Review

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

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

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

$2^2 \cdot 3^3$

$4 \cdot 27$

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

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

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

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

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

$+1 \qquad +1 \cdot \frac{3}{3}$

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

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

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

Test problems

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

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

$9x + 6y = 15$

$4x - 6y = -28$

$13x = -13$

$x = -1$

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

$2y = 8$

$y = 4$

$(-1, 4)$

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. $x, x+2, x+4$

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

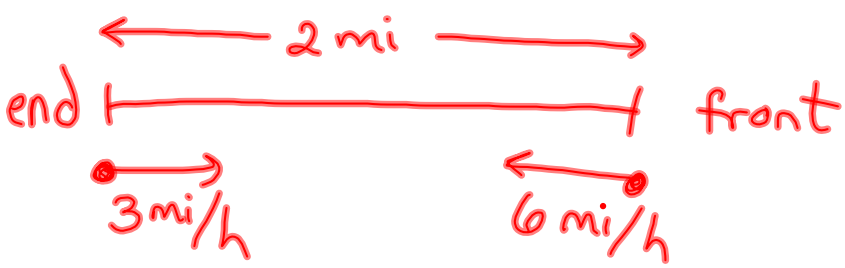
$$x^2+4x-x^2-2x=46$$

$$2x=46$$

$$x=23$$

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?



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

$$3x+6x=2$$

$$9x=2$$

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

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

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

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

$= -6x^4y^3 + 3x^2y^6 - 12x^4y^4$

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

$= -15x^3y^2z^2 - 20x^2yz^7$

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

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

$= 12x^7 - 15x^6 - 8x^5 + 10x^4 + 12x^2 - 15x$

Lead term: $12x^7$

Constant term: 0

Degree: 7

Leading coefficient: 12

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

$10x^4 - 2x^9 + 4x^2 - 15x^3 + 3x^8 - 6x + 20x^5 - 4x^{10} + 8x^3$

$= -4x^{10} - 2x^9 + 3x^8 + 20x^5 + 10x^4 - 7x^3 + 4x^2 - 6x$

Leading coefficient: -4

Degree: 10

Multiplying Two Binomials (FOIL Method)

F O I L
First Outside Inside Last

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

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

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

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

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

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

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

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

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

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

66. $(x^n + y^n)(x^n - 2x^n y^n + 3y^n)$

$= x^{2n} - 2x^{2n}y^n + 3x^n y^n + x^n y^n - 2x^n y^{2n} + 3y^{2n}$

$= \boxed{x^{2n} - 2x^{2n}y^n + 4x^n y^n - 2x^n y^{2n} + 3y^{2n}}$

Simplify.

108. $\dfrac{(2x+1)^5}{(2x+1)^3}$

$= (2x+1)^{5-3}$

$= (2x+1)^2$

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

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

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

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

$= \boxed{4x^2 + 4x + 1}$

116. $[x + (y+1)][x - (y+1)]$ $= a^2 - b^2$

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

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

$= \boxed{x^2 - y^2 - 2y - 1}$

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

$5n - 5 = 6n - 4$

$-5 + 4 = 6n - 5n$

$-1 = n$

$(3n^4)^3 = (3(-1)^4)^3 = 3^3(-1)^{12} = \boxed{27}$

Homework:

5.3 (all ODD problems):
#25-29, 43-51, 61-67, 89-97, 109-117