

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

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

SYSTEMS OF LINEAR EQUATIONS

REVIEW:

SUBSTITUTION METHOD

Solve: $y = 5 - 2x$
 $5x - 6y = 21$

Solution: Substitute $5 - 2x$ for y .
 $5x - 6(5 - 2x) = 21$
 $5x - 30 + 12x = 21$
 $17x - 30 = 21$
 $17x = 51$
 $x = 3$

Then substitute 3 for x . $y = 5 - 2(3)$
 $y = -1$

ANSWER: (3, -1)

Solve each system using substitution.

1. $y = 2x + 5$
 $3x - y = 4$

2. $8x + 3y = 26$
 $2x = y - 4$

3. $x - 7y = 13$
 $3x - 5y = 23$

4. $3x + 4y = 19$
 $2x - 5y = -10$

REVIEW:

ELIMINATION METHOD

Example 1 ~ Solve: $3x + 4y = -10$
 $5x - 2y = 18$

Solution: $3x + 4y = -10$
 $2(5x - 2y = 18) \rightarrow 10x - 4y = 36$
 $\underline{13x = 26}$
 $x = 2$

Then substitute 2 for x .
 $3(2) + 4y = -10$
 $4y = -16$
 $y = -4$

ANSWER: (2, -4)

Example 2 ~ $5x - 2y = -19$
 $2x + 3y = 0$

Solution: $3(5x - 2y = -19)$
 $2(2x + 3y = 0)$
 $\underline{15x - 6y = -57}$
 $\underline{4x + 6y = 0}$
 $19x = -57$
 $x = -3$

Then substitute -3 for x .
 $2(-3) + 3y = 0$
 $-6 + 3y = 0$
 $3y = 6$
 $y = 2$

ANSWER: (-3, 2)

Solve each system using elimination.

1. $3x + 4y = 9$
 $-3x - 2y = -3$

2. $5x + 3y = 30$
 $3x + 3y = 18$

3. $3x + y = -3$
 $x + 4y = 10$

4. $4x - 6y = -26$
 $-2x + 3y = 13$

5. $2x - 8y = 24$
 $3x + 5y = 2$

6. $5x - 9y = 47$
 $6x + 2y = 18$