

Intro to College Math: Chapter 6.7
Solving by Factoring

* Steps for solving quadratic function by factoring:

1. Put the equation in standard form. This means that 0 is on one side and everything else on the other, in decreasing powers.
2. Factor completely.
3. Set each expression in each set of () "= 0".
4. Solve each equation for the variable.

1. Solve the following equations for the indicated variable. $(5y+3)(7y+9) = 0$

$$(5y+3)(7y+9) = 0$$

$$\begin{array}{r} 5y+3=0 \\ \hline 5y = -3 \\ \hline y = -\frac{3}{5} \end{array}$$

$$\begin{array}{r} 7y+9=0 \\ \hline 7y = -9 \\ \hline y = -\frac{9}{7} \end{array}$$

To solve:

* Write down what is in each set of () and set each one "= 0".

* Then solve each one for the variable. (Goal is to get variable on left side by itself.) You do this by moving numbers to the right side by adding or subtracting. Then divide both sides by the number in front of the variable.

2. Solve the following equations for the indicated variable. $7r(4r-3)(7r+3) = 0$

$$7r(4r-3)(7r+3) = 0$$

$$\begin{array}{r} 7r=0 \\ \hline r = 0 \end{array}$$

$$\begin{array}{r} 4r-3=0 \\ \hline 4r = 3 \\ \hline r = \frac{3}{4} \end{array}$$

$$\begin{array}{r} 7r+3=0 \\ \hline 7r = -3 \\ \hline r = -\frac{3}{7} \end{array}$$

To solve:

* Write down what is in each set of () and what's outside the () and set each one "= 0".

* Then solve each one for the variable. (Goal is to get variable on left side by itself.) You do this by moving numbers to the right side by adding or subtracting. Then divide both sides by the number in front of the variable.

3. Solve the equation. $x^2 + 8x - 9 = 0$

$$x^2 + 8x - 9 = 0$$

$$(x-1)(x+9) = 0$$

$x-1=0$
 $\frac{+1 \quad +1}{x=1}$

$x+9=0$
 $\frac{-9 \quad -9}{x=-9}$

9

1 9
3 3

1+9=10
-1+9=8
1-9=-8
-1-9=-10

signs

- * First we must factor the equation.
- * Make 2 sets of () () and write the variable in each one.
- * Then take the number by itself (not the 0), and write it down to the sides. Write down each set of numbers that can multiply to get that number.
- * Then decide which set can add or subtract to get the middle number (one in front of x). Write those numbers in the ().
- * Determine the signs.
- * Then set each expression in each set of () "= 0".
- * Then solve each one for the variable.

4. Solve the following equation. $2x^2 + 3x - 5 = 0$

$$2x^2 + 3x - 5 = 0$$

$$(x-2)(x+5) = 0$$

2 5
10
1 10
2 5

2+5=7
-2+5=3
2-5=-3
-2-5=-7

signs

$$(x-\frac{2}{2})(x+\frac{5}{2}) = 0$$

$$(x-1)(2x+5) = 0$$

$x-1=0$
 $\frac{+1 \quad +1}{x=1}$

$2x+5=0$
 $\frac{-5 \quad -5}{2x=-5}$
 $\frac{-5}{2}$
 $x=\frac{-5}{2}$

- * First we must factor the equation.
- * Make 2 sets of () () and write the variable in each one.
- * Then multiply the number in front of x by the number by itself, and write it down to the side. Write down each set of numbers that can multiply to get that number.
- * Then decide which set can add or subtract to get the middle number (one in front of x). Write those numbers in the ().
- * Determine the signs.
- * Next, take the number in front of x^2 and put it under the 2 numbers in the ().
- * If it divides evenly, then you just divide it and put the new number in the (). If it does not divide evenly, then put the denominator back in front of the x in the ().
- * Then set each expression in each set of () "= 0".
- * Then solve each one for the variable.

5. Solve the following equation. $y^2 = -2y + 8$

$$\begin{array}{r}
 y^2 = -2y + 8 \\
 \text{+2y} \quad \text{+2y} \\
 \hline
 y^2 + 2y = 8 \\
 \text{-8} \quad \text{-8} \\
 \hline
 y^2 + 2y - 8 = 0 \\
 (y-2)(y+4) = 0 \\
 \swarrow \quad \searrow \\
 y-2=0 \quad y+4=0 \\
 \text{+2} \quad \text{+2} \quad \text{-4} \quad \text{-4} \\
 \hline
 y = 2 \quad y = -4
 \end{array}$$

8
 $\wedge$
 $1 \cdot 8$
 $2 \cdot 4$

$2+4=6$
 $-2+4=2$
 $2-4=-2$
 $-2-4=-6$

to determine signs

- * First, move everything on the right to the left by adding or subtracting.
- * Now we factor.
 - * Make 2 sets of () () and write the variable in each one.
 - * Then take the number by itself (not the 0), and write it down to the sides. Write down each set of numbers that can multiply to get that number.
 - * Then decide which set can add or subtract to get the middle number (one in front of x). Write those numbers in the ().
 - * Determine the signs.
- * Then set each expression in each set of () " = 0".
- * Then solve each one for the variable.

6. Solve the following equation. $y^2 + 16 = -8y$

$$\begin{array}{r}
 y^2 + 16 = -8y \\
 \text{+8y} \quad \text{+8y} \\
 \hline
 y^2 + 8y + 16 = 0 \\
 (y+4)(y+4) = 0 \\
 \swarrow \quad \searrow \\
 y+4=0 \quad y+4=0 \\
 \text{-4} \quad \text{-4} \quad \text{-4} \quad \text{-4} \\
 \hline
 y = -4 \quad y = -4
 \end{array}$$

16
 $\wedge$
 $1 \cdot 16$
 $2 \cdot 8$
 $4 \cdot 4$

$4+4=8$
 $-4+4=0$
 $4-4=0$
 $-4-4=-8$

signs

- * First, move everything on the right to the left by adding or subtracting.
- * Now we factor.
 - * Make 2 sets of () () and write the variable in each one.
 - * Then take the number by itself (not the 0), and write it down to the sides. Write down each set of numbers that can multiply to get that number.
 - * Then decide which set can add or subtract to get the middle number (one in front of x). Write those numbers in the ().
 - * Determine the signs.
- * Then set each expression in each set of () " = 0".
- * Then solve each one for the variable.

• Since they are the same number, we only write it once

