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| **Steps to Proving the Quadratic Formula** |
| Order the steps to show how the quadratic formula is derived by completing the square of the general quadratic equation. The first and last step have been completed. |
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| **1** | Start with the general quadratic equation: | $$ax^{2}+bx+c=0$$ |
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| **2** | Expand the bracket $\left(\frac{b}{2a}\right)^{2}$ | $$\left(x+\frac{b}{2a}\right)^{2}=\frac{b^{2}}{4a^{2}}-\frac{c}{a}$$ |
|  |  |  |
| **3** | Subtract $\frac{b}{2a}$ from both sides of the equation: | $$x=-\frac{b}{2a}\pm \frac{\sqrt{b^{2}-4ac}}{2a}$$ |
|  |  |  |
| **4** | Divide through by $a$: | $$x^{2}+\frac{b}{a}x=-\frac{c}{a}$$ |
|  |  |  |
| **5** | Add $\left(\frac{b}{2a}\right)^{2}$to both sides of the equation: | $$\left(x+\frac{b}{2a}\right)^{2}=\left(\frac{b}{2a}\right)^{2}-\frac{c}{a}$$ |
|  |  |  |
| **6** | Complete the square for $x^{2}+\frac{b}{a}x$: | $$\left(x+\frac{b}{2a}\right)^{2}-\left(\frac{b}{2a}\right)^{2}=-\frac{c}{a}$$ |
|  |  |  |
| **7** | Subtract $c$ from both sides: | $$ax^{2}+bx=-c$$ |
|  |  |  |
| **8** | Take the square root of both sides: | $$x+\frac{b}{2a}=\frac{\pm \sqrt{b^{2}-4ac}}{2a}$$ |
|  |  |  |
| **9** | Put $\frac{b^{2}}{4a^{2}}-\frac{c}{a}$ over a common denominator: | $$\left(x+\frac{b}{2a}\right)^{2}=\frac{b^{2}-4ac}{4a^{2}}$$ |
|  |  |  |
| **10** | Write the right hand side as a single fraction. This gives the quadratic formula: | $$x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$$ |

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| **1** |  |  |  |  |  |  |  |  | **10** |