

Review

Simplify: $\frac{2x^{-5}y^4}{3x^2y} \cdot \frac{3^{-2}xy^3}{2^3x}$

$$= \frac{y^{4+3-1}}{2^{3-1} 3^{1-(-2)} x^{2+1-(-5)-1}}$$

$$= \frac{y^6}{2^2 \cdot 3^3 \cdot x^7}$$

$$= \frac{y^6}{108x^7}$$

4.27

Find the equation of the line passing through the points (5, -3) & (-1, 1).

$$m = \frac{\Delta y}{\Delta x} = \frac{-3-1}{5-(-1)} = \frac{-4}{6} = -\frac{2}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 1 = -\frac{2}{3}(x - (-1))$$

$$y - 1 = -\frac{2}{3}x - \frac{2}{3}$$

$$\begin{matrix} +1 & & +1 \cdot \frac{3}{3} \\ \hline y = -\frac{2}{3}x + \frac{1}{3} \end{matrix}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{y_1 - y_2}{x_1 - x_2}$$

Test problems

30. Solve the system of equations. If it exists, give your solution as an ordered pair (x, y).

$$\begin{cases} 3x + 2y = 5 \\ 2x - 3y = -14 \end{cases}$$

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

$$\begin{array}{r} 9x + 6y = 15 \\ 4x - 6y = -28 \\ \hline 13x = -13 \end{array}$$

$$\begin{array}{r} 2y = 8 \\ y = 4 \end{array}$$

$$x = -1$$

$$(-1, 4)$$

Bonus A: Find three consecutive odd integers such that the product of the first and third minus the product of the first and second is 46. $x, x+2, x+4$

$$x(x+4) - x(x+2) = 46$$

$$x^2 + 4x - x^2 - 2x = 46$$

$$2x = 46$$

$$x = 23$$

$23, 25, 27$

Bonus B: If a parade 2 miles long is proceeding at 3 miles per hour, how long will it take a runner, jogging at 6 miles per hour, to travel from the front of the parade to the end of the parade?

Diagram illustrating the problem:

A horizontal line represents the parade, labeled "end" on the left and "front" on the right. A double-headed arrow above the line indicates a length of "2 mi". Below the line, a red dot on the left is labeled "3 mi/h" with an arrow pointing right. A red dot on the right is labeled "6 mi/h" with an arrow pointing left.

Equations:

$$3x + 6x = 2$$

$$9x = 2$$

$$x = \frac{2}{9} \text{ h}$$

	rate	time	distance
parade	3	x	$3x$
jogger	6	x	$6x$

5.3 Multiplication of Polynomials

Distributive Property: $a(b + c) = ab + ac$

$$a(b + c + d + e + f) = ab + ac + ad + ae + af$$

Multiplying a Polynomial by a ~~Binomial~~ ^{Monomial}

$$\begin{aligned} & -3xy^2(2x^3y - xy^4 + 4x^3y^2) \\ & = (-3xy^2)(2x^3y) + (-3xy^2)(-xy^4) + (-3xy^2)(4x^3y^2) \\ & = \boxed{-6x^4y^3 + 3x^2y^6 - 12x^4y^4} \end{aligned}$$

$$\begin{aligned} & 5xyz^2(-3x^2y - 4xz^5) \\ & = \boxed{-15x^3y^2z^2 - 20x^2yz^7} \end{aligned}$$

$$\begin{aligned} & (3x^5 - 2x^3 + 3)(4x^2 - 5x) \\ & = 3x^5(4x^2) + 3x^5(-5x) + (-2x^3)(4x^2) + (-2x^3)(-5x) + 3(4x^2) + 3(-5x) \\ & = \boxed{12x^7 - 15x^6 - 8x^5 + 10x^4 + 12x^2 - 15x} \end{aligned}$$

Lead term: $12x^7$

constant term: 0

Degree: 7

Leading coefficient: 12

$$(2x - 3 + 4x^2)(5x^3 - x^8 + 2x)$$

$$\begin{aligned} & 10x^4 - 2x^9 + 4x^2 - 15x^3 + 3x^8 - 6x + 20x^5 - 4x^{10} + 8x^3 \\ & = \boxed{-4x^{10} - 2x^9 + 3x^8 + 20x^5 + 10x^4 - 7x^3 + 4x^2 - 6x} \end{aligned}$$

Leading coefficient: -4

Degree: 10

Multiplying Two Binomials (FOIL Method)

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

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

$$= \boxed{x^3 - x^2 - 12x}$$

F O I L
 f i r s t
 +
 s i d e
 n
 s i d e
 a
 s t

Special Cases:

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

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

$\neq a^2 + b^2$

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

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

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

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

Book Problems: §5.3

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

26. $a^{n+4}(a^{n-2} + 5a^2 - 3)$

$$= a^{n+4} a^{n-2} + a^{n+4} (5a^2) + a^{n+4} (-3)$$

$$= \boxed{a^{2n+2} + 5a^{n+6} - 3a^{n+4}}$$

50. $(2a^n - b^n)(3a^n + 2b^n)$

$$= 2a^n(3a^n) + 2a^n(2b^n) - b^n(3a^n) - b^n(2b^n)$$

$4a^n b^n - 3a^n b^n$

$$= \boxed{6a^{2n} + a^n b^n - 2b^{2n}}$$

$$\begin{aligned}
 66. & (x^n + y^n)(x^n - 2x^n y^n + 3y^n) \\
 &= x^{2n} - 2x^{2n} y^n + 3x^n y^n + x^n y^n - 2x^n y^{2n} + 3y^{2n} \\
 &= x^{2n} - 2x^{2n} y^n + 4x^n y^n - 2x^n y^{2n} + 3y^{2n}
 \end{aligned}$$

Simplify.

$$\begin{aligned}
 108. & \frac{(2x+1)^5}{(2x+1)^3} = (2x+1)^{5-3} \\
 &= (2x+1)^2 \\
 &= (2x)^2 + 2(2x)(1) + 1^2 \\
 &= 4x^2 + 4x + 1
 \end{aligned}$$

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

$$\begin{aligned}
 116. & (x + (y+1))(x - (y+1)) = a^2 - b^2 \\
 &= x^2 - (y+1)^2 \\
 &= x^2 - (y^2 + 2y + 1) \\
 &= x^2 - y^2 - 2y - 1
 \end{aligned}$$

126. Find $(3n^4)^3$ if $5(n-1) = 2(3n-2)$.

$$\begin{aligned}
 5n - 5 &= 6n - 4 \\
 -5 + 4 &= 6n - 5n \\
 -1 &= n \\
 (3n^4)^3 &= (3(-1)^4)^3 = 3^3 (-1)^{12} = 27
 \end{aligned}$$

Homework:

5.3 (all ODD problems):

#25-29, 43-51, 61-67, 89-97, 109-117