# Algebra 1 Honors Review Day 2

# Exponent Properties

| Property Name | Definition |
|---|---|
| **Product of Powers** | $a^m \cdot a^n =$ $a^{m+n}$ |
| **Power of a Power** | $(a^m)^n =$ $a^{m \cdot n}$ |
| **Power of a Product** | $(ab)^m =$ $a^m b^m$ |
| **Negative Exponent** | $a^{-m} =$ $1/a^m$ |
| **Zero Exponent** | $a^0 =$ $1$ |
| **Quotient of Powers** | $\frac{a^m}{a^n} =$ $a^{m-n}$ |
| **Power of a Quotient** | $\left(\frac{a}{b}\right)^m =$ $\frac{a^m}{b^m}$ |

$\frac{2^5}{2^2} = 2^3$

$\frac{2 \cdot 2 \cdot 2 \cdot \cancel{2} \cdot \cancel{2}}{\cancel{2} \cdot \cancel{2}}$

Simplify. Your answer should only contain positive exponents.

a) $(3a^2b^{-4})(-4a^5b^5)$

$-12a^7b$

b) $\left(\frac{2a^{-2}b}{5a^3}\right)^3$

$\left(\frac{2b}{5a^5}\right)^3$

$\frac{8b^3}{125a^{15}}$

c) $\frac{4x^6y^{-8}}{2^4x^0y^{12}}$

$\frac{4x^6}{2^4x^0y^{12}y^8}$

$\frac{4x^6}{16y^{20}}$

$\frac{x^6}{4y^{20}}$

Find each product.

FOIL

FOIL

a) $(x + 4)(3x + 5)$

$x \cdot 3x + x \cdot 5 + 4 \cdot 3x + 20$

$3x^2 + 5x + 12x + 20$

$3x^2 + 17x + 20$

b) $(2x + 5)(2x - 5)$

$4x^2 - 10x + 10x - 25$

$4x^2 - 25$

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

$x^4 - 5x^2 + 4x^2 - 20$

$x^4 - x^2 - 20$

$$x + x = 2x$$

$$x \cdot x = x^2$$

## 3 different forms of lines

Standard Form: $Ax + By = C$ ; (A, B, and C are integers)

Slope-Intercept form: $y = mx + b$ ; (m is the slope; b is the y-intercept)

Point-Slope form: $y - y_1 = m(x - x_1)$ ; (m is the slope; $(x_1,y_1)$ is a point on the line)

*Parallel lines have the SAME slope

*Perpendicular lines have slopes that are negative reciprocals

**Write the equation of a line in the specified form with the given characteristics.**

a) Write an equation in slope-intercept form for a line perpendicular to $y = 3x + 7$ and passes through (1,4)

$m = 3$

$m = -1/3$

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

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

$y = -\frac{1}{3}x + \frac{1}{3} + 4$

$y = -\frac{1}{3}x + \frac{13}{3}$

$\frac{1}{3} + \frac{4 \cdot 3}{1 \cdot 3}$

$\frac{1 + 12}{3}$

$\frac{13}{3}$

DC

$4\frac{1}{3}$

**Write the equation of a line in the specified form with the given characteristics.**

b) Write an equation in point-slope form for a line parallel to $3x + y = 5$ and has an x-intercept of $-4$.

$y = -3x + 5$

$m = -3$

$(-4, 0)$

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

$y - 0 = -3(x - (-4))$

$y = -3(x + 4)$

**Write the equation of a line in the specified form with the given characteristics.**

c) Write an equation in standard form that passes through (5,4) and (2,-4)

$x_1, y_1$ (5,4) (2,-4) $x_2, y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-4}{2-5} = \frac{-8}{-3} = \frac{8}{3}$$

$$y - 4 = \frac{8}{3}(x-5)$$

$$3\left(y - 4 = \frac{8}{3}x - \frac{40}{3}\right)$$

$C = Ax + By$

$$3y - 12 = 8x - 40$$

$-3y \quad 40 \quad -3y$

$$28 = 8x - 3y$$

# Translating Words to Mathematical Expressions

**Addition**

| | |
|---|---|
| **plus** | "a number plus 2" |
| **and** | "3 and a number" |
| **added to** | "8 added to a number" |
| **greater than** | "3 greater than a number" |
| **more than** | "3 more than a number" |
| **increased by** | "a number increased by 2" |
| **sum of** | "The sum of the length and width" |

**Subtraction**

| | |
|---|---|
| **minus** | "a number minus 2" |
| **difference between** | "the difference between a number and 8" |
| **from** | "2 from a number" |
| **less** | "a number less 3" |
| **less than** | "3 less than a number" |
| **fewer than** | "2 fewer than a number" |
| **decreased by** | "a number decreased by 2" |
| **take away** | "a number take away 2" |

$x - 3$

$x - 2$

$x - 2$

$x - 2$

| | | |
|---|---|---|
| **Multiplication** | **times** | "5 times a number" |
| | **product** | "The product of 3 and a number" |
| | **double, triple, etc.** | "double a number" |
| | **twice** | "twice a number" |
| | **of (fractions of)** | "three-fourths of a number" |

| | | |
|---|---|---|
| **Division** | **quotient of** | "The quotient of 5 and a number" |
| | **Half of** | "half of a number" |
| | **per** | "The price is $8 per 50" |

**Equals**

**Is, is the same as, gives, will be, was, is equivalent to, result**

Set up then solve the equation.

a) Four less than half a number is 17. Find the number.

$\frac{1}{2}x - 4 = 17$

$2\left(\frac{1}{2}x = 21\right)$

$x = 42$

b) Four times a number, increased by 25, is 13 less than six times the number. Find the number.

$4x + 25 = 6x - 13$

$-6x \quad -25 \quad -6x \quad -25$

$-2x = -38$

$x = 19$

c) A 1000 L tank now contains 240 L of water. How long will it take to fill the tank using a pump that pumps 25 L per minute?

$240+25m=1000$

$25m=760$

$30\frac{10}{25} \neq 30\frac{2}{5}\text{ min}$

$30.4\text{ min}$

$25\overline{)760}$

$-75$

$10$

$0$

$10$

d) The length of a rectangle is 5 cm more than 5 times the width. Find the length and width if the perimeter of the rectangle is 406 cm.


$L=5+5w$

$2l+2w=P$

$2(5+5w)+2w=406$

$10+10w+2w=406$

$12w=396$

$w=33\text{cm}$

$L=170\text{cm}$

$L=5+5\cdot33$

$L=170$