Intermediate algebra
Class notes
Solving Quadratic Equations by Factoring (section 13.6)

We start solving equations here. Our factoring skills will play an important part.

Main idea:
If I tell you I know of two numbers whose product is zero, what must be true of the numbers?

Think it through. Think up examples of two numbers whose product is 0. What is always true of the numbers? We will write this rule in algebraic form.

Zero Factor Theorem: If $a \cdot b = 0$, then $a = 0$ or $b = 0$.

This is the crux of the whole section. So make sure you believe it before going on. Put numbers in for a and b to make sense of it.

In this section, we will solve equations. What does it mean to solve an equation? In other words, what are you doing when asked to solve the equation $x^2 - 11x + 24 = 0$?

This is different than what we have been doing. **Factoring expressions is just about manipulating them to make them look a little different. Solving equations means to find the *x* that makes them true.** (Notice equations have equal signs and expressions do not.) In fact, a big reason we spent so much time factoring is to be able to use that knowledge to solve equations in this section.

expl 1: Solve.

$(x + 2)(3x + 1) = 0$

See this as two numbers whose product is 0. The two numbers are "$x + 2$" and "$3x + 1$".

Solving an equation involves rewriting this equation as simpler and simpler equations until we end up with a solution like $x = 4$.

What do you know about "$x + 2$" and "$3x + 1$"? Use that to write two simpler equations. Then solve them to get x alone.

The whole point is that those two x values made the equation true. Check them in the original equation to be sure.

Check: $(x + 2)(3x + 1) = 0$

Put -2 in for x to check it.

Check: $(x + 2)(3x + 1) = 0$

Put $-1/3$ in for x to check it.

expl 2: Solve.

$x^2 + 15x + 56 = 0$

We want to use the Zero Factor Theorem. What do we need to do first?

Check your answers.

expl 3: Solve.

$3(x + 5)(x - 4) = 0$

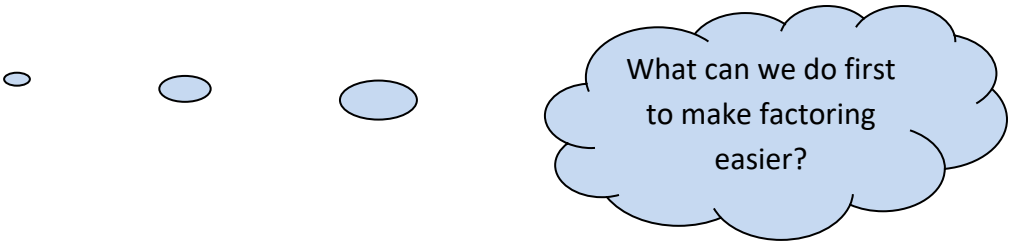
You should always check your answers. See if they make the original equation true.

expl 4: Solve.

$x^2 - 11x + 24 = 0$

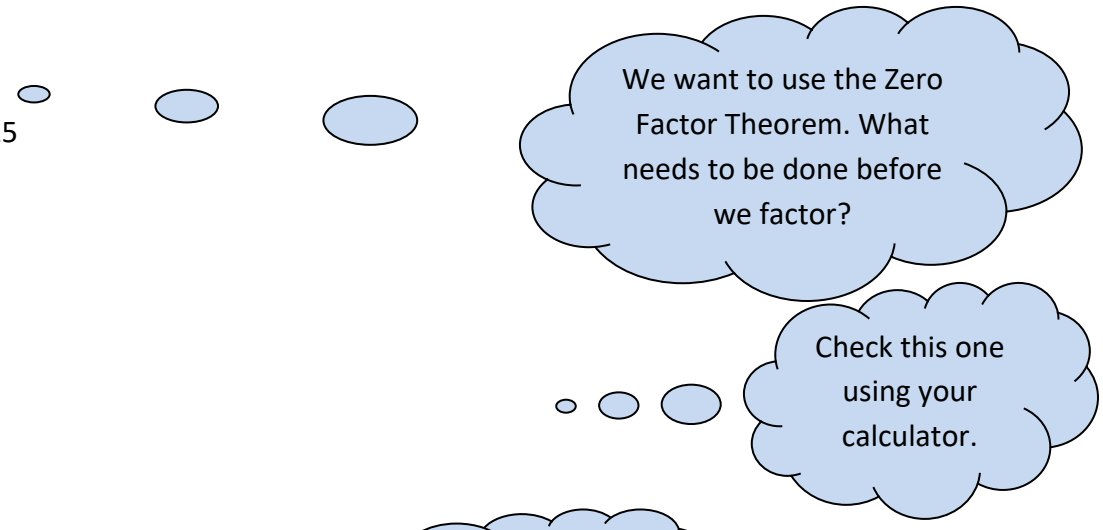
expl 5: Solve.

$7x^2 - 7x - 630 = 0$



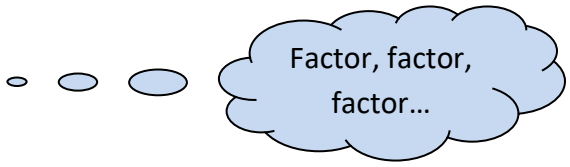
expl 6: Solve.

$2x^2 - 7x = 15$



expl 7: Solve.

$(x + ½)(x^2 + 4x - 5) = 0$

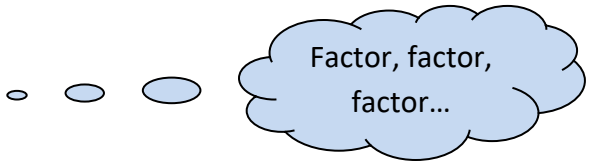


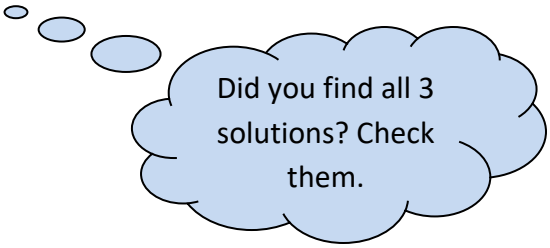
Worksheet: Solving Equations by Factoring:

This will provide some practice with these problems.

expl 8: Solve.

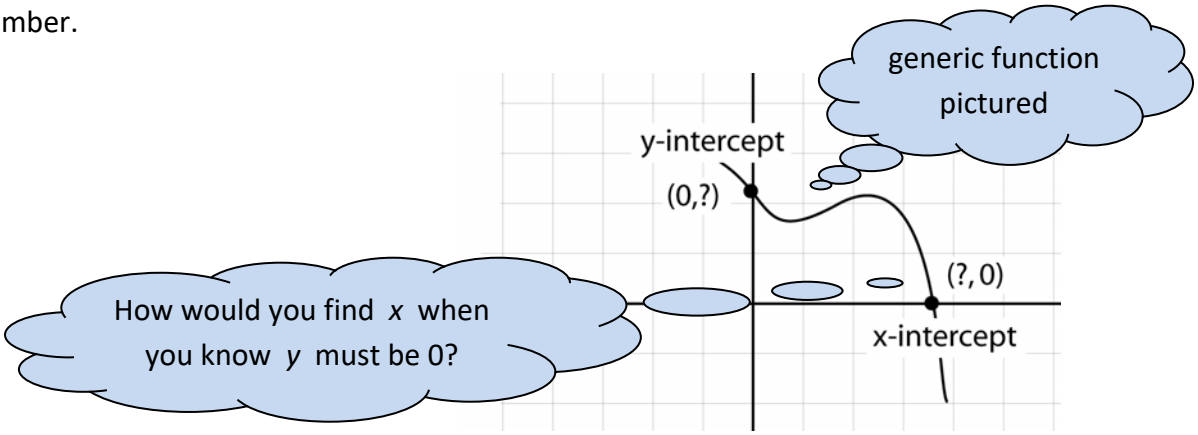
$3x^3 + 11x^2 - 4x = 0$





Finding x-intercepts:

How do we find the *x*-intercept(s) of a function like $y = 2x^2 + 13x + 6$? The picture below may help you remember.



So, how do we find the *x*-intercept(s) if we're given the function's equation?

Algebraically find the *x*-intercepts of $y = 2x^2 + 13x + 6$.