



Completing the Square Algebraically

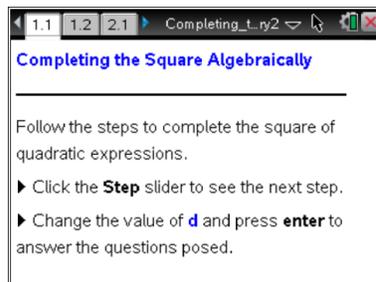
Student Activity

Name _____
Class _____

Open the TI-Nspire document

Completing_the_Square_Algebraically.tns.

In this activity, you will explore how to rewrite a quadratic expression by completing the square.



Move to page 1.2.

Press **ctrl** **▶** and **ctrl** **◀** to navigate through the lesson.

- Follow along on your handheld and fill in the table below as your teacher guides you through the first problem, which includes completing the square of the expression $3x^2 + 6x - 4$. Upon completion of Step 4, the completed expression will be in vertex form $a(x - h)^2 + k$.

	Expression	$3x^2 + 6x - 4$	What happened to the original expression?
Step 1	Group the x -terms.		
Step 2	Factor out the leading coefficient.		
Step 3	Complete the square $\left(\frac{b}{2a}\right)^2$		
Step 4	Factor and simplify.		

- Refer to the expression created in Step 3. Where does the squared constant term come from?
- In Step 3, where does the subtracted constant term outside the parentheses come from? Why is it being subtracted?



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2. Click the New slider to get a new expression. Continue to click the New slider until you get an expression that has a negative sign at the beginning. Using your handheld, complete the square of the new expression. Change the value of d to answer each prompt.

Expression			What happened to the original expression?
Step 1	Group the x-terms.		
Step 2	Factor out the leading coefficient		
Step 3	Complete the square. $\left(\frac{b}{2a}\right)^2$		
Step 4	Factor and simplify.		

- Refer to the expression created in Step 3. Where does the squared constant come from?
- In Step 3, why is the squared constant term inside the parentheses added to the constant term outside the parentheses instead of subtracted as in question 1?

3. Click the New slider to get a new expression. Using your handheld, complete the square of the new expression. Fill in the table by recording each step.

Expression			What happened to the original expression?
Step 1	Group the x-terms.		
Step 2	Factor out the leading coefficient.		
Step 3	Complete the square $\left(\frac{b}{2a}\right)^2$		
Step 4	Factor and simplify.		

- Refer to the expression created in Step 3. Where does the squared constant term come from?
- In Step 3, where does the subtracted constant term outside the parentheses come from? Why is it being subtracted?



Move to page 2.2.

4. On page 2.2, enter $f(x) = -3x^2 + 6x + 4$ by double clicking in the $f(x)$ box, change and press **Enter**. Upon completion of Step 4, the completed expression will be in vertex form $a(x - h)^2 + k$. Fill in the missing steps and explanations in the table.

Expression		$-3x^2 + 6x + 4$	What happened to the original expression?
Step 1	Isolate x-terms.		
Step 2	Factor out the leading coefficient.		
Step 3	Complete the square. $\left(\frac{b}{2a}\right)^2$		
Step 4	Factor and simplify.		Factored and combined like terms.

5. Complete the square of the following expressions. Show your work.

a. $3x^2 - 6x + 7$

b. $-2x^2 + 6x - 1$

c. $2x^2 + x - 4$