ADB</i> Must be complete method
	20	A1	May be on diagram
Alt	50 + y + y = 90	M1	oe 90 + 50 + <i>y</i> + <i>y</i> = 180
11(a)	2 <i>y</i> = 40	M1	$y = (180 - 140) \div 2$
	20	A1	
11(b)	(tri) Angle in semi-circle (= 90°) 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 ÷ their 2.5, $\frac{6 \times 20}{15}$	M1	oe eg AB \times 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	B1dep	eg medians are 1cm different Greenhouse cucumbers are more consistent with an IQR of 11 compared to

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.
(-())		5.	
15(a)	4.5 or 7.5 or 5.5 as lower limit	B1	
	$rac{1}{2}$ × (their 4.5 + their 7.5) × their 5.5	M1	Only award if consistent use of an 'lower
	$\frac{1}{2} \times (4.5 + 7.5) \times 6$		limit', eg $\frac{1}{2}$ × (4.9 + 7.9) × 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	÷				B3	B2 for two correct
		Office staff	Drivers	Mechanics	20	
			-			B2 for 1 correct and total of 8
		2	5	1		The following for a maximum of 1
						B1 for total of 8
						B1 for 1 correct
						B1 for 12 ÷ 5 or 24÷ 5 or 4 ÷ 5
						B1 for 2.4, 4.8 or 0.8 seen

Q	Answer	Mark	Comments	
17	2√3 or 5√3 seen	M1		
	7√3	A1		
18 1 B3				

18	B1 fFor $64^{\frac{1}{3}} = 4$	B3	
	B1 for $4^{\frac{3}{2}} = 8$		
	B1 for $27^{\frac{2}{3}} = 9$		

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 contant 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	$0 = 2^2 + 2a + b$ or $0 = 4^2 + 4a + b$	M1	oe eg $-4 = 2a + b$
20	Evidence that variable is eliminated eg $2a + 12 = 0$	M1dep	Evidence of balancing $a \text{ eg } 0 = 8 + 4a + 2b$
	Evidence of substituting back into an equation eg $0 = 4 + -12 + b$	M1dep	Dependent on second M1 only. Subtracting equations to eliminate <i>a</i>
	8	A1	