To factor an expression containing two or more terms, factor out the *greatest common factor* (GCF)

Factor each quadratic expression.

$3 \cdot a \cdot x \cdot x - 2 \cdot 3 \cdot a \cdot a \cdot x$

a. $5x^2 + 4x$

$x(5x+4)$

$5x^2 + 4x$

b. $3ax^2 - 6a^2x$

$3ax(x - 2a)$

Factoring $x^2 + bx + c$

To factor an expression of the form $ax^2 + bx + c$, where $\boldsymbol{a = 1}$

Ask yourself 2 questions:

1. What two numbers multiply to make c?

AND

2. What two numbers add to make b?

Factor each quadratic expression.

a. $x^2 + 5x + 4$

a b c

+ ×

$4 = 1 \cdot 4$

$5 = 1 + 4$

$(x+1)(x+4)$

$x^2 + 4x + 1x + 4$

$x^2 + 5x + 4$

b. $x^2 + 6x + 8$

+ ×

$8 = 4 \cdot 2$

$6 = 4 + 2$

$(x+4)(x+2)$

Factor each quadratic expression.

c. $x^2 - 7x + 10$

$+10 = -5 \cdot -2$

$-7 = -5 + -2$

$(x-5)(x-2)$

d. $x^2 - 2x - 8$

$-8 = +2 \cdot -4$

$-2 = +2 + -4$

$(x+2)(x-4)$

Factoring $x^2 + bx + c$

To factor an expression of the form $ax^2 + bx + c$, where a = **not 1**

1. Multiply a and c
2. Find factors of the product of ac that add to give you b
3. Rewrite your polynomial using the numbers you found in step 2 to break up b into two terms.
4. Find the GCF by grouping
5. Write out binomials

Factor each expression

$2x^2 + 13x + 15$ (a, b, c)

1. Multiply a·c

$2 \cdot 15 = 30$

2. $3 \cdot 10 = 30$ 1·30, 2·15, 3·10, 5·6

$3 + 10 = 13$

3. Rewrite & break up middle

$2x^2 + 13x + 15$

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

4. Factor by grouping

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

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

$2x^2 + 10x + 3x + 15$

$2x^2 + 13x + 15$

$6x^2 + 11x + 3$

$18 = 9 \cdot 2$

$11 = 9 + 2$

$(6x^2 + 9x) + (2x + 3)$

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

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

$(6x^2 + 2x) + (9x + 3)$

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

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

Factor each expression.

$3x^2 + 11x - 20$

$-60 = +15 \cdot -4$

$+11 = +15 + -4$

$(3x^2 + 15x) + (-4x - 20)$

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

$\boxed{(x+5)(3x-4)}$

$4x^2 - 13x + 3$

$12 = -1 \cdot -12$

$-13 = -1 + -12$

$(4x^2 - x) + (-12x + 3)$

$x(4x-1) - 3(4x-1)$

$\boxed{(4x-1)(x-3)}$