

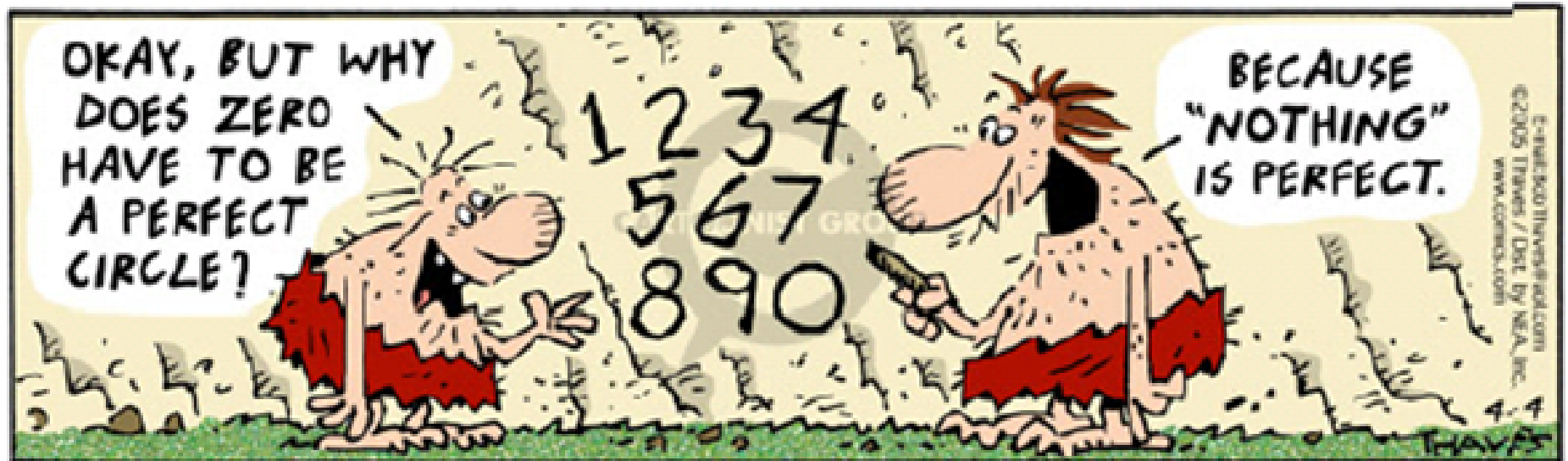
$$1. \quad \underline{\underline{(2x - 3 + 7x^2)}} - (\underline{3 - 9x^2} - \underline{\underline{2x}})$$

$$16x^2 + 4x - 6$$

$$2. \quad \underline{\underline{(x^3 - 6x)}} - \overbrace{(\underline{2x^3} + 9)} - \overbrace{(4x^2 + \underline{x^3})}$$
$$x^3 - 6x - 2x^3 - 9 - 4x^2 - x^3$$
$$-2x^3 - 4x^2 - 6x - 9$$

Warm Up

Multiplying Polynomials



Goals aligned to the Common Core Standards:

- You will use operations of addition, subtraction, and multiplication on polynomials.

Reminder: What is a monomial?

- a number/constant
- a variable
- a product of a number and one or more variables
- a monomial has NO addition or subtraction
- there cannot be a fraction with a variable in the denominator

Is the expression a monomial?

Expression	Monomial?	Reason
$17 - x$	No	Subtr.
$8f^2g$	yes	Mult
$\frac{3}{4}$	yes	#
xy	yes	Mult
$23abcd^2$	yes	Mult
$\frac{1}{2}xyz^2$ $\frac{xyz^2}{2}$	yes	Mult
$\frac{mp}{n}$	No	div. of variable

Review of Exponents...

$$x^n \leftarrow \begin{array}{l} \text{exp./power} \\ \text{base} \end{array} \quad (x)^2 = x \cdot x$$

$$2^4 \quad 2 \cdot 2 \cdot 2 \cdot 2 = 16$$

Just "x" is always to what power???

$$(x+2)^2 = (x+2)(x+2) \quad (2x)^2 = (2x)(2x)$$

Product of Powers

When multiplying two powers that have the same base, **ADD** the exponents.

$$(x^3)(x^4) = x^7$$

x x x · x x x x x

$$(4^2)(4^5)(4^3) = 4^{10}$$

$$(2a^3)(3a^6)(4a^7) = 24a^{16}$$

$$a^m \cdot a^n = a^{m+n}$$

Examples

Simplify expressions.

1. $(r^4)(-12r^7)$

$-12r^{11}$

2. $(6cd^5)(5c^5d^2)$

$30c^6d^7$
 $c \cdot d \cdot d \cdot d \cdot d \cdot d \cdot d$ $c \cdot c \cdot c \cdot c \cdot c$
 dd

3. $(4ab^6)(-7a^2b^3)$

$-28a^3b^9$

4. $(-4rx^2t^3)(-6r^5x^2t)$

$24r^6x^4t^4$

Find the product.

a) $-2x^2(-3x^2 - 7x + 10)$

$$6x^4 + 14x^3 - 20x^2$$

b) $6y(4y^2 - 9y - 7)$

$$24y^3 - 54y^2 - 42y$$

c) $-d(d^2 + 4d - 4d^3)$

d) $5x(2x - 3x^2 - 5)$

Find the product.

a) $4(3d^2 + 5d) - d(d^2 - 7d + 12)$

Find the product.

b) $3(2n^2 - 4n - 15) + 6n(5n + 2)$

Find the product.

$$c) \quad -5(-c + 4c^2 - 9) - c^2(3c^2 - 4 + c)$$

$$5c - 20c^2 + 45 - 3c^4 + 4c^2 - c^3$$

$$-3c^4 - c^3 - 16c^2 + 5c + 45$$

Find the product.

$$d) m(3m - 6m^2 - 2m^3 - 4) - 2(4m + 3 + m^3 - 2m^2)$$

$$\underline{3m^2 - 6m^3 - 2m^4 - 4m - 8m - 6 - 2m^3 + 4m^2}$$

$$-2m^4 - 8m^3 + 7m^2 - 12m - 6$$

$$\begin{array}{l} m^2 \quad m^2 \\ m^2 m^2 + m^2 m^2 \end{array}$$

Solve the equation.

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

Solve the equation.

$$\text{b) } h(h - 3) - 2h = h(h - 2) - 12$$

$$\cancel{h^2} - 3h - \cancel{2h} = \cancel{h^2} - 2h - 12$$

$$\cancel{h^2} - 5h = \cancel{h^2} - 2h - 12$$

$$+ 2h \quad + 2h$$

$$- 3h = -12$$

$$h = 4$$

Solve the equation.

$$\text{c) } 8(3b + 1) = 4(b + 3) - 9$$

Find the product.

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

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

$$x^2 - x - 6$$

$$(w - 3)(2w + 5)$$

$$2w^2 + 5w - 6w - 15$$

$$2w^2 - w - 15$$

Find the product.

$$(4x + 1)(x - 8)$$

Handwritten notes: $a^2 a^2$, $a^2 a^2$, $a^2 a^2$, $a^2 a^2$, $a^2 a^2$ (with a diagonal slash through the last one)

$$\rightarrow (a + 8)(a^2 - a - 3)$$

Handwritten notes: Blue arcs connect a to a^2 and 8 to $-a$ in the second factor.

$$\cancel{a^3} - \cancel{a^2} - 3a + 8a^2 - 8a - 24$$

Handwritten notes: The terms $-3a$ and $-8a$ are circled.

$$a^3 + 7a^2 - 11a - 24$$

Special Products

Sum and Difference Pattern

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

Square of a Binomial Pattern

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

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

Find the product.

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

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

Find the product.

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

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

Find the product.

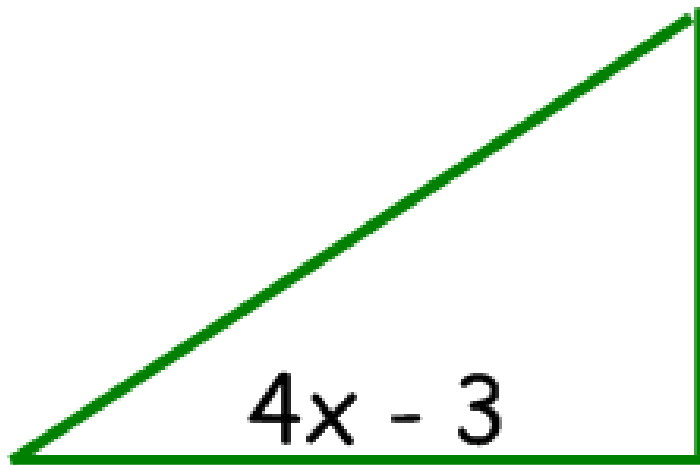
$$(x^2 - 5x + 4)(x^2 + 7x - 3)$$

Write an expression for the area of each figure.

$$2x - 5$$



$$x + 4$$



$$3x - 2$$

$$4x - 3$$

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