Putting $ax^2 + bx + c$ in the form: $a\left(x - h\right)^2 + k$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

Putting $ax^2 + bx + c$ in the form: $a\left(x-h\right)^2 + k$

To put $ax^2 + bx + c$ in the form: $a\left(x-h\right)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a\left(x-h\right)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

$c = a \cdot h^2 + k$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$c = a \cdot h^2 + k$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{b}{-2a} = \frac{-2ah}{-2a}$$

$c = a \cdot h^2 + k$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h$$

$c = a \cdot h^2 + k$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h$$

$c = a \cdot h^2 + k$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$c = a \cdot h^2 + k$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k$$

Putting ax^2+bx+c in the form: $a(x-h)^2+k$

To put ax^2+bx+c in the form: $a(x-h)^2+k$ we need the values of a, h, and k so:

$$ax^2+bx+c = a(x-h)^2+k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2+bx+c = ax^2-2ahx+ah^2+k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a=a$ We probably expected this from doing examples.

$b=-2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a\cdot h^2 + k = a\cdot\left(\frac{-b}{2a}\right)^2 + k = a\cdot\left(\frac{-b}{2a}\right)\cdot\left(\frac{-b}{2a}\right)+k$$

Putting ax^2+bx+c in the form: $a(x-h)^2+k$

To put ax^2+bx+c in the form: $a(x-h)^2+k$ we need the values of a, h, and k so:

$$ax^2+bx+c = a(x-h)^2+k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2+bx+c = ax^2-2ahx+ah^2+k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a=a$ We probably expected this from doing examples.

$b=-2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a\cdot h^2+k = a\cdot\left(\frac{-b}{2a}\right)^2+k = \cancel{a}\cdot\left(\frac{-b}{2\cancel{a}}\right)\cdot\left(\frac{-b}{2a}\right)+k$$

Putting ax^2+bx+c in the form: $a(x-h)^2+k$

To put ax^2+bx+c in the form: $a(x-h)^2+k$ we need the values of a, h, and k so:

$$ax^2+bx+c = a(x-h)^2+k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2+bx+c = ax^2-2ahx+ah^2+k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a=a$ We probably expected this from doing examples.

$b=-2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a\cdot h^2+k = a\cdot\left(\frac{-b}{2a}\right)^2+k = \cancel{a}\cdot\left(\frac{-b}{2\cancel{a}}\right)\cdot\left(\frac{-b}{2a}\right)+k = \frac{b^2}{4a}+k$$

Putting ax^2+bx+c in the form: $a(x-h)^2+k$

To put ax^2+bx+c in the form: $a(x-h)^2+k$ we need the values of a, h, and k so:

$$ax^2+bx+c=a(x-h)^2+k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2+bx+c=ax^2-2ahx+ah^2+k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a=a$ We probably expected this from doing examples.

$b=-2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a}=\frac{b}{-2a}=\frac{\cancel{-2a}h}{\cancel{-2a}}=h \qquad \Leftrightarrow \qquad h=\frac{-b}{2a}$$

$$c=a\cdot h^2+k=a\cdot\left(\frac{-b}{2a}\right)^2+k=\cancel{a}\cdot\left(\frac{-b}{2\cancel{a}}\right)\cdot\left(\frac{-b}{2a}\right)+k=\frac{b^2}{4a}+k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k = \cancel{a} \cdot \left(\frac{-b}{2\cancel{a}}\right) \cdot \left(\frac{-b}{2a}\right) + k = \frac{b^2}{4a} + k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c - \frac{b^2}{4a} = \frac{b^2}{4a} + k - \frac{b^2}{4a}$$

Putting ax^2+bx+c in the form: $a(x-h)^2+k$

To put ax^2+bx+c in the form: $a(x-h)^2+k$ we need the values of a, h, and k so:

$$ax^2+bx+c = a(x-h)^2+k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2+bx+c = ax^2-2ahx+ah^2+k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a=a$ We probably expected this from doing examples.

$b=-2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a\cdot h^2+k = a\cdot\left(\frac{-b}{2a}\right)^2+k = \cancel{a}\cdot\left(\frac{-b}{2\cancel{a}}\right)\cdot\left(\frac{-b}{2a}\right)+k = \frac{b^2}{4a}+k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c-\frac{b^2}{4a} = \cancel{\frac{b^2}{4a}}+k\cancel{-\frac{b^2}{4a}}$$

Putting ax^2+bx+c in the form: $a(x-h)^2+k$

To put ax^2+bx+c in the form: $a(x-h)^2+k$ we need the values of a, h, and k so:

$$ax^2+bx+c=a(x-h)^2+k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2+bx+c=ax^2-2ahx+ah^2+k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a=a$ We probably expected this from doing examples.

$b=-2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a}=\frac{b}{-2a}=\frac{\cancel{-2a}h}{\cancel{-2a}}=h \quad\Leftrightarrow\quad h=\frac{-b}{2a}$$

$$c=a\cdot h^2+k=a\cdot\left(\frac{-b}{2a}\right)^2+k=\cancel{a}\cdot\left(\frac{-b}{2\cancel{a}}\right)\cdot\left(\frac{-b}{2a}\right)+k=\frac{b^2}{4a}+k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c-\frac{b^2}{4a}=\cancel{\frac{b^2}{4a}}+k\cancel{-\frac{b^2}{4a}}=k$$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k = \cancel{a} \cdot \left(\frac{-b}{2\cancel{a}}\right) \cdot \left(\frac{-b}{2a}\right) + k = \frac{b^2}{4a} + k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c - \frac{b^2}{4a} = \cancel{\frac{b^2}{4a}} + k \cancel{- \frac{b^2}{4a}} = k \qquad \Leftrightarrow \qquad k = c - \frac{b^2}{4a}$$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k = \cancel{a} \cdot \left(\frac{-b}{2\cancel{a}}\right) \cdot \left(\frac{-b}{2a}\right) + k = \frac{b^2}{4a} + k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c - \frac{b^2}{4a} = \cancel{\frac{b^2}{4a}} + k \cancel{- \frac{b^2}{4a}} = k \qquad \Leftrightarrow \quad k = c - \frac{b^2}{4a} = \frac{4ac}{4a} - \frac{b^2}{4a}$$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k = \cancel{a} \cdot \left(\frac{-b}{2\cancel{a}}\right) \cdot \left(\frac{-b}{2a}\right) + k = \frac{b^2}{4a} + k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c - \frac{b^2}{4a} = \cancel{\frac{b^2}{4a}} + k \cancel{- \frac{b^2}{4a}} = k \qquad \Leftrightarrow \qquad k = c - \frac{b^2}{4a} = \frac{4ac}{4a} - \frac{b^2}{4a} = \frac{4ac - b^2}{4a}$$

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \quad \Leftrightarrow \quad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k = \cancel{a} \cdot \left(\frac{-b}{2\cancel{a}}\right) \cdot \left(\frac{-b}{2a}\right) + k = \frac{b^2}{4a} + k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c - \frac{b^2}{4a} = \cancel{\frac{b^2}{4a}} + k \cancel{- \frac{b^2}{4a}} = k \quad \Leftrightarrow \quad k = c - \frac{b^2}{4a} = \frac{4ac}{4a} - \frac{b^2}{4a} = \frac{4ac - b^2}{4a}$$

We have now found a, h, and k

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k = \cancel{a} \cdot \left(\frac{-b}{2\cancel{a}}\right) \cdot \left(\frac{-b}{2a}\right) + k = \frac{b^2}{4a} + k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c - \frac{b^2}{4a} = \cancel{\frac{b^2}{4a}} + k \cancel{- \frac{b^2}{4a}} = k \qquad \Leftrightarrow \qquad k = c - \frac{b^2}{4a} = \frac{4ac}{4a} - \frac{b^2}{4a} = \frac{4ac - b^2}{4a}$$

We have now found a, h, and k

Conclusion: We can re-write the polynomial in the form we want:

Putting $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$

To put $ax^2 + bx + c$ in the form: $a(x-h)^2 + k$ we need the values of a, h, and k so:

$$ax^2 + bx + c = a(x-h)^2 + k$$

As with our examples, we distribute the right-hand side, giving us:

$$ax^2 + bx + c = ax^2 - 2ahx + ah^2 + k$$

Like our examples, we want to find a, h, and k so coefficients are equal

$a = a$ We probably expected this from doing examples.

$b = -2ah$

We want to solve for h, which we can do by Dividing by $-2a$:

$$\frac{-b}{2a} = \frac{b}{-2a} = \frac{\cancel{-2a}h}{\cancel{-2a}} = h \qquad \Leftrightarrow \qquad h = \frac{-b}{2a}$$

$$c = a \cdot h^2 + k = a \cdot \left(\frac{-b}{2a}\right)^2 + k = \cancel{a} \cdot \left(\frac{-b}{2\cancel{a}}\right) \cdot \left(\frac{-b}{2a}\right) + k = \frac{b^2}{4a} + k$$

We want to solve for k, which we can do by Subtracting $\frac{b^2}{4a}$:

$$c - \frac{b^2}{4a} = \cancel{\frac{b^2}{4a}} + k \cancel{- \frac{b^2}{4a}} = k \qquad \Leftrightarrow \qquad k = c - \frac{b^2}{4a} = \frac{4ac}{4a} - \frac{b^2}{4a} = \frac{4ac - b^2}{4a}$$

We have now found a, h, and k

Conclusion: We can re-write the polynomial in the form we want:

$$ax^2 + bx + c = a\left(x - \frac{-b}{2a}\right)^2 + \frac{4ac - b^2}{4a}$$