**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 $y=ax^{2}+bx+c$.

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