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Factoring $ax^2+bx + c$

Unit 8 Lesson 6

Factoring ax^2+bx+c

Students will be able to:

Factor polynomials in ax^2+bx+c form.

Key Vocabulary:

- Factoring
- First term
- Middle term
- Last term

Factoring ax^2+bx+c:

let: $ax^2 + bx + c = (ex + f)(gx + h)$

where ***bx*** is the sum ***(f)(gx)*** and ***(ex)(h)*** ; ***ax²*** is the product of ***ex*** and ***gx***; and **c** is a product of ***f*** and ***h*** .

Factoring ax^2+bx+c:

Step 1: split ax^2 into its factors ex and gx;
Step 2: Split the last term ***c***, into two factors ***f*** and ***h*** whose product is ***c;***
Step 3: make sure that the sum of the product $(\boldsymbol{f})(\boldsymbol{gx})$ and $(\boldsymbol{ex})(\boldsymbol{h})$ is equal to the middle term ***bx***.
Step 3: Write the usual binomial factor such as $\boldsymbol{ax^2+bx+c=(ex+f)(gx+h)}$ where ***bx*** is the sum of the middle term (inner and outer term).

$$ax^2+bx+c=(ex+f)(gx+h)$$

Sample Problem 1: **Factor the following polynomials in ax^2+bx+c form.**

$1.2a^2+7a+6$

$2.6x^2-10x+4$

$3.4b^2-16b+16$

$4.8y^2+44y+56$

$5.2x^2-10x-300$

Sample Problem 1: **Factor the following polynomials in ax^2+bx+c form.**

$$1.2a^2+7a+6$$

Solution: $2a^2=(2a)(a)$ $\qquad$ $6=(3)(2)$

then

$$(2a+3)(a+2)$$

($3a$ and $4a$)

where

$$7a=3a+4a$$

Sample Problem 1: Factor the following polynomials in ax^2+bx+c form.

$$2.6x^2 - 10x + 4$$

Solution: $6x^2 = (3x)(2x)$ $\qquad$ $4 = (-2)(-2)$

then

$$(3x - 2)(2x - 2)$$

$-4x$ and $-6x$

where

$$-10x = -4x + (-6x)$$

Sample Problem 1: **Factor the following polynomials in ax^2+bx+c form.**

$$3.4b^2 - 16b + 16$$

Solution: $4b^2 = (2b)(2b)$ $\qquad 16 = (-4)(-4)$

then

$$(2b - 4)(2b - 4)$$

$-8b$ $\qquad -8b$

where

$$-16b = -8b + (-8b)$$

Sample Problem 1: Factor the following polynomials in ax^2+bx+c form.

$$4.8y^2+44y+56$$

Solution: $8y^2=(4y)(2y)$ $\qquad$ $56=(8)(7)$

$16y$

then $(4y+8)(2y+7)$

$28y$

where $44y=16y+28y$

Sample Problem 1: **Factor the following polynomials in ax^2+bx+c form.**

$$5.2x^2 - 10x - 300$$

Solution: $2x^2 = (2x)(x)$ $\qquad -300 = (-30)(10)$

then $\overset{-30x}{\overbrace{\qquad}}$

$$(2x-30)(x+10)$$

$\underbrace{\qquad}_{20x}$

where $-10x = -30x + 20x$