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Mark Scheme (Results)

March 2013

GCSE Mathematics (Linear) 1MA0
Higher (Non-Calculator) Paper 1H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

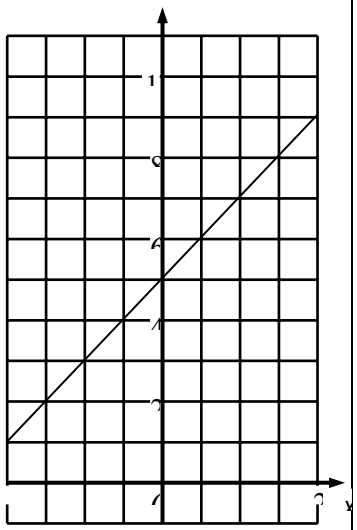
13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		183 × 47 1281 7320 8601 **or** | | 1 | 8 | 3 | × | | | 4 | 3 2 | 1 2 | 4 | | 8 | 7 | 5 6 | 2 1 | 7 | | | 6 | 0 | 1 | | **or** | 100 | 80 | 3 | | | 4000 | 3200 | 120 | 40 | | 700 | 560 | 21 | 7 | 4000 + 3200 +120 + 700 + 560 + 21 = 8601 **or** 183 × 100 = 18 300 183 × 50 = 18 300 ÷ 2 =9150 183 × 3 = 549 9150 – 549 = 8601	86.01	3	M1 for a complete method to multiply 183 by 47 and attempt at addition (condone one multiplication error) A1 for digits 8601 given as the answer B1 (dep on M1) for correctly writing their answer to 2 decimal places

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
2	(a)	Plot (2, 250) and (3.1, 190)	Plot points	1	B1 for both points plotted accurately
	(b)		Relationship	1	B1 for "As the distance from the centre increases the monthly rent decreases" or the nearer you are to the centre the more you have to pay oe (accept negative correlation)
	(c)		200 to 260	2	M1 for attempting a correct method, eg a line of best fit **or** any other indication, on a line that could be used as a line of best fit eg line to graph at $x = 2.8$or a mark on the line at 2.8 A1 for value in the range 200 to 260
3	(a)		2 reasons	2	B2 for 2 different reasons from given examples (B1 for 1 reason from given examples) eg No time frame eg No box for less than £10 accept no box for zero or none or £0 eg Overlapping intervals or boxes or £30 and/ or £50 in two boxes
	(b)		1 reason	1	C1 for reason why the sample is biased eg • they are **only** in the CD store, • the people in the store are more likely to buy CDs • she needs to ask people outside the store oe

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)	<table><tr><td>***x***</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>***y***</td><td>(1)</td><td>3</td><td>(5)</td><td>7</td><td>9</td></tr></table>	3, 7, 9	2	B2 for all three values correct in the table (B1 for 2 values correct)
	(b)		graph of $y = 2x + 5$	2	**(From their table of values)** M1 ft for plotting at least 2 of their points (any points from their table must be correctly plotted) A1 for correct line from $x = –2$ to $x = +2$ **(Use of $y = mx + c$)** M1 for line drawn with gradient of 2 **or** line drawn with a y intercept of 5 **and** a positive gradient) A1 for correct line from $x = –2$ to $x = +2$

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		$6n - 3$	2	M1 for attempt to establish linear expression in n with coefficient of 6 e.g. $6n + k$ where k is an integer (accept $n = 6n - 3$ for one mark) A1 cao
	(b)		No + Reason	1	C1 ft from their answer to part (a) for decision and explanation eg " stating no and because all the terms in the sequence are odd **and** 150 is even" **or** "no and '$6n - 3$' = 150, $n = 153/6$ ... so n is not an integer" **or** Continuing the sequence to show terms 147 **and** 153 and state "no as 150 is not in the sequence" oe

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
6	(a)		8	1	B1 for 8 (.00)
	(b)		550	4	M1 for 600 – 200 (= 400) M1 for correct method to convert '$400' to £ M1 (dep on the previous M1) for 800 – '$400' in £s A1 for value in the range 540 –560 **OR** M1 for correct method to convert $600 **and** $200 to pounds M1 for '375'–'125' M1 (dep on the previous M1) 800 –'250' A1 for a value in the range 540-560 **OR** M1 for correct method to convert £800 to dollars M1 for '1280' + 200 – 600 M1 (dep on the previous M1) for attempt to convert '$880' back to £ A1 for value in the range 540 – 560
7	(a)		$6x - 3y$	2	M1 for an attempt to combine terms in x **or** terms in y correctly eg $5x + x(= 6x)$, $4y - 7y(= -3y)$ A1 for $6x - 3y$ oe
	(b)	$7x + 14 = 7$ or $x + 2 = 1$ $7x = -7$	$x = -1$	2	M1 for correctly expanding the bracket or an attempt to divide both sides by 7 e.g. $7x + 14$ or $x + 2 = 7 \div 7$ oe A1 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8			09 36	3	M1 for listing 9, 18, 27, 36, 45, ...(at least 3 correct multiples with at most one incorrect) M1 for listing 12, 24, 36, 48, ... (at least 3 correct multiples with at most one incorrect) A1 for 09 36 or 9 36 (am) **OR** M1 for listing 9.09 9.18 9.27 9.36 ...(at least 3correct times with at most one incorrect) M1 for listing 9.12 9.24 9.36 ... (at least 3 correct times with at most one incorrect) A1 for 09 36 or 9 36 (am) **OR** M1 for $9 = 3 \times 3$ **or** $12 = 2 \times 2 \times 3$ (could be in factor tree) M1 for $9 = 3 \times 3$ **and** $12 = 2 \times 2 \times 3$ (could be in a factor tree) A1 for 09 36 or 9 36 (am) **SC B2** for 9 36 pm or (after) 36 (minutes) on the answer line
9	(a)		a^9	1	B1 for a^{4+5} or a^9
	(b)		$9e^5f^6$	2	B2 cao (B1 for two of 9, e^{6-1}, f^{8-2} as a product)
	(c)		3	1	B1 (accept ± 3 but not just –3)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*10		Angle *AED* = 38 alternate angles are equal Angle *ADE* = (180 – 38) ÷ 2 = 71 *x* = 180 – 71 base angles of an isosceles triangle are equal angles in a triangle add up to 180 angles on a straight line sum to 180 **OR** angle *AEF* = 142 allied angles/co-interior angles add up to 180 *ADE* = 142 ÷ 2 = 71 base angles of an isosceles triangle are equal exterior angle of a triangle is equal to the sum of the interior opposite angles , *x* = 180 – 71 angles in a straight line add to 180 **OR** Angle *AED* = 38 alternate angles are equal for angles *BAE* and *AED* **and** *BAD* and *ADC* (*x*) Angle *DAE*= (180 – 38) ÷ 2 = 71 base angles of an isosceles triangle are equal angles in a triangle add up to 180 **Or** Angle *AED* = 38 alternate angles are equal Angle *ADE* = (180 – 38) ÷ 2 = 71 base angles of an isosceles triangle are equal and angles in a triangle sum to 180 *x* = 38 + 71 alternate angles *BAD* and *ADC*(*x*) are equal	*x* = 109	4	B1 for angle *AED* = 38 or *AEF* = 142 M1 for a complete method to find one of the base angles of the isosceles triangle C2 (dep M1) for *x* = 109 with complete reasons (C1 (dep M1) for one reason correctly used and stated)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11			730	5	M1 for $\frac{5}{100}\times 200$ (= 10) oe M1 for $\frac{10}{100}\times 350$ (= 35) oe M1 for 6 × '10' **or** 4 × '35' M1 (dep on M1 earned for a correct method for a percentage calculation) for "60" + "140"+ 530 A1 cao **Or** M1 for 6 × 200 (= 1200) or 4 × 350 (= 1400) M1 for $\frac{5}{100}\times "1200" (=60)$ oe M1 for $\frac{10}{100}\times "1400" (=140)$ oe M1(dep on M1 earned for a correct method for a percentage calculation) for "60" + "140"+ 530 A1 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12			240	4	M1 for 16 × 2 (= 32 girls) M1 for 16 + '16 × 2' (= 48) M1 (dep on the previous M1) for (16 + '32')× 5 **or** (16 + '32') × (4 + 1) A1 cao OR M1 for 1 : 2 = 3 parts M1 for 5 schools × 3 parts (= 15 parts) M1 (dep on the previous M1) for '15' parts × 16 A1 cao **SC B2** for 176 given on the answer line
13			54	3	M1 for 180 – 360 ÷ 5 **or** 108 seen as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao **OR** M1 for 180 × (5 – 2) (= 540) ÷ 5 or 108 given as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)		8, 23, 53, 70, 77, 80	1	B1 cao
	(b)		graph	2	M1 ft from their table for at least 5 points plotted correctly at the ends of the intervals provided table values are cumulative, condoning one arithmetic error A1 cao for correct graph with points joined by curve or straight line segments [SC B1 if the shape of the graph is correct and 5 points of their points are **not** at the ends but consistently within each interval **and** joined.]
	(c)	Readings at 60 and 20 420 to 440 – 280 to 295	120 – 160	2	M1 (dep on cf graph) for use of either cf = 20 or cf = 60 A1 ft from a cf graph
	(d)	80 – 71 to 74	6 – 9	2	M1 (dep on cf graph) for evidence of reading off the cf axis from £530 0n the wages axis (could be the answer) A1ft for 6 - 9

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15			Required region	4	M1 arc radius 5 cm centre *C* M1 bisector of angle *BAD* M1 line 3 cm from *DC* A1 for correct region identified (see overlay)
16	(a)		820 000	1	B1 cao
	(b)		3.76×10^{-4}	1	B1 cao
	(c)		5×10^{8}	2	M1 for $2.3 \div 4.6 \times 10^{12-3}$ oe or 500 000 000 or 0.5×10^{9} A1 cao (accept 5.0×10^{8}
17			$\frac{12}{13}$	3	M1 for multiplying throughout by 10 oe or writing LHS as a single fraction e.g $2(4x - 1) + 5(x + 4) = 3\times 10$ or $\frac{2(4x-1)+5(x+4)}{10}$ or $\frac{2(4x-1)}{10} + \frac{5(x+4)}{10}$ M1 (dep) for a complete correct method to obtain linear equation of the form $ax = b$ (condone one arithmetic error in multiplying out the bracket) A1 for $\frac{12}{13}$ oe (decimal equivalent is 0.923…)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18		**Q** at (– 3, 1), (– 6, 1) (–5, 3) (– 3, 3) **R** at (–3, – 1), (–6, – 1), (–5, – 3) (–3, –3)	Rotation 180° about (–1, 0)	3	M1 for showing **R** correctly on the grid without showing **Q or** for showing **Q and R** correctly on the grid A1 for rotation of 180° A1 for (centre) (–1, 0) **Or** M1 for showing **R** correctly on the grid without showing **Q or** for showing **Q and R** correctly on the grid A1 for Enlargement Scale Factor –1 A1 for centre (–1, 0) **NB** Award no marks for any correct answer from an incorrect diagram or any Accuracy marks if more than one transformation is given
19			68	3	M1 for angle $OBC = 90°$ or angle $OAC = 90°$ (may be marked on the diagram or used in subsequent working) M1 for correct method to find angle BOC or AOC or AOB e.g. angle $BOC = 180 – 90 – 34$ (= 56) or angle $AOC = 180 – 90 – 34$ (=56) or angle $AOB = 180 – 2 \times 34$ (= 112) A1 cao **NB** (68 must be clearly stated as an answer and not just seen on diagram)

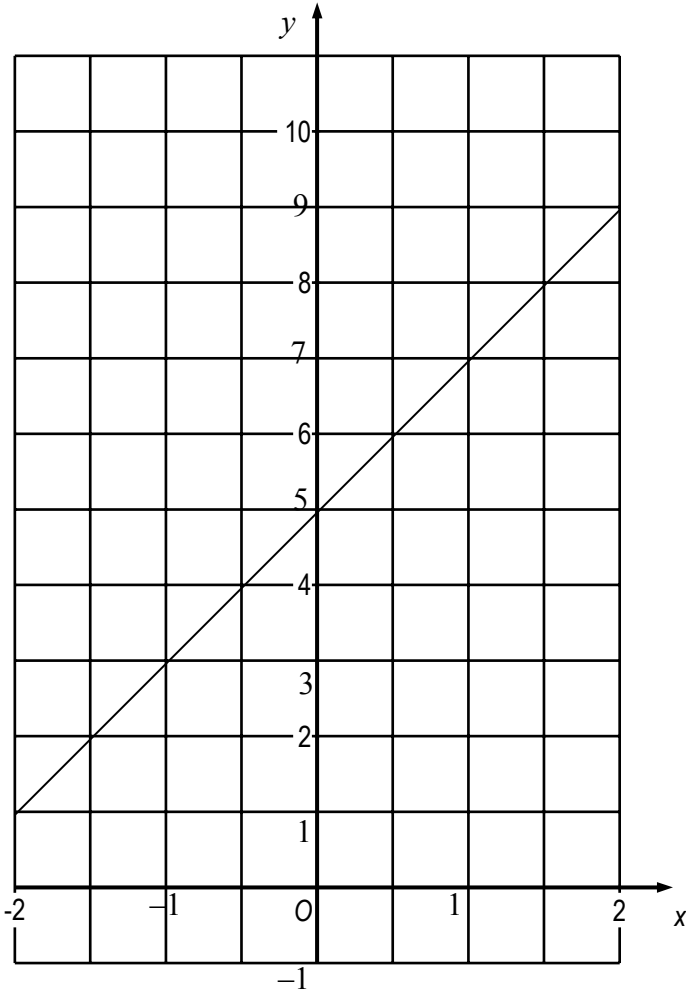
1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20	(a)(i)		$(x - 9)(x - 3)$	3	M1 for $(x \pm 9)(x \pm 3)$ A1 for $(x - 9)(x - 3)$
	(ii)		$x = 9$, $x = 3$		B1 cao
	(b)		$(y + 10)(y - 10)$	1	B1 for $(y + 10)(y - 10)$
*21		$(n + 1)^2 - n^2$ $= n^2 + 2n + 1 - n^2 = 2n + 1$ $(n + 1) + n = 2n + 1$ OR $(n + 1)^2 - n^2$ $= (n + 1 + n)(n + 1 - n)$ $= (2n + 1)(1) = 2n + 1$ $(n + 1) + n = 2n + 1$ OR $n^2 - (n + 1)^2 = n^2 - (n^2 + 2n + 1) = -2n - 1 = -(2n + 1)$ Difference is $2n + 1$ $(n + 1) + n = 2n + 1$	proof	4	M1 for any two consecutive integers expressed algebraically eg n and $n + 1$ M1(dep on M1) for the difference between the squares of 'two consecutive integers' expressed algebraically eg $(n + 1)^2 - n^2$ A1 for correct expansion and simplification of difference of squares, eg $2n + 1$ C1 (dep on M2A1) for showing statement is correct, eg $n + n + 1 = 2n + 1$ and $(n + 1)^2 - n^2 = 2n + 1$ from correct supporting algebra
22		Vertices at (–2, –4), (–4, –4), (–4, –6), (–2, –5)	Correct diagram	3	M1 for a similar shape in the correct orientation in the third quadrant M1 for an image in the correct orientation of the correct size A1 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23			75π	3	M1 for $(4 \times \pi \times 5^2) \div 2$ oe M1 for $\pi \times 5^2$ oe A1 for 75π accept 235.5 Condone the use of $\pi = 3.14\ldots$
24		EE + CC + HH **Or** EC+EH+CE+CH+HE+HC **Or** E,not E+ C,not C + H,not H	$\frac{76}{110}$	5	M1 for use of 10 as denominator for 2nd probability M1 for $\frac{4}{11}\times\frac{3}{10}$ *or* $\frac{5}{11}\times\frac{4}{10}$ *or* $\frac{2}{11}\times\frac{1}{10}$ M1 for $\frac{4}{11}\times\frac{3}{10}+\frac{5}{11}\times\frac{4}{10}+\frac{2}{11}\times\frac{1}{10}\left(=\frac{34}{110}\right)$ M1 (dep on previous M1 for $1 - \text{`}\frac{34}{110}\text{'}$ A1 for $\frac{76}{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $\frac{4}{11}\times\frac{5}{10}$ or $\frac{4}{11}\times\frac{2}{10}$ or $\frac{5}{11}\times\frac{4}{10}$ or $\frac{5}{11}\times\frac{2}{10}$ or $\frac{2}{11}\times\frac{4}{10}$ or $\frac{2}{11}\times\frac{5}{10}$ M2 for $\frac{4}{11}\times\frac{5}{10}+\frac{4}{11}\times\frac{2}{10}+\frac{5}{11}\times\frac{4}{10}+\frac{5}{11}\times\frac{2}{10}+\frac{2}{11}\times\frac{4}{10}+\frac{2}{11}\times\frac{5}{10}$ (M1 for at least 3 of these) A1 for $\frac{76}{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $\frac{4}{11}\times\frac{7}{10}$ *or* $\frac{5}{11}\times\frac{6}{10}$ *or* $\frac{2}{11}\times\frac{9}{10}$ M2 for $\frac{4}{11}\times\frac{7}{10}+\frac{5}{11}\times\frac{6}{10}+\frac{2}{11}\times\frac{9}{10}$ (M1 for two of these added) A1 for $\frac{76}{110}$ oe **PTO for SC's**

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
					SC: B2 for $\frac{76}{121}$ **SC:** B1 for $\frac{4}{11}\times\frac{4}{11}+\frac{5}{11}\times\frac{5}{11}+\frac{2}{11}\times\frac{2}{11}$ $(=\frac{45}{121})$ **Or** $\frac{4}{11}\times\frac{5}{11}+\frac{4}{11}\times\frac{2}{11}+\frac{5}{11}\times\frac{4}{11}+\frac{5}{11}\times\frac{2}{11}+\frac{2}{11}\times\frac{4}{11}+\frac{2}{11}\times\frac{5}{11}$ **Or** $\frac{4}{11}\times\frac{7}{11}+\frac{5}{11}\times\frac{6}{11}+\frac{2}{11}\times\frac{9}{11}$
25	(a)		sketch		M1 for inverting the parabola, so maximum is at (–2, 0) A1 for parabola passing through all three of the points (–2, 0), (0, –4), (–4, –4)
	(b)		$y = f(x - 6)$	1	B1 for $y = f(x - 6)$ or $y = (x - 4)^2$ oe

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)		$6\mathbf{b} - 3\mathbf{a}$	1	B1 for $6\mathbf{b} - 3\mathbf{a}$ oe
	(b)			4	M1 for $\overrightarrow{AX} = \frac{1}{3}\overrightarrow{AB}$ or $\frac{1}{3}$ '$(6\mathbf{b} - 3\mathbf{a})$' or ft to $\mathbf{2}b - a$ M1 for $\overrightarrow{OY} = \overrightarrow{OB} + \overrightarrow{BY} = 6\mathbf{b} + 5\mathbf{a} - \mathbf{b}$ $(= 5\mathbf{b} + 5\mathbf{a})$ oe M1 for $\overrightarrow{OX} = 3\mathbf{a} + $ '$2\mathbf{b} - \mathbf{a}$' $= 2\mathbf{a} + 2\mathbf{b}$ oe **Or** $\overrightarrow{OX} = 6\mathbf{b} - \frac{2}{3}$ '$(6\mathbf{b} - 3\mathbf{a})$' $(= 2\mathbf{a} + 2\mathbf{b})$ oe C1 for $\frac{2}{5}\overrightarrow{OY} = \frac{2}{5} \times 5(\mathbf{a} + \mathbf{b}) = 2(\mathbf{a} + \mathbf{b}) = \overrightarrow{OX}$

4.



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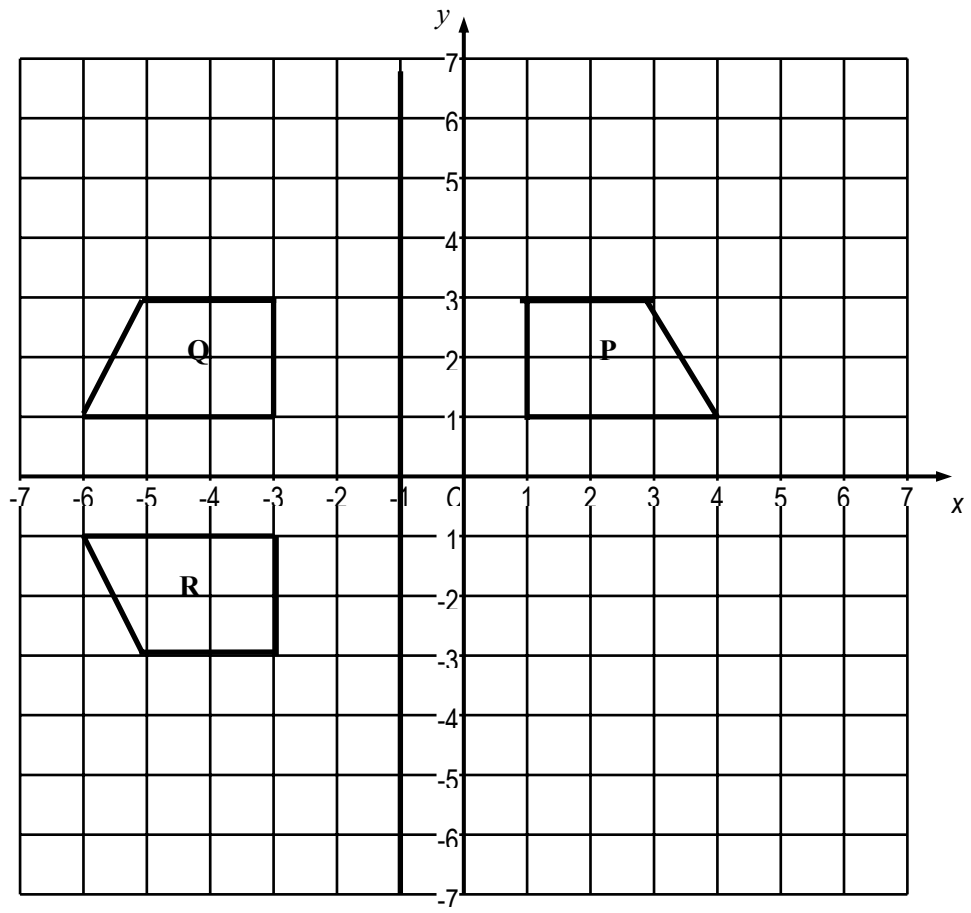

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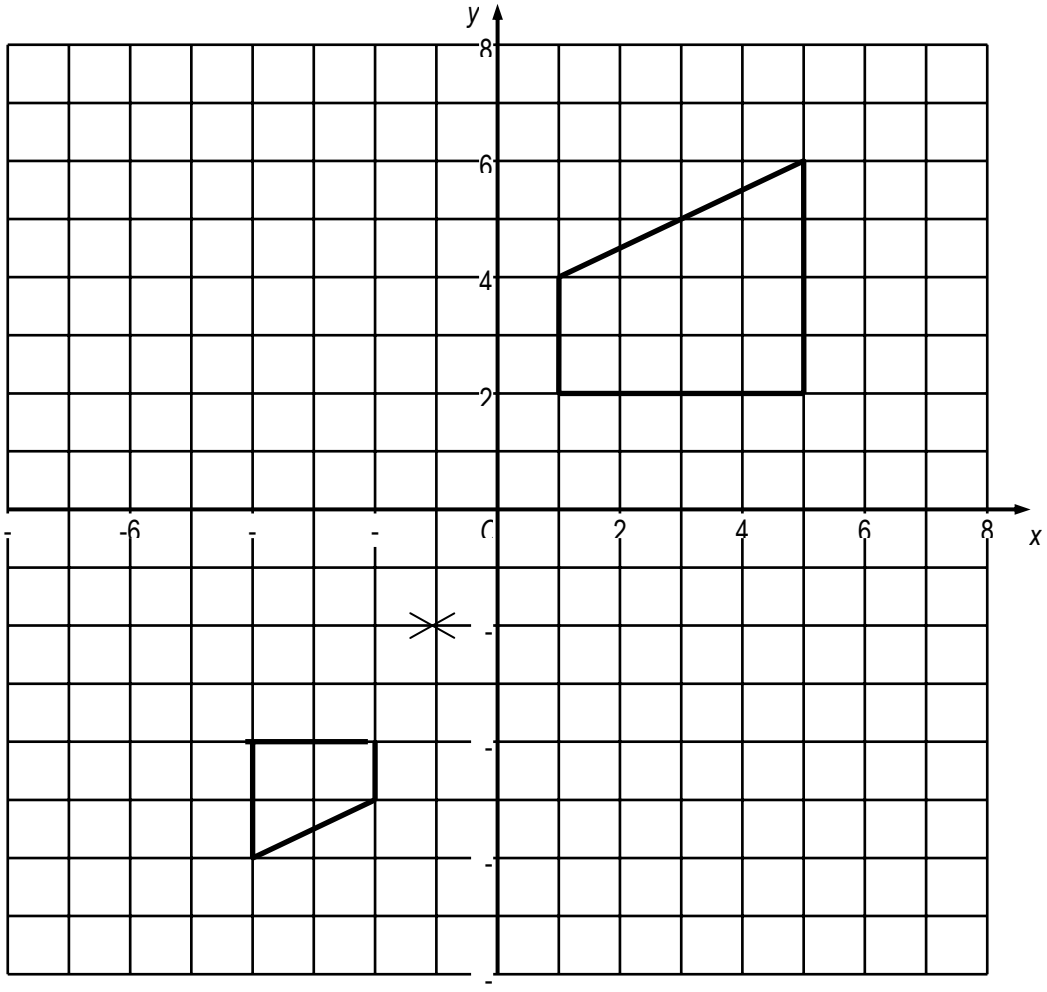
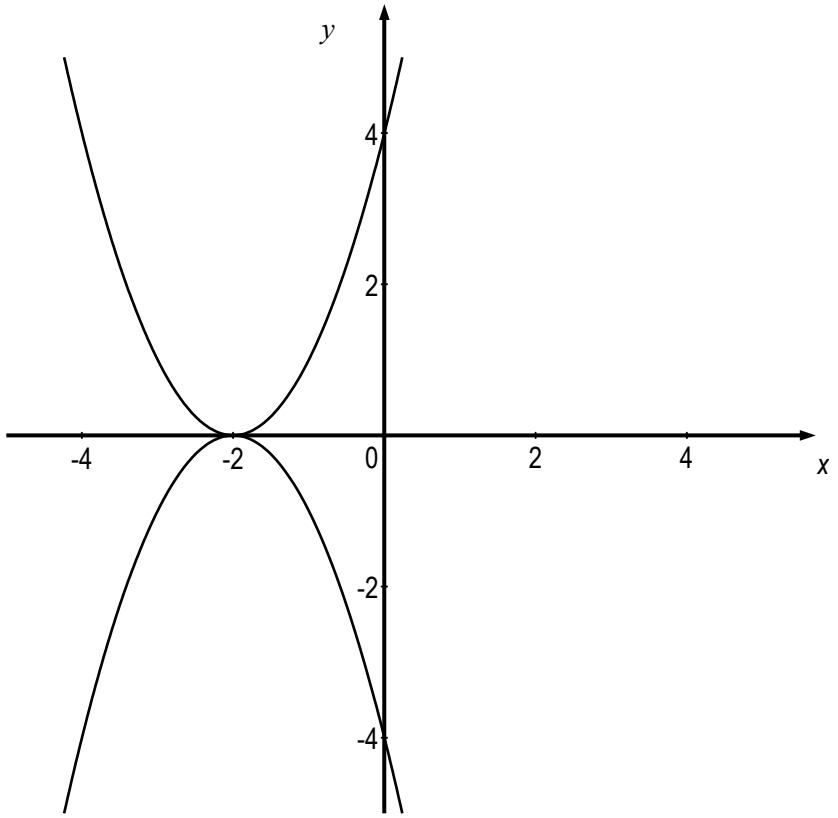


25(a)



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