4-6 Completing the Square

I have a handout for you.

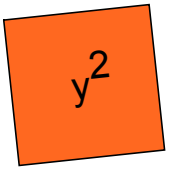
Don't Copy

This is 1 of 2 very difficult topics we will cover this year.

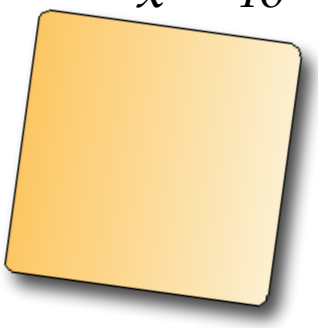
If you pay attention and stop me to ask questions when needed, you will be fine.

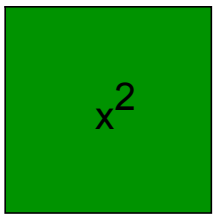
"Completing the square" does not directly refer to a quadrilateral with 4 equal sides and 4 right angles.

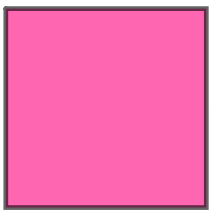
Instead it implies we create a "perfect square" to allow us to take square roots.



$x^2 = 16$ --> $x = 4$ or -4





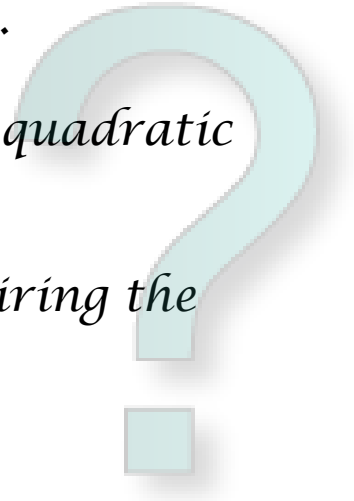


Why do we need to know this?

~ *To solve quadratics that are not factorable and/or have complex solutions.*

~ *To later understand where the quadratic formula comes from.*

~ *To be able to write proofs requiring the completion of the square.*



Solve.

Problem	$2x^2 + 11x - 23 = -x + 3$
Simplify and get only terms with "x" on the left.	$2x^2 + 12x = 26$
Make sure "x^2" coefficient is 1. If not, divide.	$x^2 + 6x = 13$
Divide the linear coefficient by 2. (Remember this magic number for factoring step.) Square it, and add it to both sides. Magic Number = _____3	$x^2 + 6x + 9 = 13 + 9$
Factor the left (using the magic number) and simplify the right.	$(x + 3)^2 = 22$
Solve for "x" and be sure the answer is simplified.	$x + 3 = \pm\sqrt{22}$ $x = -3 \pm \sqrt{22}$

Solve.

Problem	$3x^2 - 42x + 78 = 0$
Simplify and get only terms with "x" on the left.	$3x^2 - 42x = -78$
Make sure "x^2" coefficient is 1. If not, divide.	$x^2 - 14x = -26$
Divide the linear coefficient by 2. (Remember this magic number for factoring step.) Square it, and add it to both sides. Magic Number = _____-7	$x^2 - 14x + 49 = -26 + 49$
Factor the left (using the magic number) and simplify the right.	$(x - 7)^2 = 23$
Solve for "x" and be sure the answer is simplified.	$x - 7 = \pm\sqrt{23}$ $x = 7 \pm \sqrt{23}$

Solve.

Problem	$x^2 - 18x + 64 = 0$
Simplify and get only terms with "x" on the left.	$x^2 - 18x = -64$
Make sure "x^2" coefficient is 1. If not, divide.	$x^2 - 18x = -64$
Divide the linear coefficient by 2. (Remember this magic number for factoring step.) Square it, and add it to both sides. Magic Number = _____-9	$x^2 - 18x + 81 = -64 + 81$
Factor the left (using the magic number) and simplify the right.	$(x - 9)^2 = 17$
Solve for "x" and be sure the answer is simplified.	$x - 9 = \pm\sqrt{17}$ $x = 9 \pm \sqrt{17}$

$x^2 - 6x = 7$