

# Common Factoring

Ex/ Given  $y = x^2 + 4x$ , determine:

- The direction of opening.
- The vertex.
- The zeros.

a) up (a value is positive 1)

$$b) \quad x = \frac{-4}{2(1)}$$

$$= \frac{-4}{2}$$

$$= -2$$

$$y = (-2)^2 + 4(-2)$$

$$= -4$$

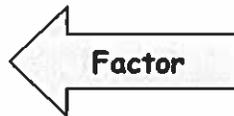
$$V(-2, -4)$$

\*  
c) Don't know

- While standard form is useful in finding the direction of opening and vertex, it does not allow us to find the zeros. If we could convert standard form back to factored form however we could identify the zeros.
- To convert from standard to factored form we have to be able to factor. That is, figure out which terms have been multiplied together to make the equation.



$$y = -2(x - 3)(x + 5) \quad \Leftrightarrow \quad y = -2x^2 - 4x + 30$$



multiply

Ex/ Expand  $3x(2x^2 + 5x - 1)$

$$= 6x^3 + 15x^2 - 3x$$

- When we expand an expression, we are multiplying all the terms in the bracket by the value in front.
- To factor, we will have to do the opposite. That is, divide all the terms by a single value, this value is called the Greatest Common Factor (GCF).
- The GCF is the number/letter/combination that all terms have in common or are divisible by.

Exponents subtract  
when divided out

Ex/ Factor.

a)  $-12x + 4y$

Can divide everything by 4  
 $= -4(3x - 1y)$   
or  
 $= 4(-3x + 1y)$

d)  $6a - 12a^5$

$= 6a(1 - 2a^4)$

Need same number of terms  
as in question

g)  $6p^2q^3 + 3p^3q^2 - 9p^2q^3$

$= 3p^2q^2(2q + 1p - 3q)$

Can take out multiple p's and q's

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

common expression

$= (x-2)(3x-2)$   
leftover

split in half  
common factor  
each half

k)  $2ax - 3bx - 2ay + 3by$

$= x(2a - 3b) - y(2a - 3b)$

$= (2a - 3b)(x - y)$

b)  $15xy - 10xy^2$

$= 5xy(3 - 2y)$

Can divide by 5, and  
x and y show up in both (common)

e)  $ax^3 - 5ax^2 + 3ax$

$= ax(x^2 - 5x + 3)$

c)  $28a^2 - 4ab$

$= 4a(7a - 1b)$

f)  $45a^2b - 15ab^2 - 60ab$

$= 15ab(3a - 1b - 4)$

h)  $64x^6y^2z - 32x^4y^4z^4$

$= 32x^4y^2z(2x^2 - 1y^2z^3)$

j)  $2x(2x - 5y) - 3y(2x - 5y)$

$= (2x - 5y)(2x - 3y)$

l)  $10x^2 + 5x - 6xy - 3y$

$= 5x(2x + 1) - 3y(2x + 1)$

$= (2x + 1)(5x - 3y)$

Homework: Pg. 203

#s: 7ace, 8ace, 9ace, 10ace, 12a