

# Math 115E Activity 14

Chapter 5 Section 1-2  
Factoring Quadratics Part 2

## How to factor quadratic equations

### Quadratic factoring when $a = 1$ :

When factoring, the form  $x^2 + bx + c$   
can be factored as  $(x + m)(x + n)$   
Start with real numbers  $m$  and  $n$  so:  
they both multiply to  $c$  and both add to  $b$   
There is not a value in front of either  $x$

### Quadratic factoring when $a \neq 1$ :

When factoring, the form  $ax^2 + bx + c$   
can be factored as  $(px + m)(qx + n)$   
Start with two real numbers such that:  
multiply to  $a \cdot c$  and yet add to  $b$   
then we re-group the terms and factor

Example: We want to factor  $3x^2 - 11x + 10$

**Step 1:** Find the factors of  $3 * 10 = 30$  that add up to  $-11$ , (Write the factors if needed)

**Step 2:** The factors of 30 are:  $\pm(1, 30), \pm(2, 15), \pm(3, 10), \pm(5, 6)$ ,  
so the pair that adds to  $-11$  is  $-5$  and  $-6$

**Step 3:** Rewrite the quadratic:  $3x^2 + (-6x - 5x) + 10 = 0$

**Step 4:** Regroup so that each group has a common factor:  $(3x^2 - 6x) + (-5x + 10) = 0$

**Step 5:** Factor out a common term:  $(3x)(x - 2) - 5(x - 2) = 0$

**Step 6:** Factor again with the  $x - 2$  term:  $(3x - 5)(x - 2) = 0$

**Step 7:** Solve for  $x$ , so we get  $3x - 5 = 0$  and  $x - 2 = 0$ , giving us  $x = \frac{5}{3}$  and  $x = 2$

**DONE:** So starting with  $3x^2 - 11x + 10 = 0$ , we get  $(3x - 5)(x - 2) = 0$

**NOTE:** If we aren't able to factor out a common term or we don't get the same expression in both parentheses in Step 5, then go back to Step 3 and swap the factor pair.

## Factor the following quadratic equations

#1  $x^2 + 9x + 14$

#7  $9x^2 - 27x + 18$

#2  $x^2 - 8x + 7$

#8  $4x^2 - 13x + 10$

#3  $x^2 + x - 30$

#9  $2x^2 - 13x - 7$

#4  $3x^2 + 10x + 8$

#10  $4x^2 + 20x + 25$

#5  $2x^2 - 9x + 10$

#11  $3x^2 - 19x + 20$

#6  $2x^2 - 6x - 20$

#12  $8x^2 - 6x - 9$

$$(5x^2 + 10x) + (2x + 4)$$
$$5x(x + 2) + 2(x + 2)$$

$$2x^2 + 7x + 6$$
$$(2x^2 + 4x) + (3x + 6)$$
$$2x(x + 2) + 3(x + 2)$$
$$(2x + 3)(x + 2)$$