

Distributive Property

$$a(b+c) = ab + ac$$

$$a = 2$$

$$b = -\frac{33}{7}$$

$$c = \pi$$

$$2\left(-\frac{33}{7} + \pi\right)$$

$$= 2\left(-\frac{33}{7}\right) + 2\pi$$

$$= -\frac{66}{7} + 2\pi$$

<p><u>Polynomial</u> sum of monomials</p>	<p>Monomial = product of real numbers and variables</p>
$5x^3 - 7x^2 + 3x - 4$	$3x^2y$

Exponents:

$$x^3 = x \cdot x \cdot x$$

$$3x^5y^2 = 3 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y$$

$$x^2x^3 = x \cdot x \cdot x \cdot x \cdot x = x^5 = x^{2+3}$$

$$x^m x^n = x^{m+n}$$

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

$$\begin{aligned}
 &3x^2y(2x) + 3x^2y(5y^3) \\
 &= 6x^3y + 15x^2y^4
 \end{aligned}$$

$$2x^5y^2 + 7x^5y^2 = 9x^5y^2$$

$$-4x^5yz^2 (2x^3y - 3xyz + 5xz^4)$$

$$-8x^8y^2z^2 + 12x^6y^2z^3 - 20x^6yz^6$$

Multiplying Binomials

$$(a+b)(c+d)$$

F O I L = first, outside,
inside, last

$$(a+b)c + (a+b)d$$

$$ac + bc + ad + bd$$

$$(2x^2 - 3x^4)(5x^3 + x)$$

$$2x^2(5x^3 + x) - 3x^4(5x^3 + x)$$

$$\underline{10x^5 + 2x^3} - \underline{15x^7 - 3x^5}$$

$$7x^5 + 2x^3 - 15x^7$$

$$\boxed{-15x^7 + 7x^5 + 2x^3}$$

Descending Order

$$(2x^3y^5 + 3)(4xy^2 - 12x^5y)$$

$$2x^3y^5(4xy^2 - 12x^5y) + 3(4xy^2 - 12x^5y)$$

$$8x^4y^7 - 24x^8y^6 + 12xy^2 - 36x^5y$$

$$(3x^2 + 2x)(4x^3 - 7x + 5)$$

$$3x^2(4x^3 - 7x + 5) + 2x(4x^3 - 7x + 5)$$

$$12x^5 - 21x^3 + 15x^2 + 8x^4 - 14x^2 + 10x$$

$$12x^5 + 8x^4 - 21x^3 + x^2 + 10x$$

$$(2y^5 - 3y^4 + y^3 - 2y^2)(5y^6 - y^4 + 8y^2 - 11y)$$

$$= 2y^5(5y^6 - y^4 + 8y^2 - 11y) - 3y^4(5y^6 - y^4 + 8y^2 - 11y) +$$

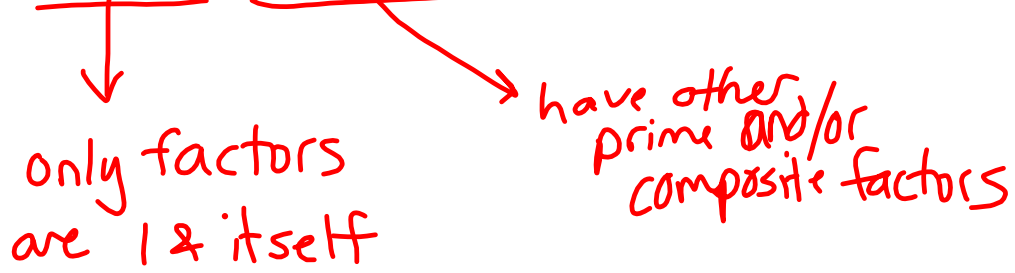
$$+ y^3(5y^6 - y^4 + 8y^2 - 11y) - 2y^2(5y^6 - y^4 + 8y^2 - 11y)$$

$$= 10y^{11} - 2y^9 + 16y^7 - 22y^6 - 15y^{10} + 3y^8 - 24y^6 + 33y^5 +$$

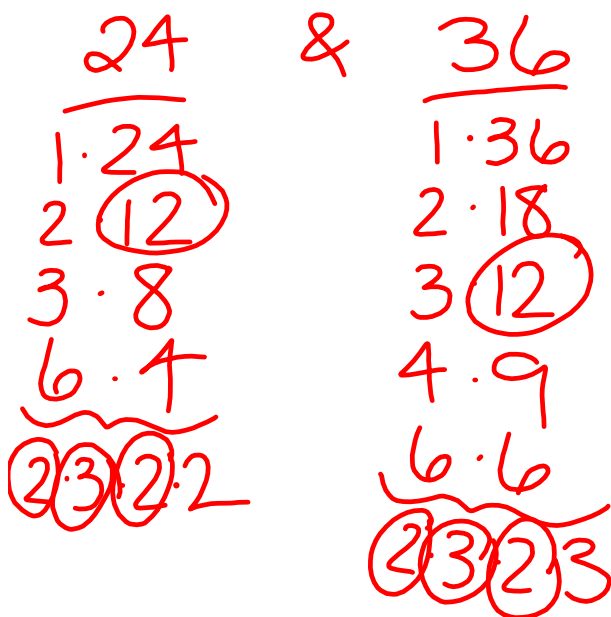
$$+ 5y^9 - y^7 + 8y^5 - 11y^4 - 10y^8 + 2y^6 - 16y^4 + 22y^3 =$$

$$= 10y^{11} - 15y^{10} + 3y^9 - 7y^8 + 15y^7 - 44y^6 + 41y^5 - 27y^4 + 22y^3$$

Prime numbers v. composite numbers



Greatest common factor



$$2y^2x^3 = 2 \cdot y \cdot y \cdot x \cdot x \cdot x$$

$$8x^4y = 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x \cdot y$$

$$\text{GCF} = 2x^3y$$

$$4x^3 - 6x^5 + 8x^2 \quad \text{GCF: } 2x^2$$

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

$$18x^3y^5 + 24x^4y^2 - 30x^5y^3$$

$$\text{GCF: } 6x^3y^2$$

$$6x^3y^2(3y^3 + 4x - 5x^2y)$$

$$30x^3y^5z - 12x^2y^2z^3 + 42xy^3z^2$$

$$6xy^2z(5x^2y^3 - 2xz^2 + 7yz)$$

Special products

$$(a+b)^2 = (a+b)(a+b) = aa + ab + ba + bb$$

$$= a^2 + 2ab + b^2$$

$$(a-b)^2 = (a-b)(a-b) = a^2 - 2ab + b^2$$

$$(a-b)(a+b) = a^2 + ab - ab - b^2 = a^2 - b^2$$

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

$$a=x$$

$$b=2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$(xy-7)(xy+7) =$$

$$a=xy$$

$$b=7$$

$$x^2y^2 - 49$$

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

$$x^4 - 9 = (x^2)^2 - 3^2 = (x^2-3)(x^2+3)$$

$$9y^2 - 81 = 9(y^2 - 9) = 9(y+3)(y-3)$$

$$(3y)^2 - 9^2 = (3y-9)(3y+9) = 3(y-3) \cdot 3(y+3) = \uparrow$$

$$4x^3 - 49x = x(4x^2 - 49) = x((2x)^2 - 7^2)$$

$$= x(2x+7)(2x-7)$$

$$x^2 + 2x + 1 = (x+1)^2$$

$$(x)^2 + 2 \cdot x \cdot 1 + 1^2$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$x^2 - 18x + 81 = (x-9)^2$$

$$x^2 - 2 \cdot x \cdot 9 + 9^2$$

$$= (x-9)(x-9)$$

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

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

$$x^2 y^2 - 14xy + 49 = (xy-7)^2$$

$$(xy)^2 - 2 \cdot xy \cdot 7 + 7^2$$

$$x^2 - 8x + 15$$

$$(x-5)(x-3)$$

$$x^2 + 12x + 20$$

$$(x+10)(x+2)$$

$$b^2 + 4b - 32$$

$$(b+8)(b-4)$$

Factor:

$$x^2 + 4x - 5 = (x+5)(x-1)$$

$$y^2 - 18y + 72 = (y-12)(y-6)$$

$$y^2 - 13y + 12 = (y-12)(y-1)$$

$$x^2 + 7x - 18 = (x+9)(x-2)$$

Factoring by Grouping

$$\underline{x(a+2) - 2(a+2)}$$

$$(a+2)(x-2)$$

$$3(x+y) + a(x+y)$$

$$(x+y)(3+a)$$

$$\underline{x^2 + 3x + 2x + 6}$$

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

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

$$\underline{a^2b + 3a^2 + 2b + 6}$$

$$a^2(b+3) + 2(b+3)$$

$$(b+3)(a^2+2)$$

$$\begin{aligned}
 & x^2 - 5x + 4x - 20 \\
 & x(x-5) + 4(x-5) \\
 & (x-5)(x+4)
 \end{aligned}$$

$$\begin{aligned}
 & 2x^3 - x^2 - 4x + 2 \\
 & x^2(2x-1) - 2(2x-1) \\
 & (2x-1)(x^2-2) \\
 & (2x-1)(x^2+2)
 \end{aligned}$$

$$2x^2 + 7x + 3$$

$$2 \cdot 3 = 6 = 6 \cdot 1$$

what factors of the product
 of the constant term & the x^2 -coeff.
 sum to give us the x -coeff.

$$\begin{aligned}
 & 2x^2 + 6x + x + 3 \\
 & 2x(x+3) + 1(x+3) \\
 & (x+3)(2x+1)
 \end{aligned}$$