Name :	Class	Register Number

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DUNEARN SECONDARY SCHOOL
Mid-Year Examination 2014
Mathematics
Paper 1

Secondary 2 Express

Monday **19May 2014** **0800 - 0900** **1 hour**

INSTRUCTIONS TO CANDIDATES

Write your name, class and register number in the spaces at the top of this page.
Answer **all** questions.
Write your answers on the question paper.
All working must be shown. Omission of essential working will result in loss of marks.
Do not use any highlighters, correction fluid or correction tape for the paper.

INFORMATION FOR CANDIDATES

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 40.
The use of an electronic calculator is expected where appropriate.
You are reminded of the need for clear presentation in your answers.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

PARENT'S SIGNATURE

FOR EXAMINER'S USE
40

Setter:**Mrs Yeo Poh Leng**

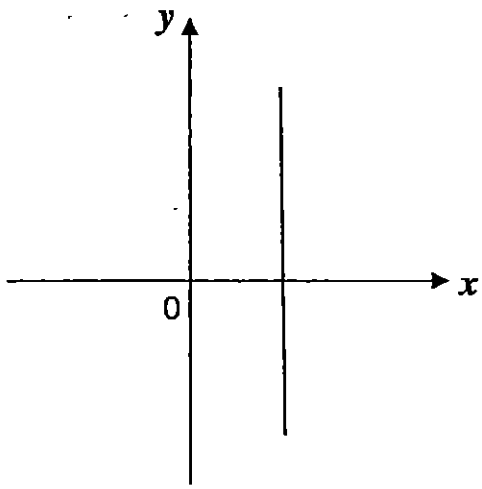
This question paper consists of 9 printed pages, including this cover page.

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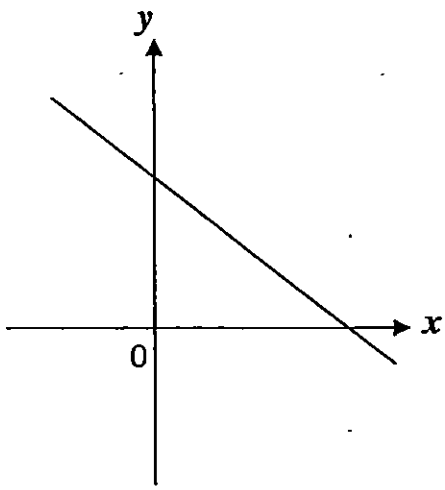
1 Which of the graphs below could be the graph of

(a) $x = 3$,

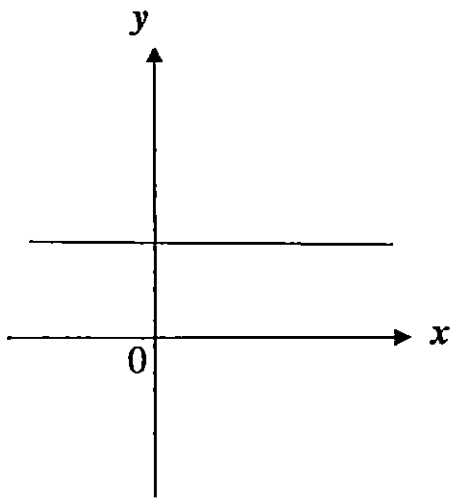
(b) $y = 3$.



Graph 1



Graph 2



Graph 3

Answer: **(a)** Graph _____ [1]

(b) Graph _____ [1]

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2 The diagram shows the graph of the straight line $y-x=-4$.

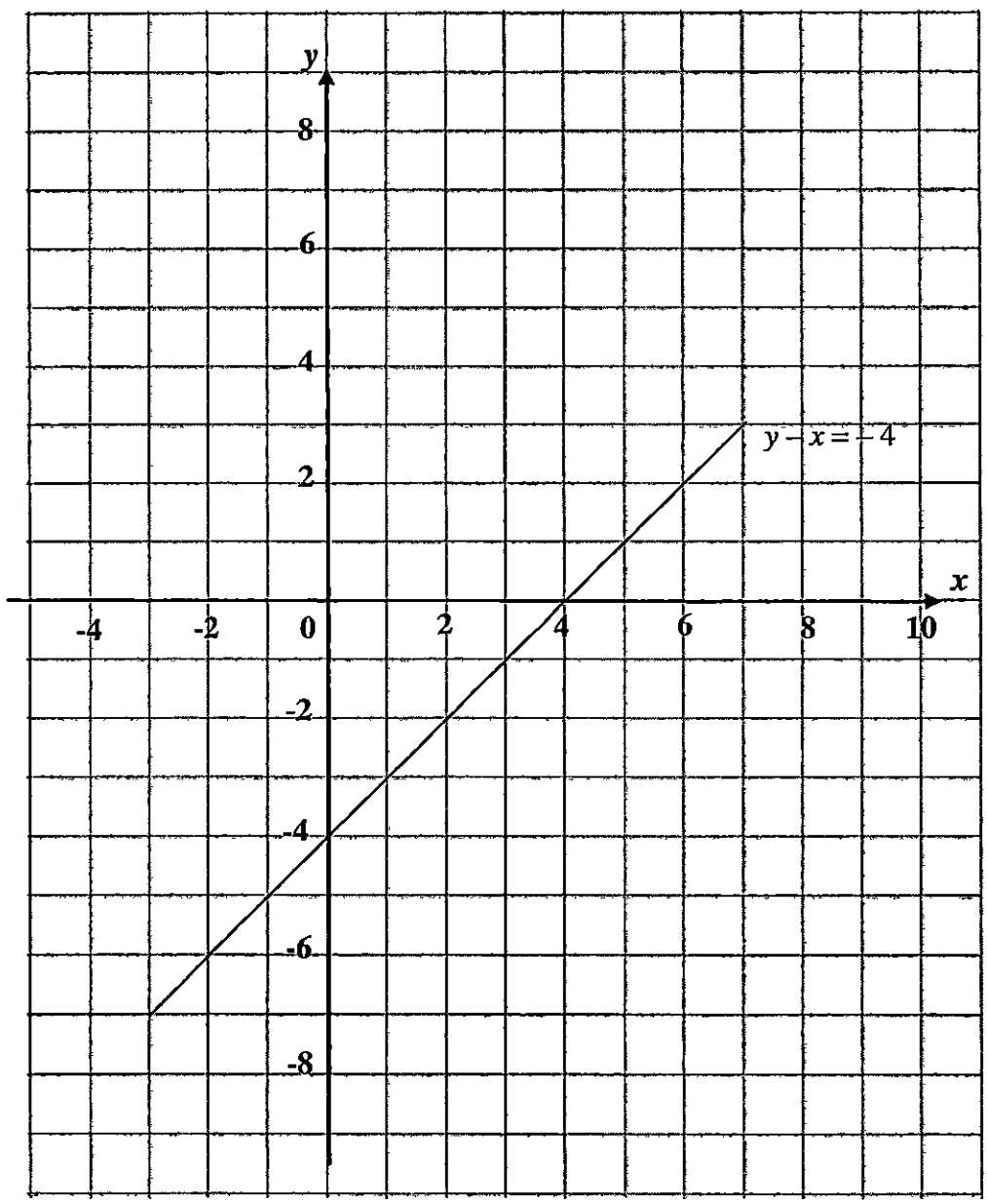
(a) Another line $2x+y=2$ passes through the points (0, 2) and (1,0).

x	0	3
y	2	a

Find a and use the values on the above table to draw the line $2x+y=2$. [1]

(b) **Use your graph** to solve the simultaneous equations $y-x=-4$ and $2x+y=2$.

Answer(**a**)



Answer: **(b)** $x=$ _____ $y=$ _____ [1]

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3 **(a)** Factorise $x^2 - 2xy + y^2$.

(b) **Hence,** evaluate $42 \times 42 - 168 + 4$.

You must show your working clearly.

Answer: **(a)** _____ [1]

(b) _____ [2]

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4 Given that $x + y = 3$ and $x^2 - y^2 = 45$, find the value of $8x - 8y$.

Answer: _____ [3]

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5 Given that $v = \sqrt{\frac{wx}{x+w}}$, express w in terms of v and x.

Answer: _____ [3]

6 It is given that y is directly proportional to x^2. If $y = 20$ when $x = 1$, find

(a) y when x is doubled,

(b) x when $y = 80$.

Answer: (a) $y =$ _____ [2]

(b) $x =$ _____ . [2]

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7 **(a)** Factorise completely $3a(r+s)-r-s$.

(b) Expand and simplify $(3x + 2y)(x - 5y)$.

Answer: **(a)** _____ [2]

(b) _____ [2]

8 **(a)** Factorise $x^2 - 9$.

(b) **Use your answer in part (a)** to find two factors of 9991, other than 1 and 9991. You must show your working.

Answer: **(a)** _____ [1]

(b) _____ [3]

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9 Melvin stands at the edge of a cliff and throws a ball vertically upwards. The height of the ball above the top of the cliff after t seconds is h metres such that $h = t(8 - 5t)$.

(a) Find h when $t = 1$.

(b) **(i)** Find h when $t = 5$.

(ii) Explain the significance of your answer.

(c) Find the time taken in seconds when the ball is at the same level as the top of the cliff.

Answer: **(a)** _____ m [1]

(bi) _____ m [1]

(bii) _____ [1]

(c) _____ s [2]

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10 Simplify

(a) $\dfrac{(2x-5y)^2}{10x^2-25xy}$,

(b) $\dfrac{x^2-16y^2}{x^2+10xy+24y^2}$.

Answer: **(a)** _____ [2]

(b) _____ [3]

11 Solve the following equations.

(a) $6x^2+7x-24=0$

(b) $(3y+1)^2=196$

Answer: **(a)** $x=$ _____ or _____ [2]

(b) $y=$ _____ or _____ [3]

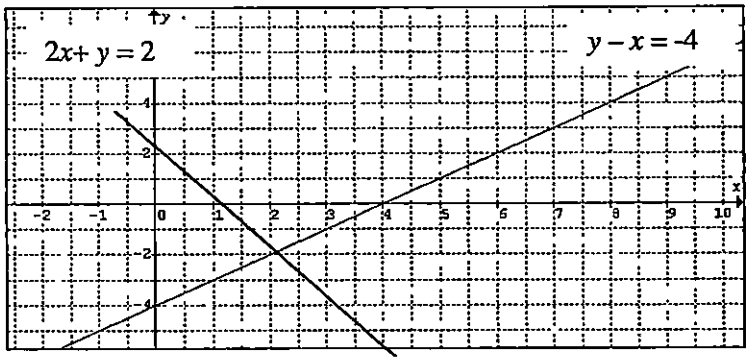
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Answers (Sec 2EMaths 2014 Mid-Year Exam Paper 1)

		ANSWERS			
1	(a)	Graph 1 $x=3$	B1	1	
	(b)	Graph 3 $y=3$	B1	1	2

2	(a)	$2x+y=2$			
		x | 0 | 3			
		y | 2 | -4			
		$a=-4$			
		Correct line drawn on grid passing through (2, -2)	D1	1	
					
	(b)	$x=2$, $y=-2$	B1	1	2

3	(a)	$(x-y)^2$	B1	1	
	(b)	$42^2-168+4$			
		$=(42-2)^2$ or $42^2-2(42)(2)+2^2$	M1		
		$=40^2$			
		$=1600$	A1	2	3

4		$x^2-y^2=45$			
		$(x+y)(x-y)=45$			
		$x-y=45\div3=15$	M1		
		$8x-8y=8(x-y)$	M1		
		$=8\times15=120$	A1	3	3

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5	$v = \sqrt{\frac{wx}{x+w}}$			
	$v^2 = \frac{wx}{x+w}$	M1		
	$v^2x + v^2w = wx$			
	$wv^2 - wx = -v^2x$	M1		
	$w = -\frac{v^2x}{v^2-x}$ or $\frac{v^2x}{x-v^2}$	A1	3	3

6	**(a)**	$y = kx^2$ $k = 20$	M1		
		$y = 20x^2$ $y = 20(2)^2$ $= 80$	A1	2	
	(b)	$y = 20x^2$ $80 = 20x^2$			
		$x^2 = 4$	M1		
		$x = \pm 2$	A1	2	4

7	**(a)**	$3a(r+s) - r - s$			
		$= 3a(r+s) - (r+s)$	M1		
		$= (r+s)(3a-1)$	A1	2	
	(b)	$(3x + 2y)(x - 5y)$			
		$= 3x^2 - 15xy + 2xy - 10y^2$	M1		
		$= 3x^2 - 13xy - 10y^2$	A1	2	4

8	**(a)**	$x^2 - 9 = (x+3)(x-3)$	B1	1	
	(b)	$x^2 - 9 = 9991$			
		$x^2 = 10000$ **or** $x^2 - 10000 = 0$	M1		
		$x = \pm\sqrt{10000}$			
		$= 100$			
		$(x+3)(x-3) = (100+3)(100-3)$	M1		
		The factors are 103 and 97.	A1	3	4

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9	**(a)**	$t = 1$, $h = 8 - 5$ $= 3$ m	B1	1	
	(bi)	$t = 5$, $h = 8\,(5) - 5\,(5)^2$ $= -85$ m	B1 1		
	(bii)	The ball is 85 m below the top of the cliff	B1	1	
	(c)	$t(8-5t) = 0$			
		$t = 0$ **(reject) or** $t = \frac{8}{5}$	M1	1	
		Time is $\frac{8}{5}s$ or $1.6\,s$	A1	1	5

10	**(a)**	$\frac{(2x-5y)^2}{10x^2-25xy}$			
		$= \frac{(2x-5y)^2}{5x(2x-5y)}$	M1		
		$= \frac{2x-5y}{5x}$	A1	2	
	(b)	$\frac{(x+4y)(x-4y)}{(x+4y)(x+6y)}$	M1 M1		
		$= \frac{(x-4y)}{(x+6y)}$	A1	3	5

11	**(a)**	$6x^2 + 7x - 24 = 0$ $(2x - 3)(3x + 8) = 0$	M1		
		$x = 1\frac{1}{2}$ **or** $-2\frac{2}{3}$	A1	2	
	(b)	$(3y+1)^2 = 196$			
		$3y+1 = \pm 14$	M1 M1		
		$3y+1 = 14$ **or** $3y+1 = -14$			
		$y = 4\frac{1}{3}$ **or** -5	A1	3	5
		OR			
		$(3y+1)^2 = 196$			
		$9y^2+6y+1-196 = 0$	M1		
		$9y^2+6y-195 = 0$			
		$(9y-39)(y+5) = 0$	M1		
		$y = 4\frac{1}{3}$ **or** -5	A1		

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DUNEARN SECONDARY SCHOOL

Mid **ımination 2014**
Mat
Pap

Secondary 2 Express

Thursday **8May 2014** **0800 - 0930** **1hr 30 mins**

INSTRUCTIONS TO CANDIDATES

Write your name, class and register number in the spaces at the top of this page.
Answer **all** questions.
Write your answers on the writing paper or graph paper provided.
All working must be shown. Omission of essential working will result in loss of marks.
Do not use any highlighters, correction fluid or correction tape for the paper.

INFORMATION FOR CANDIDATES

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 60.
The use of an electronic calculator is expected where appropriate.
You are reminded of the need for clear presentation in your answers.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

PARENT'S SIGNATURE

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Setter:**Mrs Yeo Poh Leng**

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1 It is given that one of the solutionto the equation $3x^2 = 6 - bx$ is 3. Find

(a) the value of b, [1]

(b) the other solution of the equation. [2]

2 The speed of a bullet fired from a gun is inversely proportional to the square root of its mass. When the mass is 64 g, the speed is 560 m/s.
Using $s$to represent speed in m/s and m to represent mass in grams with k as the constant,

(a) write an equation connecting $s$and m, [3]

(b) use the equation to find its mass when its speed is 400 m/s. [2]

3 There are 2 queues at the bus stop during peak hours. The number of people in the firstand second queues are p and$q$ respectively. The value of p is greater than q.

(a) If the difference in the numbers of people in these queues is 18, form an equationconnecting$p$ and q. [1]

(b) If the number of people in the first queue is three times the number of people in the second queue, form another equation connecting p and q. [1]

(c) Solve the simultaneous equations using**substitution** method.
Hence, find the total number of people in the two queues. [3]

4 (a) Factorise $16x^2 - 24xy + 9y^2$. [2]

(b) Given that

$$x^2 + y^2 = 19$$

and $xy = 3$,

find the value of $(x + y)$ when both x and y are positive. [3]

5 Expand and simplify each of the following algebraic expressions.

(a) $7(x-3)(x+2)$ [2]

(b) $(x-1)[x^2-(x+1)]$ [3]

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6 Sue is x years old. Carol is one year older than Sue and Niki is one year younger than Sue. The product of Carol's and Niki's ages is 264 times the difference of their ages.

(a) Use this information to form an equation, in terms of x, and show that it reduces to $x^2 - 529 = 0$. [2]

(b) Solve the equation for all possible values of x. [2]

(c) Hence, write down Niki's age. [1]

7 Simplify the following expressions.

(a) $\dfrac{2x^2-2}{x^2+2x+1} \div \dfrac{1}{x+1}$ [3]

(b) $\dfrac{6ab+cd-2ad-3bc}{3b-d}$ [3]

8 (a) Given that $x = a + b^2$,
(i) make b the subject of the formula, [2]
(ii) hence, find the values of b when $x = 240$ and $a = 71$. [2]

(b) Express $\dfrac{3}{x-y} - \dfrac{4}{4y^2-4x^2} + \dfrac{5}{x+y}$ as a single fraction. [4]

9 (a) Factorisecompletely $x^2y^2 - x^2 - 1 + y^2$. [3]

(b) Solve $\dfrac{p}{25} = \dfrac{1}{7p}$ giving your answer correct to 3 significant figures. [3]

(c) Mrs Chan bought x eggs at $(x-9)$ cents each and $(x-2)$ sausages at $(x-3)$ cents each. Write down and simplify an algebraic expression for theamount of money Mrs Chan spent. [3]

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10 Answer the whole question on a sheet of graph paper.

The table of values for the quadratic equation $y = 5 - x - x^2$ as shown below.

x	–3	–2	–1	0	1	2
y	–1	3	p	5	3	q

(a) Find

(i) p,

(ii) q. [2]

(b) Using a scale of 2 cm to 1 unit for both x-axis and y-axis, draw the graph of $y = 5 - x - x^2$ for -3 ≤ x ≤ 2. [3]

(c) Use your graph to find

(i) the equation of the line of symmetry, [1]

(ii) the maximum value of y, [1]

(iii) the values of x that satisfy the equation $5 - x - x^2 = 3$. [2]

End of Paper

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Answers (Sec 2E Maths 2014 Mid-Year Exam Paper 2)

		ANSWERS			
1	(a)	$3x^2+bx-6=0$ When $x=3$, $3(3)^2+b(3)-6=0$ $3b+21=0$ $b=-7$	B1	1	
	(b)	$3x^2-7x-6=0$ $(3x+2)(x-3)=0$ $\therefore x=-\frac{2}{3}$ or $x=3$	M1		
		The other solution is $x=-\frac{2}{3}$	A1	2	3
2	(a)	$s=\frac{k}{\sqrt{m}}$	M1		
		$k=s\sqrt{m}$ $=560\times 8$ $=4480$	M1		
		$s=\frac{4480}{\sqrt{m}}$	A1	3	
	(b)	$400=\frac{4480}{\sqrt{m}}$			
		$m=\left(\frac{4480}{400}\right)^2$	M1		
		$=125.44$ g	A1	2	5
3	(a)	$p-q=18$	B1	1	
	(b)	$p=3q$	B1	1	
	(c)	$3q-q=18$ $2q=18$ $q=9$ $p=27$	M1		
		total number of people in both queue = 36	M1		
			A1	3	5

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4	(a)	$16x^2-24xy+9y^2=(4x)^2-2(4x)(3y)+(3y)^2$ $=(4x-3y)^2$. or multiplication frame	M1 A1	2	cao
	(b)	Given $x^2+y^2=19$ and $xy=3$, $x^2+y^2+2(xy)=19+2(3)$ $x^2+2xy+y^2=25$ $(x+y)^2=25$ $(x+y)=\pm 5$ Since both x and y are positive, $(x+y)$ cannot be –5. Hence, $(x+y)=5$.	M1 M1 A1		3

5	(a)	$7(x-3)(x+2)=7(x^2-x-6)$ $=7x^2-7x-42$	M1 A1	2	
	(b)	$(x-1)[x^2-(x+1)]$ $=(x^3-x(x+1)-x^2+(x+1)]$ or $(x-1)[x^2-x-1]$ $=(x^3-x^2-x-x^2+x+1)$ $=x^3-2x^2+1$	M1 M1 A1	3	5

6	(a)	Let x years old be Sue's age. Let $(x+1)$ years old be Carol's age. Let $(x-1)$ years old be Niki's age. $(x+1)(x-1) = 264[(x+1)-(x-1)]$ $(x^2-1) = 264(2)$ $x^2-529=0$ (shown)	M1 A1	2	
	(b)	$x^2-529=0$ $x^2-23^2=0$ $(x+23)(x-23)=0$ $x=-23$ or 23 .	M1 A1	2	
	(c)	22	B1	1	5

7	(a)	$\frac{2x^2-2}{x^2+2x+1}\div\frac{1}{x+1}$ $=\frac{2(x^2-1)}{(x+1)^2}\times\frac{x+1}{1}$ $=\frac{2(x-1)(x+1)}{(x+1)^2}\times\frac{x+1}{1}$ $=2(x-1)$ or $2x-2$	M1 M1 A1	3	

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(b)	$\dfrac{6ab+cd-2ad-3bc}{3b-d}$				
	$=\dfrac{6ab-3bc+cd-2ad}{3b-d}$		M1		
	$=\dfrac{3b(2a-c)+d(c-2a)}{3b-d}$	either	M1		
	$=\dfrac{3b(2a-c)-d(2a-c)}{3b-d}$				
	$=\dfrac{(3b-d)(2a-c)}{3b-d}$				
	$=2a-c$		A1	3	6

8	**(ai)**	$x=a+b^2$			
		$b^2=x-a$			
		$b=\pm\sqrt{x-a}$	M1 A1	2	
	(aii)				
		$b=\pm\sqrt{240-71}$			
		$=+13$	M1		
		or -13	A1	2	
	(b)	$\dfrac{3}{x-y}-\dfrac{4}{4y^2-4x^2}+\dfrac{5}{x+y}$			
		$=\dfrac{3}{x-y}-\dfrac{4}{4(y+x)(y-x)}+\dfrac{5}{x+y}$	M1		
		$=\dfrac{3}{x-y}+\dfrac{4}{4(x+y)(x-y)}+\dfrac{5}{x+y}$	M1		
		$=\dfrac{3(x+y)+1+5(x-y)}{(x+y)(x-y)}$	M1		
		$=\dfrac{8x-2y+1}{(x+y)(x-y)}$	A1	4	8

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9	(a)	$x^2y^2 - x^2 - 1 + y^2$			
		$= x^2(y^2-1) - (1-y^2)$ or $x^2(y^2-1) + (-1+y^2)$			
		$= x^2(y^2-1) + (y^2-1) = (x^2+1)(y^2-1)$	M1		
		$= (x^2+1)(y^2-1)$	M1		
		$= (x^2+1)(y+1)(y-1)$	A1	3	
	(b)	$\frac{p}{25} = \frac{1}{7p}$			
		$7p^2 = 25$	M1		
		$p^2 = \frac{25}{7}$	M1		
		$p = \pm\sqrt{\frac{25}{7}}$			
		$= \pm 1.89$	A1	3	
	(c)	$x(x-9) + (x-3)(x-2)$	M1		
		$= x^2 - 9x + x^2 - 5x + 6$	M1		
		$= 2(x^2 - 7x + 3)$ or $2x^2 - 14x + 6$	A1	3	9

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10 **(ai)**

x	−3	−2	-1	0	1	2
y	-1	3	**5**	5	3	**-1**

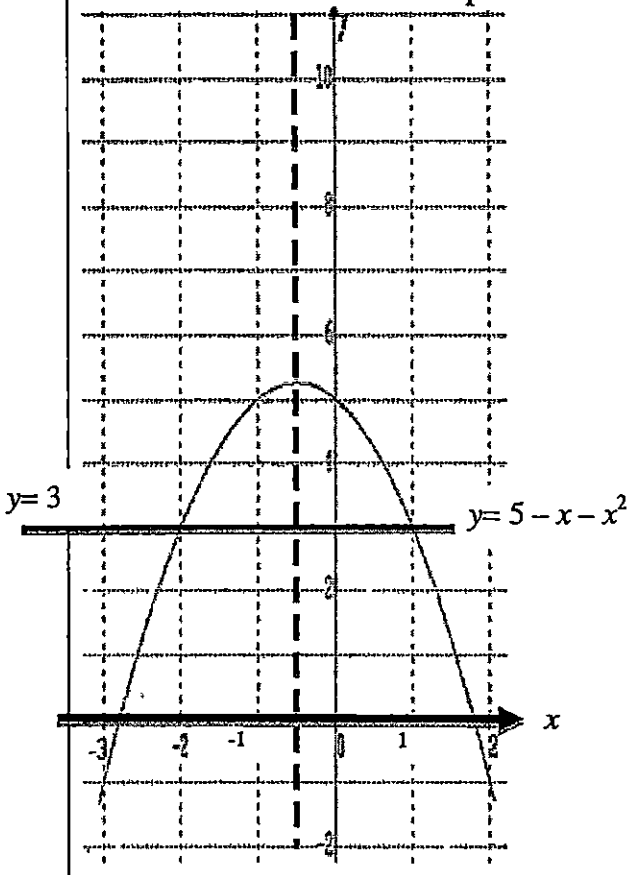
$p = 5$

$q = -1$ — B2 2

(b) Correct scale — D1

Correct axes — D1

Smooth curve and correct shape — D1 3



Line of symmetry, $y = -0.5$

(ci) $x = -0.5 \pm 0.5$ — B1 1

(cii) 5.25 ± 0.5 — B1 1

(ciii) 1 or -2 ± 0.5 — B1 for both 1 9

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