

1 Completing the square

- a) Write $x^2 - 8x + 3$ in the form $(x + p)^2 + q$.
b) Hence solve $x^2 - 8x + 3 = 0$. Give your answers as surds.

a) $(x - 4)^2 - 16 + 3 = (x - 4)^2 - 13$
b) $(x - 4)^2 = 13, x - 4 = \pm\sqrt{13}$
 $x = 4 + \sqrt{13}$ or $x = 4 - \sqrt{13}$

2 Completing the square

- a) Write $2x^2 + 12x + 23$ in the form $a(x + b)^2 + c$.
b) Use your answer to explain why $2x^2 + 12x + 23 = 0$ has no solutions.

a) $2[(x + 3)^2 - 9] + 23 = 2(x + 3)^2 + 5$
b) $2(x + 3)^2$ is never negative,
so the least value is 5, never 0

3 Iteration

- a) Show that $x^3 + 5x = 9$ has a solution between 1 and 2.
b) Show that $x^3 + 5x = 9$ can be rearranged to give
$$x = \frac{9}{x^2 + 5}$$

a) $1 + 5 = 6 < 9$ and $8 + 10 = 18 > 9$, so a solution between
b) $x(x^2 + 5) = 9$
divide by $x^2 + 5$

4 Iteration

- a) Use $x_{n+1} = \frac{9}{x_n^2 + 5}$ with $x_0 = 1.5$ to find x_1, x_2 and x_3 to 4 decimal places.
b) Show that the solution of $x^3 + 5x = 9$ is 1.3 to 1 decimal place.

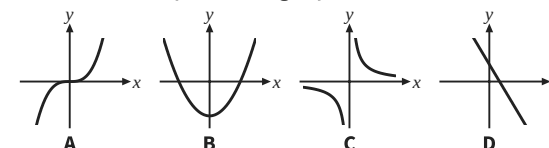
a) $x_1 = 1.2414, x_2 = 1.3759, x_3 = 1.3056$
b) at 1.25: $8.203 < 9$
at 1.35: $9.210 > 9$, so 1.3

More graphs and equations revision mat answers

Higher A

5 Recognising graphs

- a) Match each equation to its graph: $y = x^3$ $y = 2 - 3x$
 $y = x^2 - 4$ $y = \frac{1}{x}$
b) Find where the quadratic graph crosses the x axis.



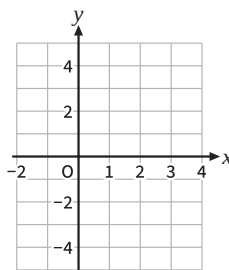
a) A cubic x^3 , B $x^2 - 4$, C reciprocal, D $2 - 3x$
b) $x^2 = 4$: $(-2, 0)$ and $(2, 0)$

6 Plotting quadratic graphs

- a) Complete the table for
 $y = x^2 - 2x - 4$.

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

- b) Draw the graph on the grid.

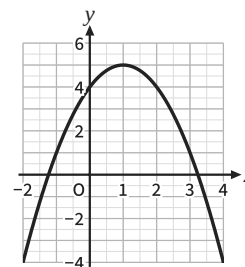


a) 4, -1, -4, -5, -4, -1, 4
b) a smooth U curve, lowest at $(1, -5)$

7 Plotting quadratic graphs

The graph of $y = 4 + 2x - x^2$ is drawn.

- a) Estimate the solutions of $4 + 2x - x^2 = 0$.
b) Draw a straight line to estimate the solutions of $3 + x - x^2 = 0$.



a) -1.2 and 3.2 b) draw $y = x + 1$
 $x = -1.3$ or $x = 2.3$

8 Roots and turning points

The graph of $y = x^2 - 2x - 8$ is a curve.

- a) Find the coordinates of the points where it crosses the x axis.
b) Use your answer to find the coordinates of its turning point.

a) $(x - 4)(x + 2) = 0$: $(-2, 0)$ and $(4, 0)$
b) halfway: $x = 1, y = 1 - 2 - 8 = -9$
 $(1, -9)$