

Maths HL10 Extended – Quadratic, Reciprocal and Exponential graphs

1 The graph of $y = x^2$ is drawn on the grid.

a The table shows some corresponding values of $y = x^2 + 3$. Copy and complete the table by filling in the missing values.

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
y		5.25	4	3.25	3		4	5.25	7

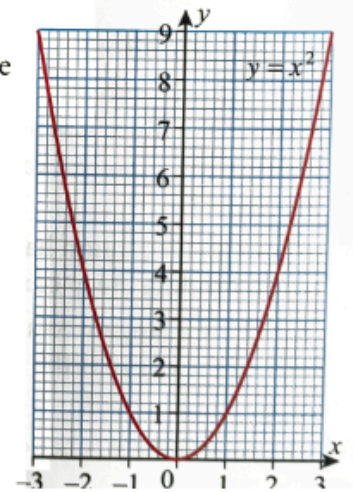
b Plot the graph of $y = x^2$ and the graph of $y = x^2 + 3$ for $-2 \leq x \leq 2$ on a grid.

c Will the two curves ever meet? Explain your answer.

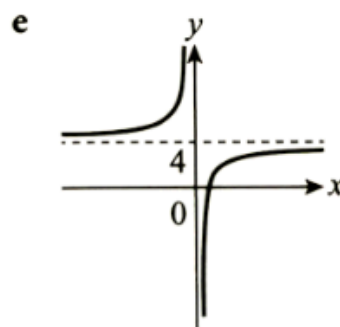
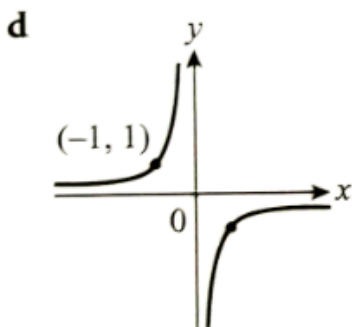
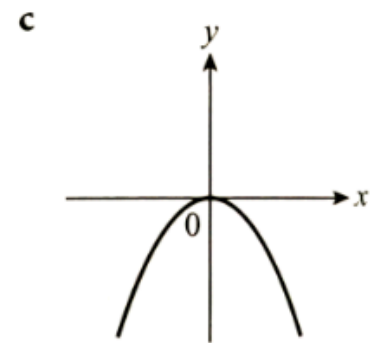
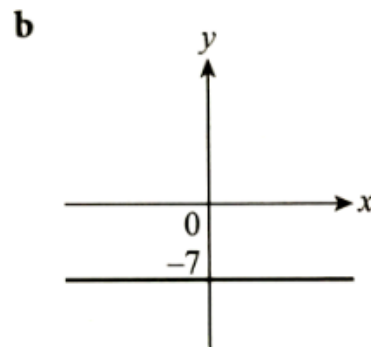
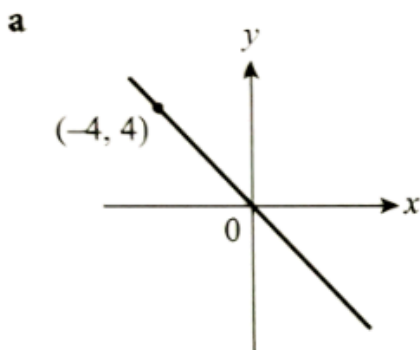
d By drawing a suitable straight line on the same grid, solve the equations:

i $x^2 = 6$

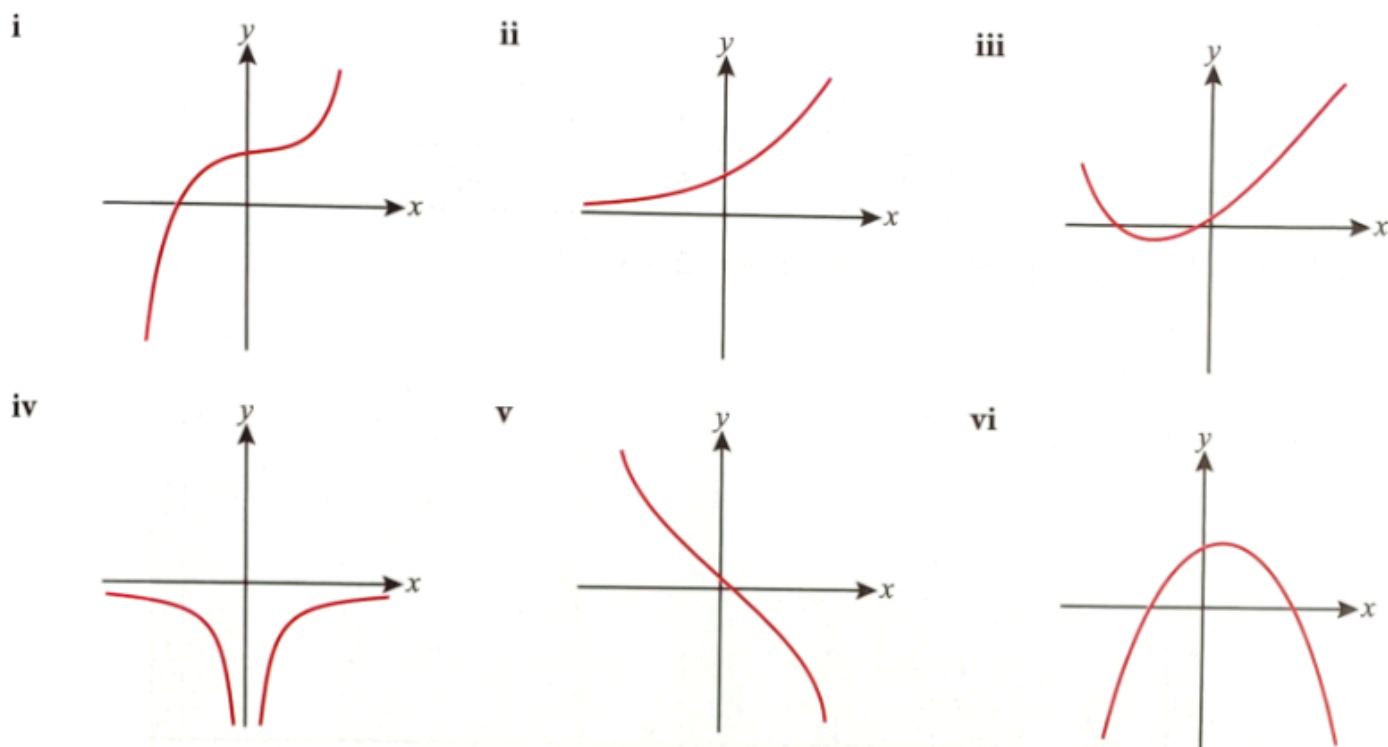
ii $x^2 + 3 = 6$



2 Look at these sketch graphs. For each one, write the general form of its equation. Use letters to represent any constant values if you need to.



3 Six sketch graphs are shown here.



Match the graphs to the following equations.

- a $y = 1 + x - 2x^2$
- b $y = 3^x$
- c $y = x^3 + x^2 + 1$
- d $y = -\frac{16}{x^2}$

- 4 a In a chemical reaction, the mass, M grams, of a chemical is given by the formula $M = \frac{160}{2^t}$ where t is the time, in minutes, after the start.

A table of values for t and M is given below.

t (min)	0	1	2	3	4	5	6	7
M (g)	p	80	40	20	q	5	r	1.25

- i Find the values of p , q and r .
 - ii Draw the graph of M against t for $0 \leq t \leq 7$. Use a scale of 2 cm to represent one minute on the horizontal t -axis and 1 cm to represent 10 grams on the vertical M -axis.
 - iii Draw a suitable tangent to your graph and use it to estimate the rate of change of mass when $t = 2$.
- b The other chemical in the same reaction has mass m grams, which is given by $m = 160 - M$. For what value of t do the two chemicals have equal mass?