

## ORDER OF OPERATIONS

**REMEMBER: PLEASE EXCUSE MY DEAR AUNT SALLY**

P — Perform all operations that occur within grouping symbols such as ( ), { }, or [ ].

E — Evaluate exponents (powers and roots)

M & D — Perform multiplication and division operations from left to right

A & S — Perform addition and subtraction operations from left to right.

Simplify the following expressions.

1]  $(-4 + 2)(-2 + 5)^2$

2]  $5 - 12 \div 3 - 7$

3]  $8 \div (6 - 2) + 5$

4]  $11 \times 622 - 3$

## LINEAR EQUATIONS

Helpful hints:

• When solving a linear equation the goal is to isolate the variable.

• To move a term across the equal sign, you must use inverse operations.

• To keep the equation balanced, you must perform the operation on both sides of the equation.

Find the value of the variable.

1]  $\frac{4}{5}a = -20$

2]  $-\frac{x}{3} = 5$

3]  $2p + 5 = 13$

4]  $12 + 2b = 2 + 5b$

5]  $4x + 5 + 5x + 40 = 180$

6]  $2(4x + 4) = x + 1$

7]  $2(x + 5) = 3(x - 2)$

8]  $180 - x = 3(90 - x)$

9]  $\frac{1}{2}(6 + 4x) - \frac{1}{4}(8x - 12) = \frac{1}{2}(2x - 4)$

10]  $5x - [7 - (2x - 1)] = 3(x - 5) + 4(x + 3)$

## FRACTIONS

Examples: Simplify the fraction.

a]  $\frac{8w}{2} = \frac{8w}{2} = 4w$

b]  $\frac{5x - 10}{15} = \frac{5(x - 2)}{15} = \frac{x - 2}{3}$

c]  $\frac{x + 6}{36 - x^2} = \frac{x + 6}{(6 - x)(6 + x)} = \frac{1}{6 - x}$

Simplify the fraction.

1]  $\frac{14}{10}$

2]  $\frac{75}{15}$

3]  $\frac{18a}{36}$

4]  $\frac{3x}{x}$

5]  $\frac{5bc}{10b^2}$

6]  $\frac{-8y^3}{10y^2}$

7]  $\frac{-18r^3t}{12rt}$

8]  $\frac{6a + 12}{6}$

9]  $\frac{x + 2}{3x + 6}$

10]  $\frac{5a + 5b}{a^2 - b^2}$

11]  $\frac{b^2 - 25}{b^2 - 12b + 35}$

12]  $\frac{a^2 + 8a + 16}{a^2 - 16}$

13]  $\frac{3x^2 - 6x - 24}{3x^2 + 2x - 8}$

## THE COORDINATE PLANE

Name the coordinates of each point.

1. M            2. N            3. K            4. R

5. S            6. T            7. U            8. V

9. W            10. Q

11. Name all the points shown that lie on the  $x$ -axis.

12. Name all the points shown on the  $y$ -axis.

13. What is the  $x$ -coordinate of every point that lies on a vertical line through P?

14. Which of the following points lie on a horizontal line through W?

(-2, 1)            (2, 3)            (1, -3)            (-2, 0)            (0, -3)            (2, 0)

Name all the points shown that lie in the quadrant indicated. (A point on an axis is not in any quadrant.)

15. Quadrant I                      16. Quadrant II                      17. Quadrant III                      18. Quadrant IV

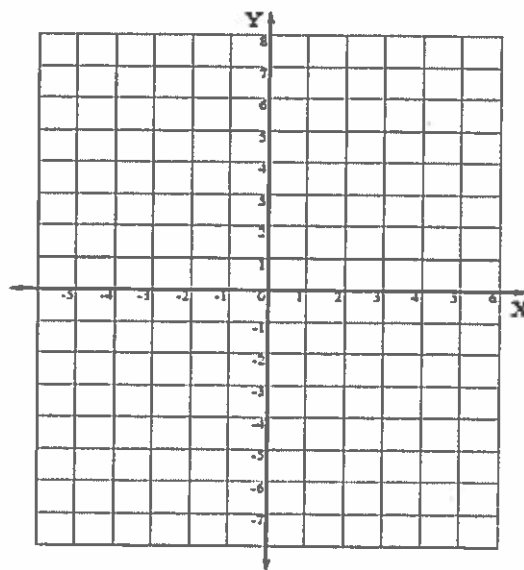
Plot each point on the graph shown to the right.

19.  $A(2, 1)$                       20.  $B(5, 0)$

21.  $C(0, 3)$                       22.  $D(-3, 1)$

23.  $E(-2, -1)$                       24.  $F(1, -2)$

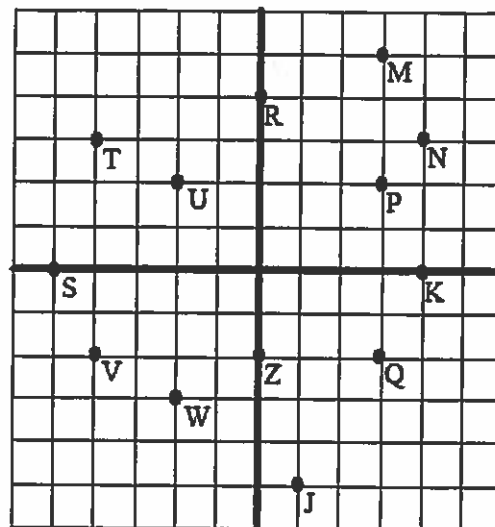
25.  $G(4, -2)$                       26.  $H(-4, -3)$



Find the coordinates of the midpoint of  $\overline{AB}$ .

27.  $A(0, 1), B(4, 1)$

28.  $A(-3, 4), B(-3, -4)$



## GRAPHS AND EQUATIONS OF LINES

### SLOPE-INTERCEPT FORM

$y = mx + b$ , where  $m$  = slope and  $b$  =  $y$ -intercept

#### Graphing Equations in Slope-Intercept Form

1. Write the equation in slope-intercept by solving for  $y$
2. Find the  $y$ -intercept and use it to plot the point where the line crosses the  $y$ -axis.
3. Find the slope and use it to plot a second point on the line.
4. Draw a line through the two points.

### WRITING EQUATIONS OF LINES

To write the equation of a line in slope-intercept form you must have the slope and the  $y$ -intercept.

#### Given a Graph

Identify the  $y$ -intercept and the slope from the graph and plug those values into the equation  $y = mx + b$ .

#### Given the Slope and a Point

*Example:*

Write an equation of the line that passes through (1, 3) and has a slope of -5.

Step 1: Substitute -5 for  $m$ .

$$y = -5x + b$$

Step 2: Substitute 1 for  $x$  and 3 for  $y$ .

$$3 = -5(1) + b$$

Step 3: Solve for  $b$ .

$$3 = -5 + b$$

$$3 + 5 = b$$

$$8 = b$$

Step 4: Substitute the values of  $m$  and  $b$  into the equation. *Answer:*  $y = -5x + 8$

#### Given Two Points

Step 1: Find the slope of the line using the two points and the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ .

Step 2: Choose either point and follow the steps above.

### PROBLEMS:

Write an equation of the line that passes through the given point and has the given slope.

1. (0, 4),  $m = 2$

2. (1, 0),  $m = 3$

3. (9, 3),  $m = -23$

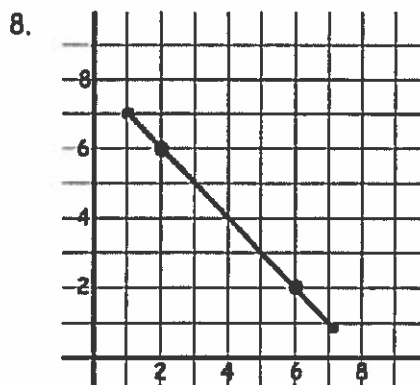
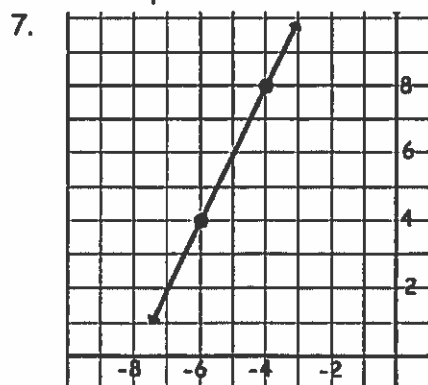
Write an equation of the line that passes through the given points.

4. (8, 5), (11, 14)

5. (-5, 9), (4, 7)

6. (-8, 8), (0, 1)

Write an equation of the line.



## EXPONENTS

### REVIEW: Exponent Rules

$$a^0 = 1 \quad \text{Example: } 5^0 = 1$$

$$a^m \cdot a^n = a^{m+n} \quad \text{Example: } x^2 \cdot x^4 = x^{2+4} = x^6$$

$$\frac{a^m}{a^n} = a^{m-n} \quad \text{Example: } \frac{b^7}{b^3} = b^{7-3} = b^4$$

$$(a^m)^n = a^{m(n)} \quad \text{Example: } (y^3)^4 = y^{3(4)} = y^{12}$$

$$a^{-m} = \frac{1}{a^m} \quad \text{Example: } 6^{-2} = \frac{1}{6^2} = \frac{1}{36}$$

Simplify.

1.  $(-6)^3$

2.  $(-5)^4$

3.  $3^{-2}$

4.  $2^{-3}$

5.  $(-4)^{-3}$

6.  $\left(\frac{2}{3}\right)^{-2}$

7.  $\left(\frac{5}{3}\right)^{-3}$

8.  $15^0$

9.  $(-1)^{20}$

10.  $(-1)^{99}$

11.  $2^3 \cdot 2^2 \cdot 2^{-4}$

12.  $4^2 \cdot 3^3 \cdot 2^{-3}$

Simplify. Use only positive exponents in your answers.

13.  $r^5 \cdot r^8$

14.  $x^{-1} \cdot x^{-2}$

15.  $\frac{r^9}{r^4}$

16.  $\frac{m^3}{m^5}$

17.  $a \cdot a^{-1}$

18.  $(x^2)^{-2}$

19.  $(b^4)^2$

20.  $(s^5)^3$

21.  $(3y^2)(2y^4)$

22.  $(4x^3y^2)(2y^4)$

23.  $(5a^2b^3)(a^{-2}b)$

24.  $(-2ab^5)(-4ab^{-3})$

## FACTORING

Examples: Factor.

1.  $24x^3 - 32x^2$  *Hint:  $8x^2$  is the greatest common factor between the two terms.*  
 $= 8x^2(3x - 4)$

2.  $x^2 - 12x - 28$   
 $(x - 14)(x + 2)$

Factor the trinomial. if the trinomial cannot be factored, say so.

1.  $x^2 + 5x + 4$

2.  $x^2 - 8x + 12$

3.  $5x^2 + 5x - 10$

4.  $3x^2 + 54x + 243$

5.  $-x^2 + 2x - 1$

## QUADRATIC EQUATIONS

Example: $3x^2 + 14x + 8 = 0$ Solution: $(3x+2)(x+4) = 0$ $3x+2 = 0$ or $x+4 = 0$
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Solve each equation by factoring. (Hint: You may need the Quadratic Formula, from Algebra I. If you are not familiar with the Quadratic Formula, please do some research on the web. *If this doesn't help*, please email me and I will help. It is a formula that is part of the Algebra I curriculum but often is not covered at Bragg due to time constraints.)

1.  $x^2 + 5x - 6 = 0$

2.  $x^2 - 7x - 18 = 0$

3.  $x^2 = 20x - 36$

4.  $x^2 + 8x = 20$

5.  $4x^2 + 15 = 17x$

6.  $3x^2 - 13x - 10 = 0$

7.  $6x^2 + 11x - 10 = 0$

8.  $8x^2 + 10x - 25 = 0$

## PROPORTIONS

Example: 1. $\frac{3}{2} = \frac{y}{22}$ $3(22) = 2y$ $66 = 2y$ $33 = y$	2. $\frac{x+4}{5} = \frac{x-2}{3}$ $3(x+4) = 5(x-2)$ $3x+12 = 5x-10$ $22 = 2x$ $11 = x$
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Solve the following proportions using the format used in the examples.

1.  $\frac{7}{2} = \frac{y}{3}$

2.  $\frac{7}{3} = \frac{21}{x}$

3.  $\frac{25}{15} = \frac{10}{x}$

4.  $\frac{10}{6x+7} = \frac{6}{2x+9}$

5.  $\frac{4}{x-3} = \frac{6}{x+3}$

6.  $\frac{3x-5}{2} = \frac{x-15}{4}$

7.  $\frac{2-4x}{-6} = \frac{6x-8}{10}$

8.  $\frac{x+2}{5} = \frac{4}{x+1}$

9.  $\frac{2}{x-3} = \frac{x-2}{6}$