

1 Completing the square

- a) Write $5 + 8x - 2x^2$ in the form $a - b(x - c)^2$.
b) Hence find the values of k for which $5 + 8x - 2x^2 = k$ has two solutions.

a) $-2[(x - 2)^2 - 4] + 5 = 13 - 2(x - 2)^2$
b) the greatest value is 13
 $k < 13$

2 Completing the square

- a) Write $4x^2 + 12x + 1$ in the form $(ax + b)^2 + c$.
b) Hence solve $4x^2 + 12x + 1 = 0$. Give your answers in simplified surd form.

a) $(2x + 3)^2 - 9 + 1 = (2x + 3)^2 - 8$
b) $2x + 3 = \pm\sqrt{8} = \pm 2\sqrt{2}$
 $x = \frac{-3 \pm 2\sqrt{2}}{2}$

3 Iteration

- a) Use $x_{n+1} = 4 + \frac{3}{x_n^2}$ with $x_0 = 4$ to find x_1, x_2 and x_3 to 4 decimal places.
b) Show that the solution of $x^3 - 4x^2 - 3 = 0$ is 4.17 to 2 decimal places.

a) $x_1 = 4.1875, x_2 = 4.1711, x_3 = 4.1724$
b) at 4.165: $-0.138 < 0$
at 4.175: $0.050 > 0$, so 4.17

4 Iteration

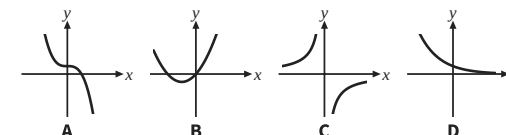
The iteration $x_{n+1} = \sqrt{(k - \frac{4}{x_n})}$ with $x_0 = 2$ gives $x_1 = 3$.

- a) Find the value of k .
b) Find the equation it solves, in the form $x^3 + ax + b = 0$.

a) $9 = k - 2, k = 11$
b) $x^2 = 11 - \frac{4}{x}$, times by x
 $x^3 - 11x + 4 = 0$

5 Recognising graphs

- a) Match each equation to its graph: $y = 0.5^x$ $y = 1 - x^3$
 $y = x^2 + 2x$ $y = -\frac{3}{x}$
b) For which two does y always decrease as x increases?



- a) A $1 - x^3$, B $x^2 + 2x$, C reciprocal, D exponential
b) A and D: they fall left to right all the way

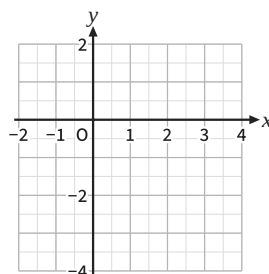
More graphs and equations revision mat answers

6 Plotting quadratic graphs

- a) Complete the table for
 $y = \frac{1}{2}x^2 - x - 3$.

x	-2	-1	0	1	2	3	4
y	1		-3		-3		

- b) Draw the graph. Use it to solve $x^2 - 2x - 6 = 0$.

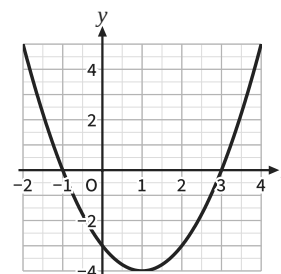


- a) 1, -1.5, -3, -3.5, -3, -1.5, 1
b) $x^2 - 2x - 6$ is 2y: $y = 0$ at -1.6, 3.6 (± 0.1)

7 Plotting quadratic graphs

The graph of $y = x^2 - 2x - 3$ is drawn.

- a) Use it to solve $x^2 - 2x \leq 3$.
b) Find the values of k for which $x^2 - 2x - 3 = k$ has two positive solutions.



- a) the curve is on or below 0: $-1 \leq x \leq 3$
b) between (1, -4) and (0, -3): $-4 < k < -3$

8 Roots and turning points

A quadratic curve has turning point (3, -8) and crosses the x axis at (5, 0).

- a) Write down the other point where it crosses the x axis.
b) Find where it crosses the y axis.

a) by symmetry about $x = 3$: (1, 0)
b) $a(2)(-2) = -8, a = 2$
 $y = 2(x - 1)(x - 5)$: (0, 10)