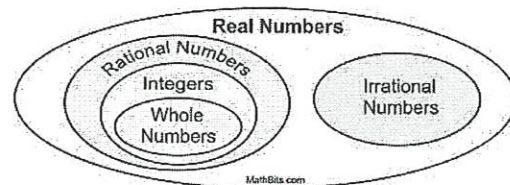# SECTION 1: NUMBER SENSE

<u>Part 1:</u> The Real Number System
Use the diagram to the right to determine the smallest set to which each number belongs

1. -4.2

   Rational

2. 9

   whole

3. $3\sqrt{5}$

   Irrational

4. $\sqrt{16}$

   whole

5. $\frac{5}{3}$

   Rational

6. $-\frac{8}{2}$

   Integer

<u>Part 2:</u> Operations
Find each sum, different, product, or quotient. Simplify any fractions.

7. $(-12) + 7$

   $\boxed{-5}$

8. $4 - (-15)$

   $\boxed{19}$

9. $\frac{2}{3} + \frac{5}{2}$ $\frac{4}{6} + \frac{15}{6}$

   $\boxed{\frac{19}{6}}$

10. $2 - \frac{4}{5}$ $\frac{10}{5} - \frac{4}{5}$

    $\boxed{\frac{6}{5}}$

11. $(30)\left(-\frac{3}{6}\right)$

    $\frac{-90}{6} = \boxed{-30}$

12. $\frac{1}{8} \div \frac{1}{4}$

    $\frac{1}{8} \cdot \frac{4}{1} = \frac{4}{8} = \boxed{\frac{1}{2}}$

<u>Part 3:</u> Comparison
Complete each statement with <, >, or =.

13. $3 \; \underline{<} \; 7$

14. $-1 \; \underline{<} \; 4$

15. $-4 \; \underline{>} \; -10$

16. $|-6| \; \underline{=} \; 6$

17. $\frac{1}{4} \; \underline{<} \; \frac{8}{12}$

18. $\frac{11}{4} \; \underline{>} \; \frac{3}{2}$

SECTION 2: EXPRESSIONS AND EQUATIONS

Part 1: Order of Operations
Use the order of operations to evaluate each expression.

1. $8^2 \div (2 \cdot 8) + 2$

$64 \div 16 + 2$

$4 + 2$

$\boxed{6}$

2. $\dfrac{5^2 \cdot 4 - 5 \cdot 4^2}{5(4)}$

$\dfrac{25 \cdot 4 - 5 \cdot 16}{20} = \dfrac{100 - 80}{20} = \boxed{1}$

3. $\frac{1}{2} \cdot 26 - 3^3$

$13 - 27$

$\boxed{-14}$

4. $5 + [30 - (6-1)^2]$

$5 + [30 - (5)^2]$

$5 + (30 - 25)$

$5 + 5 = \boxed{10}$

5. $250 \div [5(3 \cdot 7 + 4)]$

$250 \div [5(21 + 4)]$

$250 \div [5(25)]$

$250 \div 125 = \boxed{2}$

6. $\dfrac{2 \cdot 4^2 - (8 \div 2)}{2 \cdot (5+2)}$

$\dfrac{2 \cdot 16 - (4)}{2 \cdot (7)} = \dfrac{32 - 4}{14} = \dfrac{28}{14} = \boxed{2}$

Part 2: Evaluating Algebraic Expressions
Evaluate each expression using the values below. Leave your answers as a simplified fraction when necessary.

7. $5x^2 - y$ when x = 4 and y = 24.

$5(4)^2 - 24$

$5(16) - 24$

$80 - 24 = \boxed{56}$

8. $x^2 + 3x + 8$ when x = -3.

$(-3)^2 + 3(-3) + 8$

$9 - 9 + 8 = \boxed{8}$

9. $(z \div x)^2 + \frac{4}{5}x$ when x = 2 and z = 4.

$(4 \div 2)^2 + \dfrac{4}{5}(2)$

$(2)^2 + \dfrac{8}{5}$

$4 + \dfrac{8}{5} = \dfrac{20}{5} + \dfrac{8}{5} = \boxed{\dfrac{28}{5}}$

10. $xy - 6z$ when x = 12, y = 9, and z = 4.

$(12)(9) - 6(4)$

$108 - 24 = \boxed{84}$

Part 3: Combining Like Terms
Simplify each expression by combining like terms.

11. $7x - 1 + 2x$

$$\boxed{9x - 1}$$

12. $3x + 2 - 6x + 8 - 1$

$$\boxed{-3x + 9}$$

13. $-4(2x - 1) + 3x - 7$

$-8x + 4 + 3x - 7$

$$\boxed{-5x - 3}$$

14. $3(x + 3) - (2x - 1) + 11x + 8$

$3x + 9 - 2x + 1 + 11x + 8$

$$\boxed{12x + 18}$$

Part 4: Solving Equations
Solve each equation for x. Leave your answers as a simplified fraction when necessary.

15. $-14 + x = -2$

$+14 \qquad +14$

$$\boxed{x = 12}$$

16. $5\left(\frac{2}{5}x = 6\right)5$

$\dfrac{2x}{2} = \dfrac{30}{2}$

$$\boxed{x = 15}$$

17. $14x - 8 = 34$

$+8 \quad +8$

$\dfrac{14x}{14} = \dfrac{42}{14}$

$$\boxed{x = 3}$$

18. $5\left(\frac{3x-7}{5} = 16\right)5$

$3x - 7 = 80$

$+7 \quad +7$

$\dfrac{3x}{3} = \dfrac{87}{3}$

$$\boxed{x = 29}$$

19. $-5x - 10 = 2$

$+10 \quad +10$

$\dfrac{-5x}{-5} = \dfrac{12}{-5}$

$$\boxed{x = -\dfrac{12}{5}}$$

20. $3(x + 8) - 5 = 10$

$3x + 24 - 5 = 10$

$3x + 19 = 10$

$-19 \quad -19$

$\dfrac{3x}{3} = \dfrac{-9}{3}$

$$\boxed{x = -3}$$

SECTION 3: LINEAR EQUATIONS

<u>Part 1:</u> Calculating Slope
Use the slope formula to find the slope of the line that passes through each pair of points.

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

1. $\overset{x_1\ y_1}{(2, 5)}$ and $\overset{x_2\ y_2}{(6, 2)}$

$$m = \frac{2-5}{6-2} = \boxed{\frac{-3}{4}}$$

2. $\overset{x_1\ y_1}{(1, -2)}$ and $\overset{x_2\ y_2}{(-2, -5)}$

$$m = \frac{-5-(-2)}{-2-1} = \frac{-3}{-3} = \boxed{1}$$

<u>Part 2:</u> Writing Equations
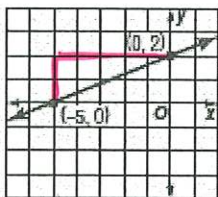*Write the equation of the line in the form y = mx + b.*

3.   Slope = 2
     y-intercept = 3

$$\boxed{y = 2x + 3}$$

4.   Slope = $\frac{4}{3}$
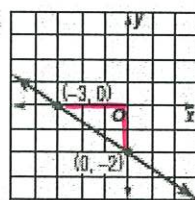   y-intercept = -4

$$\boxed{y = \frac{4}{3}x - 4}$$

5.

$$m = \frac{2}{5}$$
$$b = 2$$

$$\boxed{y = \frac{2}{5}x + 2}$$

6.

$$m = \frac{-2}{3}$$
$$b = -2$$

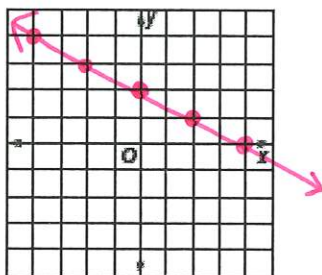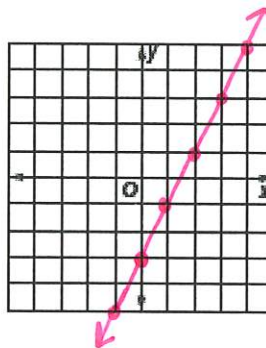$$\boxed{y = -\frac{2}{3}x - 2}$$

<u>Part 3:</u> Graphing Lines
Graph each line.

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

8. $y = 2x - 3$

SECTION 4: WORD PROBLEMS

1. Write an algebraic expression for the verbal expressions below.

   a. Four times a number is decreased by twelve. $4x - 12$

   b. Three more than the product of five and a number. $5x + 3$

   c. The quotient of two more than a number and eight. $\dfrac{x+2}{8}$

   d. Seven less than twice a number. $2x - 7$

   e. A number decreased by 12 is less than 48. $x - 12 < 48$

2. Two dogs in a park are named Roy and Spot. Roy weighs 20 pounds more than Spot. If the sum of their weights is 250 pounds, how much does each dog weigh?

   Roy: $x + 20$ $x + x + 20 = 250$ Spot: 115 lbs
   Spot: x $\underline{2x + 20 = 250}$ Roy: 135 lbs
                           $ -20 \quad -20$

                           $\dfrac{2x}{2} = \dfrac{230}{2}$ $x = 115$

3. Three-fourths of the student body attended the pep rally. If there were 1,230 students at the pep rally, how many students are there in total?

   $x =$ total # of students

   $4\left(\dfrac{3}{4}x\right) = (1230)4$ 1,640 students

   $\dfrac{3x}{3} = \dfrac{4920}{3}$ $x = 1640$

4. Susie went to the mall and spent $41 on t-shirts and socks. Susie only bought 1 pair of socks for $5 and spent the rest on t-shirts that cost $12 each. How many t-shirts did Susie buy?

   $x =$ # of tshirts bought

   $5 + 12x = 41$ 3 tshirts
   $-5 \qquad -5$
   $\dfrac{12x}{12} = \dfrac{36}{12}$ $x = 3$

5. A gym membership charges a one-time fee of $50 plus $15 every month. How much would it cost to use the gym for 5 months?

   $x =$ # of months

   $15x + 50$ $125
   $15(5) + 50$
   $75 + 50 = 125$