

Algebra II
Section 5.4
Completing the Square

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Bell Ringer

You and your classmates decide to sell sweatshirts and T-shirts to raise money for a school trip. You decide that you should sell at least fifteen items, but do not want to exceed 75 items. Based on a small survey of students, you also decide that the number of T-shirts should be at least twice the number of sweatshirts. Which system is the model?

- | | | | |
|--|--|-------------------------------------|--|
| A) $S+T \geq 75$ | B) $S+T \leq 75$ | C) $S+T \leq 75$ | D) $S+T > 75$ |
| $S+T \geq 15$ | $S+T \leq 15$ | $S+T \geq 15$ | $S+T \leq 15$ |
| $T < 2S$ | $T \geq 2S$ | $T \geq 2S$ | $T < 2S$ |

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Not all Quadratics are easy to factor and solve. Today we are going to Complete the Square of the quadratics.

We are going to start by finding the number.

(Divide b by 2 and then square it)

1. $\frac{8}{2} = (4)^2$ 2. $\frac{20}{2} = (10)^2$ 3. $\frac{-6}{2} = (-3)^2$ 4. $\left(\frac{7}{2}\right)^2 = \frac{49}{4}$

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$$ax^2 + bx + c = 0$$

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Complete the square for each expression. Write the resulting expression as a perfect square.

1. $x^2 + 14x + 49$ 2. $x^2 - 12x + 36$ 3. $x^2 - 9x + \frac{81}{4}$

$\frac{14}{2} = 7^2$

$\left(\frac{-9}{2}\right)^2 = \frac{81}{4}$

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Find the number that is added to both sides of the given equation to solve it by completing the square.

1. $x^2 - 6x + \underline{9} = -8 + \underline{9}$ 2. $x^2 + 10x + \underline{25} = 0 + \underline{25}$
 $\frac{-b}{a} = \frac{-(-6)}{1} = 3$ $\frac{-b}{a} = \frac{-10}{1} = -5$
 $(x-3)^2 = 1$ $(x+5)^2 = 25$

3. $x^2 - 7x + \underline{\frac{49}{4}} = -12 + \underline{\frac{49}{4}}$ 4. $x^2 - 15x + \underline{\frac{225}{4}} = -1 + \underline{\frac{225}{4}}$

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Conclusion

1. What is the process in completing the square?

- Step 1 Find b
 Step 2 $\div 2$
 Step 3 square it
 Step 4 add to both sides

Talk with your neighbor.

2. Help your neighbor with completing this square.

$x^2 + 3x + \underline{\quad} = 6 + \underline{\quad}$ Then rewrite as perfect square.

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Assignment

Completing the Square Worksheet

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