Grade:10

Week:7

Subject: Mathematics

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Factors of quadratic expressions

Factors of algebraic expressions

- 3x+6 is an algebraic expression.When it is represented as 3(x+2),3 & (x+2) are it's factors.
- Since $4x^2 + 6x = 2x(2x + 3)$, *2*x & (2x+3) are factors of $4x^2 + 6x$.

Factors of trinomial quadratic expressions.

- Trinomial quadratic expressions are the expressions of the form of,$ax^2 + bx + c$.

(Here $a \neq 0, b \neq 0, c \neq 0$)

a=coefficient of x^2

b =coefficient of x

c =constant term

For example let $x^2 + 5x + 6$

$$x^2 + 5x + 6 = ax^2 + bx + c$$

Here $a = 1, b = 5, c = 6$

Another example let $-x^2 - x + 6$,

$$-x^2 - x + 6 = ax^2 + bx + c$$

Here $a = -1, b = -1, c = 6$

Let's consider the product of (x+2)&(x+3),

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

$$= x^2 + 3x + 2x + 6$$

$$= x^2 + 5x + 6$$

- The middle term of the trinomial quadratic expression $x^2 + 5x + 6$ which is 5x is represented as (3x + 2x) .
- Product of the two terms 3x&2x is represented as $3x \times 2x = 6x^2$
- The product of the first and last term of the trinomial quadratic expression $x^2 + 5x + 6$ is $6x^2$

1. ***Let's find the factors of*** x^2 **+ 7x + 10**

Product of the first and last term = $x^2 \times 10 = +10x^2$

Middle term=+7x

Product as $+10x^2$ *and the addition as +7x can be made using +5x&+2x.*

Then, $x^2 + 7x + 10 = x^2 + 5x + 2x + 10$

$= x(x+5) + 2(x+5)$

$= (x + 2)(x + 5)$

2. ***Let's find the factors of*** x^2 **- 7x + 12**

Product of the first and last term= $x^2 \times 12 = 12x^2$

Middle term=-7x

Product as $+12x^2$ *and the addition as -7x can be made using -4x&-3x.*

Then, $x^2 - 7x + 12 = x^2 - 4x - 3x + 12$

$= x(x-4) - 3(x-4)$

$= (x - 4)(x - 3)$

3. ***Let's find the factors of*** x^2 **- 7x - 8**

Product of the first and last term= $x^2 \times -8 = -8x^2$

Middle term=-7x

Product as $-8x^2$ *and the addition as -7x can be made using -8x&+x*

Then, $x^2 - 7x - 8 = x^2 - 8x + x - 8$

$= x(x-8) + (x-8)$

$= (x - 8)(x + 1)$

4. ***Let's find the factors of*** $2a^2$ **+ 13ab - 7**b^2

Product of the first and last term= $2a^2 \times -7b^2 = -14ab^2$

Middle term=+13ab

Product as-14ab^2 and the addition as +13ab can be made using 14ab&-ab

Then, $2a^2 + 13ab - 7b^2 = 2a^2 + 14ab - ab - 7b^2$

$= 2a(a+7b) - b(a+7b)$

$= (2a - b)(a + 7b)$

5. When the expressions like **12 - 4x -** x^2 are given to fatorize,

   Writing it as **-** x^2 **- 4x + 12** is easier to factorize.

   Answer to the exercises *7.1 & 7.2*

Factors of the expressions of the form of difference of two squares.

When the product of (x-y) & (x+y) is considered,

$$(x-y)(x+y) = x^2 + xy - xy - y^2$$

$$= x^2 - y^2$$

$$x^2 - y^2 = (x-y)(x+y)$$

Since, $x^2 - y^2 = x^2 + 0 - y^2$,

Let's factorize x^2 **+ 0 -** y^2

Product of the first and last term=x^2 x- y^2 =-x^2y^2

Middle term=0

Product as -x2y2 and the addition as 0 can be made using -xy&xy

Then, $x^2 + 0 - y^2 = x^2 - xy + xy - y^2$

$= x(x-y) + y(x-y)$

$= (x + y)(x - y)$

$$x^2 - y^2 = (x-y)(x+y)$$

Examples:-

1. $x^2 - 4 = x^2 - 2^2 = (x-y)(x+y)$
2. $25a^2 - 16b^2 = 5^2a^2 - 4^2b^2 = (5a - 4b)(5a + 4b)$
3. $(x+3)^2 - y^2 = [(x+3)-y]\ [(x+3) + y]$
4. $(a-2)^2 - (a+5)^2 = [(a-2)-(a+5)]\ [(a-2)+(a+5)] = [a-2-a-5][a-2+a+5]$

$= (-7)(2a + 3)$

Answer to the exercises7 *.3 & 7.4*