

Completed Square Form

Ex: Write $f(x) = x^2 + 6x - 3$ in the form $(x + a)^2 + b$.

Hence write down the coordinates of the turning point and the equation of the axis of symmetry.

Soln: $x^2 + 6x - 3$
 $= (x + 3)^2 - 9 - 3$ TP = (-3, -12)
 $= (x + 3)^2 - 12$ Axis of Symmetry: $x = -3$

1. Write each of the following in the form $y = (x + a)^2 + b$, hence write down the coordinates of the turning point and the equation of the axis of symmetry.

(a) $y = x^2 + 4x + 1$

(b) $y = x^2 + 6x + 5$

(c) $y = x^2 + 10x + 9$

(d) $y = x^2 + 2x - 2$

(e) $y = x^2 + 8x - 4$

(f) $y = x^2 + 4x - 6$

(g) $y = x^2 - 2x + 2$

(h) $y = x^2 - 6x + 4$

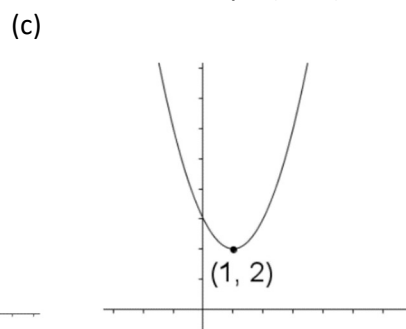
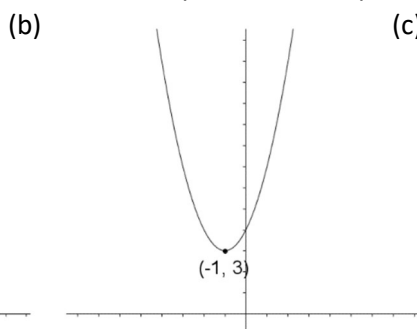
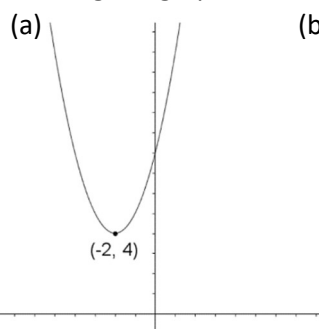
(i) $y = x^2 - 10x + 8$

(j) $y = x^2 - 6x - 4$

(k) $y = x^2 - 4x - 6$

(l) $y = x^2 - 5x + 2$

2. Using the graphs below, write the equation of the quadratic in the form $y = (x + a)^2 + b$



3. Write down the turning point of each of the following and state whether it is a minimum or maximum.

(a) $y = (x + 2)^2 + 3$

(b) $y = (x + 3)^2 + 6$

(c) $y = (x + 5)^2 + 7$

(d) $y = (x + 1)^2$

(e) $y = (x - 3)^2 + 3$

(f) $y = (x - 5)^2 - 1$

(g) $y = (x - 4)^2 + 1$

(h) $y = (x - 7)^2 - 5$

(i) $y = 3 - (x + 3)^2$

(j) $y = 5 - (x - 3)^2$

(k) $y = 6 - (x - 5)^2$

(l) $y = 1 - (x + 2)^2$

(m) $y = -4 - (x - 3)^2$

(n) $y = (x - 3)^2 + 1$

(o) $y = -7 - (x + 2)^2$

(p) $y = 5 - (x + 11)^2$

4. Sketch the graphs of the following functions showing the turning point and y- intercept.

(a) $y = (x + 3)^2 + 3$

(b) $y = (x - 2)^2 + 1$

(c) $y = (x + 4)^2 + 1$

(d) $y = (x + 1)^2 + 3$

(e) $y = 4 - (x - 1)^2$

(f) $y = 3 - (x + 2)^2$

(g) $y = 2 - (x - 3)^2$