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

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

#### Student Task Statement

Elena says, “$\left(x+3\right)^{2}$ can be expanded into $x^{2}+6x+9$. Likewise, $\left(2x+3\right)^{2}$ 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. $\left(4x+1\right)^{2}$
	2. $\left(5x−2\right)^{2}$
	3. $\left(\frac{1}{2}x+7\right)^{2}$
	4. $\left(3x+n\right)^{2}$
	5. $\left(kx+m\right)^{2}$
2. Decide if each expression is a perfect square. If so, write an equivalent expression of the form $\left(kx+m\right)^{2}$. 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 $\left(ax^{2}+bx+c\right)$
 | * squared factors $\left(kx+m\right)^{2}$
 |
| --- | --- |
| * $100x^{2}+80x+c$
 | *
 |
| * $36x^{2}−60x+c$
 | *
 |
| * $25x^{2}+40x+c$
 | *
 |
| * $0.25x^{2}−14x+c$
 | *
 |
| *
 | *
 |

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:

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

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

Method 2:

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

Method 3:

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

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

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. $12x^{2}+20x−77=0$



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