## Unit 7 Lesson 16: The Quadratic Formula

### 1 Evaluate It (Warm up)

#### Student Task Statement

Each expression represents two numbers. Evaluate the expressions and find the two numbers.

1. $1\pm \sqrt{49}$
2. $\frac{8\pm 2}{5}$
3. $\pm \sqrt{\left(-5\right)^{2}−4⋅4⋅1}$
4. $\frac{-18\pm \sqrt{36}}{2⋅3}$

### 2 Pesky Equations

#### Student Task Statement

Choose one equation to solve, either by rewriting it in factored form or by completing the square. Be prepared to explain your choice of method.

1. $x^{2}−2x−1.25=0$
2. $5x^{2}+9x−44=0$
3. $x^{2}+1.25x=0.375$
4. $4x^{2}−28x+29=0$

### 3 Meet the Quadratic Formula

#### Student Task Statement

Here is a formula called the **quadratic formula**.

$x=\frac{-b\pm \sqrt{b^{2}−4ac}}{2a}$

The formula can be used to find the solutions to any quadratic equation in the form of $ax^{2}+bx+c=0$, where $a$, $b$, and $c$ are numbers and $a$ is not 0.

This example shows how it is used to solve $x^{2}−8x+15=0$, in which $a=1$, $b=-8$, and $c=15$.

$\begin{matrix}x&=\frac{-b\pm \sqrt{b^{2}−4ac}}{2a}&  &original equation&\\x&=\frac{-\left(-8\right)\pm \sqrt{\left(-8\right)^{2}−4\left(1\right)\left(15\right)}}{2\left(1\right)}&  &substitute the values of a,b,and c&\\x&=\frac{8\pm \sqrt{64−60}}{2}&  &evaluate each part of the expression&\\x&=\frac{8\pm \sqrt{4}}{2}&&&\\x&=\frac{8\pm 2}{2}&&&\\x&=\frac{10}{2}  or  x=\frac{6}{2}&&&\\x&= 5   or  x= 3&&&\end{matrix}$

Here are some quadratic equations and their solutions. Use the quadratic formula to show that the solutions are correct.

1. $x^{2}+4x−5=0$. The solutions are $x=-5$ and $x=1$.
2. $x^{2}+7x+12=0$. The solutions are $x=-3$ and $x=-4$.
3. $x^{2}+10x+18=0$. The solutions are $x=-5\pm \frac{\sqrt{28}}{2}$.
4. $x^{2}−8x+11=0$. The solutions are $x=4\pm \frac{\sqrt{20}}{2}$.
5. $9x^{2}−6x+1=0$. The solution is $x=\frac{1}{3}$.
6. $6x^{2}+9x−15=0$. The solutions are $x=-\frac{5}{2}$ and $x=1$.



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