## Unit 7 Lesson 14: Completing the Square (Part 3)

### 1 Perfect Squares in Two Forms (Warm up)

#### Student Task Statement

Elena says, “$(x+3)^{2}$ can be expanded into $x^{2}+6x+9$. Likewise, $(2x+3)^{2}$ can be expanded into $4x^{2}+6x+9$.”

Find an error in Elena’s statement and correct the error. Show your reasoning.

### 2 Perfect in A Different Way

#### Student Task Statement

1. Write each expression in standard form:
	1. $(4x+1)^{2}$
	2. $(5x−2)^{2}$
	3. $(\frac{1}{2}x+7)^{2}$
	4. $(3x+n)^{2}$
	5. $(kx+m)^{2}$
2. Decide if each expression is a perfect square. If so, write an equivalent expression of the form $(kx+m)^{2}$. If not, suggest one change to turn it into a perfect square.
	1. $4x^{2}+12x+9$
	2. $4x^{2}+8x+25$

### 3 When All the Stars Align

#### Student Task Statement

1. Find the value of $c$ to make each expression in the left column a perfect square in standard form. Then, write an equivalent expression in the form of squared factors. In the last row, write your own pair of equivalent expressions.

|  |  |
| --- | --- |
| * standard form $(ax^{2}+bx+c)$
 | * squared factors $(kx+m)^{2}$
 |
| * $100x^{2}+80x+c$
 | *
 |
| * $36x^{2}−60x+c$
 | *
 |
| * $25x^{2}+40x+c$
 | *
 |
| * $0.25x^{2}−14x+c$
 | *
 |
| *
 | *
 |

1. Solve each equation by completing the square:
* $25x^{2}+40x=-12$
* $36x^{2}−60x+10=-6$

### 4 Putting Stars into Alignment (Optional)

#### Student Task Statement

Here are three methods for solving $3x^{2}+8x+5=0$.

Try to make sense of each method.

Method 1:

$\begin{matrix}3x^{2}+8x+5&=0\\(3x+5)(x+1)&=0\end{matrix}$

$\begin{matrix}x=-\frac{5}{3} or x=-1\end{matrix}$

Method 2:

$\begin{matrix}3x^{2}+8x+5&=0\\9x^{2}+24x+15&=0\\(3x)^{2}+8(3x)+15&=0\\U^{2}+8U+15&=0\\(U+5)(U+3)&=0\end{matrix}$
$\begin{matrix}U=-5 &or U=-3\\3x=-5 &or 3x=-3\\x=-\frac{5}{3} &or x=-1\end{matrix}$

Method 3:

$\begin{matrix}3x^{2}+8x+5&=0\\9x^{2}+24x+15&=0\\9x^{2}+24x+16&=1\\(3x+4)^{2}&=1\end{matrix}$

$\begin{matrix}3x+4=1 &or 3x+4=-1\\x=-1 &or x=-\frac{5}{3}\end{matrix}$

Once you understand the methods, use each method at least one time to solve these equations.

1. $5x^{2}+17x+6=0$
2. $6x^{2}+19x=-10$
3. $8x^{2}−33x+4=0$
4. $8x^{2}−26x=-21$
5. $10x^{2}+37x=36$
6. $12x^{2}+20x−77=0$



© CC BY 2019 by Illustrative Mathematics®