

## 7.0 ~ Combining Like Terms/FOIL/Factoring Review

### COMBINING LIKE TERMS:

Remember when combining like terms, you may combine terms with the exact same variable.

**Example 1:** Simplify each expression by combining like terms.

a.  $1 + 3x + 9 - 5x$

$$10 - 2x$$

f.  $15xyz - 9x^2 + 10yz + 8xyz + 8y^2 + 2yz - 2x^2$

$$-11x^2 + 8y + 23xyz + 12yz$$

b.  $7 - 8y + 12 + 5x - y$

$$5x - 9y + 19$$

g.  $4 \log x + 10 \log x$

$$14 \log x$$

c.  $8x^2 - 9 + 12x + 3x^2 + 10x$

$$11x^2 + 22x - 9$$

f.  $2 \sin \theta - 4 \sin \theta$

$$-2 \sin \theta$$

d.  $-3y^4 + y^2 - 9y^2 + 15y^2 - 10y^4$

$$-13y^4 + 7y^2$$

g.  $13 \sin^2 \theta + 4 \sin \theta - 4 \sin^2 \theta$

$$9 \sin^2 \theta + 4 \sin \theta$$

e.  $10xy + 14x^2y - 15xy^2 - 3xy^2$

$$14x^2y - 18xy^2 + 10xy$$

FOIL [First Outside Inside Last]

**Example 2:** Multiply the following polynomials together. Then simplify by combining like terms.

a.  $(x+4)(x+9)$

$$x^2 + 9x + 4x + 36$$

$$x^2 + 13x + 36$$

b.  $(x-8)(x+10)$

$$x^2 + 10x - 8x - 80$$

$$x^2 + 2x - 80$$

c.  $(x-12)(x-5)$

$$x^2 - 5x - 12x + 60$$

$$x^2 - 17x + 60$$

d.  $(x+9)^2$

$$(x+9)(x+9)$$

$$x^2 + 9x + 9x + 81$$

$$x^2 + 18x + 81$$

e.  $(x-4)^2$

$$(x-4)(x-4)$$

$$x^2 - 4x - 4x + 16$$

$$x^2 - 8x + 16$$

f.  $(2z-9)(z-4)$

$$2z^2 - 8z - 9z + 36$$

$$2z^2 - 17z + 36$$

g.  $(x+y+3)(x-2y+6)$

$$x^2 - 2xy + 6x + xy - 2y^2 + 6y + 3x - 6y$$

$$x^2 - xy + 9x - 2y^2$$

h.  $(x+4)(x-3)(x+6)$

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

$$(x^2 + x - 12)(x+6)$$

$$x^3 + x^2 - 12x + 6x^2 + 6x - 72$$

$$x^3 + 7x^2 - 6x - 72$$

i.  $(x+5)(2x-3)(x+9)(x-1)$

$$(2x^2 - 3x + 10x - 15)(x^2 - 1x + 9x - 9)$$

$$(2x^2 + 7x - 15)(x^2 + 8x - 9)$$

$$2x^4 + 16x^3 - 18x^2 + 7x^3 + 56x^2 - 63x - 15x^2 - 90x + 135$$

$$2x^4 + 23x^3 + 23x^2 - 153x + 135$$

FACTORING

**Example 3:** Factor the following polynomials:

a.  $12x^2 - 2x$   
 $2x(6x-1)$

b.  $24x^3 + 6x$   
 $6x(4x^2+1)$

c.  $15xy - 5x^2y$   
 $5xy(3-x)$

d.  $30x^4z^9 + 6xz$   
 $6xz(5x^3z^8+1)$

e.  $x^2 + 12x + 27$   
 $(x+9)(x+3)$

f.  $x^2 - 3x - 40$   
 $(x-8)(x+5)$

g.  $x^2 - 13x + 42$   
 $(x-7)(x-6)$

h.  $2x^2 - 5x - 12$   
 $(2x+3)(x-4)$

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

Perfect Squares: Polynomials in the form  $a^2 + 2ab + b^2$  may be factored into  $(a+b)(a+b)$

i.  $x^2 + 8x + 16$   
 $(x+4)(x+4)$   
 $(x+4)^2$

j.  $x^2 + 20x + 100$   
 $(x+10)(x+10)$   
 $(x+10)^2$

k.  $x^2 + 18x + 81$   
 $(x+9)(x+9)$   
 $(x+9)^2$

l.  $x^2 + 24x + 144$   
 $(x+12)(x+12)$   
 $(x+12)^2$

Perfect Squares: Polynomials in the form  $a^2 - 2ab + b^2$  may be factored into  $(a-b)(a-b)$

m.  $x^2 - 16x + 64$   
 $(x-8)(x-8)$   
 $(x-8)^2$

n.  $y^2 - 10y + 25$   
 $(y-5)(y-5)$   
 $(y-5)^2$