

# SOLVE QUADRATIC FUNCTIONS BY FACTORING

Remember:  $y = ax^2 + bx + c$

Factor using the AC method.

Ex. Factor  $x^2 - 8x + 12$ .

$$a = 1 \quad b = -8 \quad c = 12$$

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|--|---|
| <p>1) <u><math>x^2 - 8x + 12</math></u>     <math>1 \times 12 = 12</math></p>  | <p>1) To the side, multiply a and c.</p>  |
| <p>2) <math display="block">\begin{array}{r l} &amp; 12 \\ -6 &amp; -2 \\ \hline 3 &amp; 4 \\ -3 &amp; 4 \end{array} -8</math></p> | <p>2) Find factors of <u>ac</u> that sum to b.</p>  |
| <p>3) <math>x^2 - 8x + 12</math><br/><math>x^2 - 6x - 2x + 12</math></p>   | <p>3) Rewrite b as the sum of factors of ac.</p>  |
| <p>4) <math>(x^2 - 6x)(-2x + 12)</math></p>  | <p>4) Group pairs using <u>parenthesis</u>.</p>   |
| <p>5) <math>x(x-6) - 2(x-6)</math></p>   | <p>5) Factor out what each pair has in common. The goal is for the terms in ( ) to be the same.</p> |
| <p>6) <math>(x-6)(x-2)</math></p>  | <p>6) Rewrite.</p>  |

Factor  $15x^2 - 8x + 1$ .

Step 1)  $15x^2 - 8x + 1$

$$15 \times 1 = 15$$

Step 2)  $15x^2 - \underline{8x} + 1$

$$\begin{array}{r} 15 \\ \hline 3 \ 5 \\ \hline -3 \ -5 \end{array} \Bigg| -8$$

Step 3)  $15x^2 - 3x - 5x + 1$

Step 4)  $(15x^2 - 3x)(-5x + 1)$

Step 5)  $3x(5x - 1) - 1(5x - 1)$

Step 6)  $(3x - 1)(5x - 1)$

$$15x^2 + 7x - 2$$

$$(15)(-2) = -30$$

$$(15x^2 + 10x) - 3x - 2$$

$$\begin{array}{r|l} -30 & \\ -10 & 3 \\ \hline 10 & -3 \end{array} \Bigg| 7$$

$$5x(3x + 2) - 1(3x + 2)$$

$$\boxed{(5x - 1)(3x + 2)}$$

## SOLVING:

- The original equation must  $= 0$
- Factor
- Use the Zero-Product Property

If  $ab = 0$ , then  
 $a = 0$  and/or  $b = 0$

$$12x^2 - 4x = 5 \quad \leftarrow \text{Not} = 0$$

$$\underline{\quad -5 \quad -5 \quad}$$

$$12x^2 - 4x - 5 = 0 \quad (12)(-5) = -60$$

$$(12x^2 - 10x)(+6x - 5) = 0$$

$\begin{array}{r} -60 \\ \hline -10 \quad 6 \\ \hline -4 \end{array}$

$$2x(6x - 5) + 1(6x - 5) = 0$$

$$(2x + 1)(6x - 5) = 0$$

$$2x + 1 = 0$$

$$\underline{\quad -1 \quad -1 \quad}$$

$$\frac{2x}{2} = \frac{-1}{2}$$

$$x = -\frac{1}{2}$$

$$6x - 5 = 0$$

$$\underline{\quad +5 \quad +5 \quad}$$

$$\frac{6x}{6} = \frac{5}{6}$$

$$x = \frac{5}{6}$$

} Zero product property