

Completing the Square Exam Questions MS (From OCR Legacy C1)

Q1 (Jun 2005, Q2)

2(i)	EITHER $3(x^2 + 4x) + 7$ $3(x+2)^2 - 12 + 7$ $3(x+2)^2 - 5$ OR $3(x^2 + 2ax + a^2) + b$ $3x^2 + 6ax + 3a^2 + b$ $6a = 12$ $a = 2$ $3a^2 + b = 7$ $b = -5$	M1 A1 M1 A1	4	$a = \frac{12}{6 \text{ or } 2}$ $a = 2$ $7 - a^2$ or $7 - 3a^2$ or $\frac{7}{3} - a^2$ (their a) $b = -5$
(ii)	$x = -2$	B1 ft	1 5	$x = -2$

Q2 (Jun 2006, Q3)

(i)	$2x^2 + 12x + 13 = 2(x^2 + 6x) + 13$ $= 2[(x+3)^2 - 9] + 13$ $= 2(x+3)^2 - 5$	B1 B1 M1	4	$a = 2$ $b = 3$ $13 - 2b^2$ or $13 - b^2$ or $\frac{13}{2} - b^2$ (their b) $c = -5$
(ii)	$2(x+3)^2 - 5 = 0$ $(x+3)^2 = \frac{5}{2}$ $x = -3 \pm \sqrt{\frac{5}{2}}$	M1 A1 A1	3	Uses correct quadratic formula or completing square method $x = \frac{-12 \pm \sqrt{40}}{4}$ or $(x+3)^2 = \frac{5}{2}$ $x = -3 \pm \sqrt{\frac{5}{2}}$ or $-3 \pm \frac{1}{2}\sqrt{10}$

Q3 (Jan 2007, Q6)

6 (i)	$2(x^2 - 12x + 40)$ $= 2[(x - 6)^2 - 36 + 40]$ $= 2[(x - 6)^2 + 4]$ $= 2(x - 6)^2 + 8$	B1 B1 M1 A1 4	$a = 2$ $b = 6$ $80 - 2b^2$ or $40 - b^2$ or $80 - b^2$ or $40 - 2b^2$ (their b) $c = 8$
(ii)	$x = 6$	B1 ft 1	
(iii)	$y = 8$	B1 ft 1	
		6	

Q4 (Jun 2008, Q10) [Modified]

(i)	$2(x^2 - 3x) + 11$	B1	$p = 2$
	$= 2\left[\left(x - \frac{3}{2}\right)^2 - \frac{9}{4}\right] + 11$	B1	$q = -\frac{3}{2}$
	$= 2\left(x - \frac{3}{2}\right)^2 + \frac{13}{2}$	M1	$r = 11 - 2q^2$ or $\frac{11}{2} - q^2$
		A1	$r = \frac{13}{2}$
			4

(ii)	$\left(\frac{3}{2}, \frac{13}{2}\right)$	B1✓
		B1✓
		2

Q5 (Jan 2009, Q6) [Modified]

6(i)	$5(x^2 + 4x) - 8$ $= 5[(x + 2)^2 - 4] - 8$ $= 5(x + 2)^2 - 20 - 8$ $= 5(x + 2)^2 - 28$	B1 B1 M1 A1 4	$p = 5$ $(x + 2)^2$ seen or $q = 2$ $-8 - 5q^2$ or $-\frac{8}{5} - q^2$ $r = -28$
(ii)	$x = -2$	B1 ft 1	

Q6 (Jun 2012, Q4)

(i)	$2(x^2 - 10x) + 49$ $= 2(x - 5)^2 - 50 + 49$ $= 2(x - 5)^2 - 1$	B1 B1 M1 A1 [4]	$p = 2$ $(x - 5)^2$ $49 - 2q^2$ or $\frac{49}{2} - q^2$
(ii)	(5, -1)	B1 FT B1 FT [2]	ft their q (Do not allow “5x”) ft their r (Do not allow “-1y”)