



Math Virtual Learning

Algebra 1 S2

April 24th, 2020



Algebra 1 S2
Lesson: April 23rd, 2020

Learning Target:
Students will solve quadratics using completing the square.



Warm-Up

Factor these special cases:

1. $x^2 + 8x + 16$

2. $x^2 - 14x + 49$

3. $x^2 - 10x + 25$

4. $x^2 + 6x + 9$

5. $x^2 + 22x + 121$

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

***Answers are in the video lesson.**



Today's Lesson

In today's lesson we will learn another way to solve quadratic equations. The method is called *completing the square*.

Go ahead and [click here](#) to get started with today's video.

Perfect Square List: 1^2 2^2 3^2 4^2 5^2 6^2 7^2 8^2 9^2 10^2 11^2 12^2
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144



Today's Examples

Example 1: $x^2 - 6x - 27 = 0$

Example 2: $x^2 - 12x + 55 = 0$

Example 3: $x^2 - 16x + 19 = 4$

Example 4: $x^2 - 16x + 63 = 0$



Independent Practice

1) $x^2 + 20x - 44 = 0$

2) $x^2 + 12x + 14 = -6$

3) $x^2 - 14x - 32 = 0$

4) $x^2 + 8x - 20 = 0$

5) $x^2 + 6x + 5 = 0$

6) $x^2 + 14x + 81 = 0$

7) $x^2 - 10x - 11 = 0$

8) $x^2 + 18x + 65 = 0$

Independent Practice

1) $x^2 + 20x - 44 = 0$

$$x^2 + 20x - 44 = 0$$

~~+44~~ ~~+44~~

$$\left(\frac{20}{2}\right)^2 = (10)^2 = 100$$

$$x^2 + 20x + 100 = 44 + 100$$

$$x^2 + 20x + 100 = 144$$

$$\sqrt{(x+10)^2} = \sqrt{144}$$

$$x+10 = \pm 12$$

~~-10~~ ~~-10~~

$$x = -10 + 12 \quad \boxed{x = 2}$$

$$x = -10 \pm 12$$

$$x = -10 - 12 \quad \boxed{x = -22}$$

Independent Practice

2) $x^2 + 12x + 14 = -6$

Handwritten solution for the quadratic equation $x^2 + 12x + 14 = -6$ using the completing the square method:

$$x^2 + 12x + 14 = -6$$

~~-14~~ ~~-14~~

$$x^2 + 12x + 36 = -20 + 36$$

$$x^2 + 12x + 36 = 16$$

$$\sqrt{(x+6)^2} = \sqrt{16}$$

$$x+6 = \pm 4$$

~~-6~~ ~~-6~~

$$x = -6 + 4 \quad \boxed{x = -2}$$

$$x = -6 - 4 \quad \boxed{x = -10}$$

$(12/2)^2 = (6)^2 = 36$

Independent Practice

3) $x^2 - 14x - 32 = 0$

$$x^2 - 14x - 32 = 0$$

$$+32 \quad +32$$

$$\left(-\frac{14}{2}\right)^2 = \underline{(-7)^2} = 49$$

$$x^2 - 14x + 49 = 32 + 49$$

$$x^2 - 14x + 49 = 81$$

$$\sqrt{(x-7)^2} = \sqrt{81}$$

$$x-7 = \pm 9$$

$$+7 \quad +7$$

$$x = 7 \pm 9$$

$$x = 7 + 9$$

$$x = 16$$

$$x = 7 - 9$$

$$x = -2$$

Independent Practice

4) $x^2 + 8x - 20 = 0$

The image shows a handwritten solution on lined paper for the quadratic equation $x^2 + 8x - 20 = 0$. The steps are as follows:

- Start with the equation: $x^2 + 8x - 20 = 0$. The -20 is crossed out, and $+20$ is added to both sides.
- Calculate the constant to complete the square: $(8/2)^2 = (4)^2 = 16$.
- Add 16 to both sides: $x^2 + 8x + 16 = 20 + 16$.
- Simplify the right side: $x^2 + 8x + 16 = 36$.
- Take the square root of both sides: $\sqrt{(x+4)^2} = \sqrt{36}$.
- Simplify the square roots: $x + 4 = \pm 6$. The $+4$ is crossed out, and -4 is added to both sides.
- Write the general solution: $x = -4 \pm 6$.
- Find the two specific solutions: $x = -4 + 6$ and $x = -4 - 6$.
- Box the final answers: $x = 2$ and $x = -10$.

Independent Practice

5) $x^2 + 6x + 5 = 0$

$$x^2 + 6x + 5 = 0$$

$$x^2 + 6x + 9 = -5 + 9$$

$$x^2 + 6x + 9 = 4$$

$$\sqrt{(x+3)^2} = \sqrt{4}$$

$$x+3 = \pm 2$$

$$x = -3 \pm 2$$

$$x = -3 + 2 \quad \boxed{x = -1}$$

$$x = -3 - 2 \quad \boxed{x = -5}$$

Independent Practice

6) $x^2 + 14x + 81 = 0$

$x^2 + 14x + 81 = 0$ $(14/2)^2 = (\underline{7})^2 = 49$
 ~~-81~~ -81

$x^2 + 14x + \underline{49} = -81 + \underline{49}$

$x^2 + 14x + 49 = -32$

$\sqrt{(x + \underline{7})^2} = \sqrt{-32}$

↑ Negative #

No Real Solutions

Independent Practice

7) $x^2 - 10x - 11 = 0$

$$x^2 - 10x - 11 = 0$$

$$\quad \quad \quad \cancel{+11} \quad +11$$

$$x^2 - 10x + 25 = 11 + 25$$

$$x^2 - 10x + 25 = 36$$

$$\sqrt{(x-5)^2} = \sqrt{36}$$

$$x - 5 = \pm 6$$

$$\quad \quad \quad \cancel{+5} \quad +5$$

$$x = 5 + 6 \quad \boxed{x = 11}$$

$$x = 5 - 6 \quad \boxed{x = -1}$$

$$(-10/2)^2 = (-5)^2 = 25$$

Independent Practice

8) $x^2 + 18x + 65 = 0$

$x^2 + 18x + 65 = 0$
 ~~$-65 -65$~~

$(18/2) = (\underline{9})^2 = 81$

$x^2 + 18x + \underline{81} = \underline{-65 + 81}$

$\sqrt{(x + \underline{9})^2} = \sqrt{16}$

$x + \underline{9} = \pm 4$

~~$-9 -9$~~

$x = -9 + 4$ $x = -9 - 4$

$x = -5$
 $x = -13$



Additional Practice:

Click on the links below to get additional practice and to check your understanding!

[Extra video](#)

[Extra Practice](#) for using the quadratic formula

*Set timers to beat your scores

[Quizizz](#) for using the quadratic formula.

*You can play the game or use the flashcards to practice.