


4 Graph sketching

4.1 Parabolas of the form $y = k(x - a)(x - b)$

In this exercise you will learn how to:

- sketch the graph of a parabola with equation given in the form $y = k(x - a)(x - b)$
- use the sign of k to find the shape of the curve: 
- use the y-intercept occurs where $x = 0$ to label the y-intercept (the intersection with the y-axis)
- use the zeros occur where $y = 0$ to label the zeros (the roots, or the x-intercepts)
- sketch the graph of a parabola by factorising into the form $y = k(x - a)(x - b)$

1 Sketch a graph, showing the zeros and the y-intercept, of the curve with equation:

- | | | |
|---------------------------|---------------------------|----------------------------|
| (a) $y = (x - 1)(x + 2)$ | (b) $y = (x + 3)(x + 5)$ | (c) $y = (x - 2)(x - 5)$ |
| (d) $y = (4 - x)(2 + x)$ | (e) $y = (1 + 2x)(1 - x)$ | (f) $y = (2x + 1)(3x - 2)$ |
| (g) $y = x(x - 4)$ | (h) $y = 3x(2 - x)$ | (i) $y = 3(x - 1)(x + 1)$ |
| (j) $y = 4(x - 1)(x + 3)$ | (k) $y = 2(2 - x)(3 - x)$ | (l) $y = 2(x - 2)(x - 1)$ |

2 Sketch a graph, showing the roots and the y-intercept, of the curve with equation:

- | | | |
|---------------------|-----------------------|-----------------------|
| (a) $y = (x - 2)^2$ | (b) $y = -(x + 3)^2$ | (c) $y = 2(x + 1)^2$ |
| (d) $y = (1 - x)^2$ | (e) $y = -2(3 - x)^2$ | (f) $y = 4(2x - 1)^2$ |

3 Sketch a graph, showing the zeros and the intersection with the y-axis, of the curve with equation:

- | | | |
|---------------------------|------------------------|------------------------|
| (a) $y = x^2 + 4x + 3$ | (b) $y = x^2 - 6x + 5$ | (c) $y = x^2 - 3x - 4$ |
| (d) $y = x^2 - 16$ | (e) $y = 2x^2 + x - 1$ | (f) $y = x^2 + 6x$ |
| (g) $y = 4x^2 - 9$ | (h) $y = 2x^2 + 6x$ | (i) $y = 4x^2 - x - 3$ |
| (j) $y = 2x^2 - 12x + 10$ | (k) $y = 4x - x^2$ | (l) $y = 4 - x^2$ |
| (m) $y = 3x^2 - 3$ | (n) $y = 2 - x - x^2$ | (o) $y = 3 + 2x - x^2$ |
| (p) $y = 12 - 2x - 2x^2$ | | |