Turning Points

By completing the square, find the coordinates of the turning points of these quadratic graphs:

(a) $x^2 + 6x + 1$

(b) $x^2 - 10x - 3$

(c) $x^2 + 8x + 4$

(d) $x^2 - 3x - 5$

(e) $x^2 + x + 9$

By completing the square, find the coordinates of the turning points of these quadratic graphs:

(a) $10 - 2x - x^2$

(b) $6 + 4x - x^2$

(c) $2x^2 + 8x - 1$

(d) $3x^2 - 18x - 4$

(e) $13 - 4x - 2x^2$

(a) A quadratic graph with equation $y = x^2 + 6x + b$ has a turning point at $(a, -13)$. Find the values of a and b.

(b) A quadratic graph with equation $y = x^2 + ax - \frac{7}{4}$ has a turning point at $(-\frac{3}{2}, b)$. Find the values of a and b.

(a) A quadratic graph has a turning point at $(2, 3)$ and passes through $(0, 7)$. Find the equation of the quadratic, giving your answer in the form $y = ax^2 + bx + c$.

(b) A quadratic graph has a turning point at $(-1, 6)$ and passes through $(0, 8)$. Find the equation of the quadratic, giving your answer in the form $y = ax^2 + bx + c$.

(c) A quadratic graph has a turning point at $(1, 11)$ and passes through $(0, 9)$. Find the equation of the quadratic, giving your answer in the form $y = ax^2 + bx + c$.