# Single Pure – Polynomial Sketching

When sketching curves, remember to find where it crosses the $x$-axis and the $y$-axis. For quadratics find the coordinates of the vertex. Think about what happens to $y$ when $x$ is *very* positive and *very* negative.

Also remember that

- a factor of the form $(x - a)$ indicates a 'cut' at $x = a$,

- a factor of the form $(x - a)^2$ indicates a 'touch' at $x = a$,

- a factor of the form $(x - a)^3$ indicates an 'inflection point' at $x = a$.

## Questions

1. Sketch the following quadratic curves:

   (a) $y = (x - 3)(x + 6)$.
   (b) $y = x(x - 4)$.
   (c) $y = (3 - x)(x + 1)$.
   (d) $y = (x + 2)^2$.
   (e) $y = (2x + 1)(x - 3)$.
   (f) $y = -(x + 3)(2 - 3x)$.
   (g) $y = 3(2x + 5)(x - 2)$.
   (h) $y = x^2 - 5x + 4$.
   (i) $y = 2x^2 - 5x - 12$.
   (j) $y = 4x^2 - 8x - 5$.
   (k) $y = 6x^2 + 23x + 15$.

2. Sketch the following polynomial curves of order 3 (cubic) or higher:

   (a) $y = (x + 2)(x - 1)(x - 6)$.
   (b) $y = x(x - 3)(x + 2)$.
   (c) $y = -(2x + 1)(x - 4)(x + 5)$.
   (d) $y = (2 - x)(x + 1)(x - 7)$.
   (e) $y = (2 - x)(x - 1)(6 + x)$.
   (f) $y = (x + 2)^2(x - 1)$.
   (g) $y = (x + 4)(x - 1)^3$.
   (h) $y = -x^2(x + 3)^2$.
   (i) $y = (x + 4)(x - 1)^2(3 - x)$.
   (j) $y = (2x + 5)(3x - 4)^2$.
   (k) $y = -x(2x - 1)^2(3x - 5)^3$.

3. Now, look at your curves. Figure out the equation of each curve from the sketch you have just drawn.