Mark scheme

Completing the square

Mathematics 0580 · Questions from Paper 2 and Paper 4

Total marks

30

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	Total
2	2	2	3	3	4	4	10	**30**

Question 1 **[2]**

1	[a =] 64 [b =] −8	**2**	**B1** for each or for both $(x-8)^2$ and $x^2-16x+64$

Question 2 **[2]**

2	$(x+4)^2-23$ final answer	**2**	**B1** for $(x+4)^2$

Question 3 **[2]**

3	[p =] 10 [k =] –46	**2**	**B1** for each

Question 4 **[3]**

4	$a = 3.5$ or $\frac{7}{2}$ **and** $b = -17.25$ or $-\frac{69}{4}$	**3**	**B2** for one correct or **M2** for $(x+\frac{7}{2})^2-5-\left(\frac{7}{2}\right)^2$ or **M1** for $(x+\frac{7}{2})^2$ oe or $2a = 7$ or $a^2+b = -5$ after $x^2+2ax+a^2$

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Question 5 **[3]**

5	$a = 2$ $b = 3$ $c = 20$	**3**	**B2** for any two correct For c, FT 2 + *their* $a \times$ *their* $(b)^2$ or **B1** for $b = 3$ nfww OR **B2** for $2(x+3)^2 - 20$ or **M1** for $(x + 3)^2$ seen or for $ax^2 + 2abx + ab^2 - c$ or for $a = 2$ and one of $2ab = 12$ and $ab^2 - c = -2$

Question 6 **[4]**

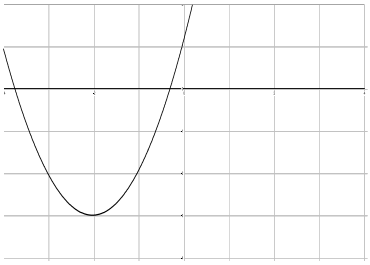
6(a)	$[p =]\ 4$ $[q =]\ -6$	**2**	**B1** for one correct or $(x+4)^2 - 6$ or $x^2 + px + px + p^2$ $[+ q]$
6(b)	-10 and 2	**2**	**M1** for $(x+4)^2 = 36$ or $(x + their 4)^2 = 30 - their(-6)$ or for correct method to solve quadratic e.g. $(x+10)(x-2)$

Question 7 **[4]**

7(a)	$(x-9)^2 - 108$	**2**	**B1** for $(x+h)^2 - 108$ or $(x-9)^2 + h$ or $k = -9$
7(b)	19.4 or 19.39… -1.39 or -1.392…	**2**	**M1FT** $x - their 9 = \pm\sqrt{their 108}$ **A1** for $9 \pm \sqrt{108}$ or $9 \pm 6\sqrt{3}$

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Question 8 **[10]**

8(a)	$-2 < x \leqslant 1$	**2**	**B1** for $-2 < x$ or $x \leqslant 1$
8(b)(i)	$(x+2)^2 - 3$	**2**	**M1** for $(x+2)^2 + k$
8(b)(ii)	$(x+2)^2 = 3$	**M1**	**FTdep** *their* **(b)(i)** for $k < 0$
	–3.73 or –3.732... and –0.268 or –0.2679...	**B1**	
8(b)(iii)	(–2, –3)	**2**	**FT** *their* $(x+2)^2 - 3$ **B1** for each coordinate
8(b)(iv)	Correct sketch 	**2**	Parabola with minimum point in correct quadrant and both x-intercepts negative and positive y-intercept **B1** for parabola with minimum point.

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