

**Stealth Quadratics Exam Questions MS (from OCR 4721)**

**Q1 (Jun 2005, Q4)**

$$k = x^3$$

$$k^2 + 26k - 27 = 0$$

$$k = -27, 1$$

$$x = -3, 1$$

*M1	Attempt a substitution to obtain a quadratic
A1	$k^2 + 26k - 27 = 0$
A1	-27, 1
DM1	Attempt cube root
A1 5	$x = -3, 1$ (no extras)
	( SR: $x = 1$ seen www B1 $x = -3$ seen www B1 )
<b>5</b>	

**Q2 (Jan 2007, Q4)**

Let  $y = x^{\frac{1}{3}}$

$$y^2 + 3y - 10 = 0$$

$$(y - 2)(y + 5) = 0$$

$$y = 2, y = -5$$

$$x = 2^3, x = (-5)^3$$

$$x = 8, x = -125$$

*M1	Attempt a substitution to obtain a quadratic or factorise with $\sqrt[3]{x}$ in each bracket
DM1	Correct attempt to solve quadratic
A1	Both values correct
DM1	Attempt cube
A1 ft 5	Both answers correctly followed through
<b>5</b>	SR B2 $x = 8$ from T & I

**Q3 (Jun 2007, Q6)**

Let  $y = (x + 2)^2$   
 $y^2 + 5y - 6 = 0$

$$(y + 6)(y - 1) = 0$$

$$y = -6 \text{ or } y = 1$$

$$(x + 2)^2 = 1$$

$$x = -1$$

$$\text{or } x = -3$$

B1	Substitute for $(x + 2)^2$ to get $y^2 + 5y - 6 (= 0)$
M1	Correct method to find roots
A1	Both values for y correct
M1	Attempt to work out x
A1	One correct value
A1 6	Second correct value and no extra real values
<b>6</b>	

**Q4 (Jun 2008, Q4)**

$$y = x^{\frac{1}{2}}$$

$$2y^2 - 7y + 3 = 0$$

$$(2y - 1)(y - 3) = 0$$

$$y = \frac{1}{2}, y = 3$$

$$x = \frac{1}{4}, x = 9$$

**M1\*** Use a substitution to obtain a quadratic or factorise into 2 brackets each containing  $x^{\frac{1}{2}}$

**M1dep** Correct method to solve a quadratic

**A1**

**M1** Attempt to square to obtain  $x$

**A1**

**SR** If first **M1** not gained and 3 and  $\frac{1}{2}$  given as final answers, award **B1**

**5**

**Q5 (Jan 2009, Q3)**

Let  $y = x^{\frac{1}{3}}$

$$3y^2 + y - 2 = 0$$

$$(3y - 2)(y + 1) = 0$$

$$y = \frac{2}{3}, y = -1$$

$$x = \left(\frac{2}{3}\right)^3, x = (-1)^3$$

$$x = \frac{8}{27}, x = -1$$

**\*M1**

Attempt a substitution to obtain a quadratic or factorise with  $\sqrt[3]{x}$  in each bracket

**DM1**

Correct method to find roots

**A1**

Both values correct

**DM1**

Attempt cube of at least one value

**A1 ft 5**

Both answers correctly followed through

**5**

**SR** If **M1\*** not awarded, **B1**  $x = -1$  from T & I

**Q6 (Jun 2012, Q7)**

$$k = x^{\frac{1}{2}}$$

$$k^2 - 6k + 2 = 0$$

$$(k - 3)^2 - 7 = 0$$

$$k = 3 \pm \sqrt{7}$$

$$x = (3 \pm \sqrt{7})^2$$

$$x = 16 + 6\sqrt{7} \text{ or } x = 16 - 6\sqrt{7}$$

M1*	Use a substitution to obtain a quadratic with $k^2$ , $6k$ and $2$ (may be implied by squaring or rooting later)
M1 dep	Correct method to solve resulting quadratic
A1	$k = 3 \pm \sqrt{7}$ or $k = \frac{6 \pm \sqrt{28}}{2}$ or $k = 3 \pm \frac{\sqrt{28}}{2}$
M1	Recognise the need to square to obtain $x$
M1	Correct method for squaring $a + \sqrt{b}$ (3 or 4 term expansion)
A1	Allow $16 \pm 3\sqrt{28}$ or $16 \pm 2\sqrt{63}$
<b>[6]</b>	

**Q7 (Jun 2014, Q3)**

$$k = x^2$$

$$4k^2 + 3k - 1 = 0$$

$$(4k - 1)(k + 1) = 0$$

$$k = \frac{1}{4}, k = -1$$

$$x = \pm \sqrt{\frac{1}{4}}$$

$$x = \pm \frac{1}{2}$$

M1*	Substitute for $x^2$
M1dep*	Attempt to solve resulting quadratic
A1	Correct values of $k$ <b>soi</b>
M1	Attempt to square root
A1	Final answers correct, no extras
<b>[5]</b>	

**Q8 (Jun 2015, Q4)**

$$k = x^{\frac{1}{3}}$$

$$k^2 - k - 6 = 0$$

$$(k - 3)(k + 2) = 0$$

$$k = 3, k = -2$$

$$x = 3^3, x = -2^3$$

$$x = 27, x = -8$$

M1\*

Use a substitution to obtain a quadratic, or factorise into 2 brackets each containing  $x^{\frac{1}{3}}$

M1dep

Attempt to solve resulting three-term quadratic – **see guidance in appendix 1**

A1

Correct values of  $k$

M1

Attempt to cube at least one value

A1

Final answers correct **ISW**

**[5]**