1. Identify the set(s) each number belongs to: natural, whole, integers, rational, irrational, or real.

a) \( \frac{3}{2} \)
b) -5.6
c) 1000
d) \( \sqrt{5} \)
e) -5
f) \( \sqrt{9} \)
g) \(-\frac{22}{3}\)

Simplify each expression.

1. \( 6y - 4 + y \)
2. \( 6y + 3x + 6y - 2x \)
3. \( 4(y - 3) + 9 - 3y \)
4. \( 2a - 5(a + 1) \)
5. \( (6b^3)(3b^4) \)
6. \( 2x(3x^3 - 4) \)
7. \( (x^3)^5 \)
8. \( 3(x^2)^6 \)
9. \( 2x^3 - 4x - 6x^3 \)

Solve each equation. Check your solution. Answers must be reduced fractions, when applicable. If an equation has no solution or all real numbers as a solution, so state.

1. \( 2m + 12 = 3m - 31 \)
2. \( 2h - 8 = 5h + 17 \)
3. \( 9a - 3 = 3 \)
4. \( 4n - 12 = 12 - 4n \)
5. \( 4x - 9 = 7x + 12 \)
6. \( -6y - 3 = 3 - 6y \)
7. \( 8q + 12 = 4(3 + 2q) \)
8. \( -7(2b - 4) = 5(-2b + 6) \)
9. \( 7(-3y + 2) = 8(3y - 2) \)
10. \( \frac{1}{2} - \frac{5}{3}x = \frac{7}{8}x + \frac{7}{2} \)
11. \( \frac{15 - x}{3} = -9 \)
12. \( -\frac{x}{3} - 4 = 13 \)
13. \( \frac{7}{9} = \frac{8}{x} \)
14. \( \frac{1}{12} = \frac{2}{x^6} \)

Rewrite each equation in slope-intercept form.

1. \( -3x + y = 9 \)
2. \( 4x - 3y = -18 \)
3. \( x + \frac{3}{2}y = \frac{3}{5} \)

Rewrite each equation in standard form.

1. \( y = \frac{2}{3}x - 3 \)
2. \( y - 4 = 2(x + 5) \)
3. \( x + \frac{3}{2}y = 5 \)

Solve each inequality. Show your solution in each of the three different notations (graph, interval notation, and set notation). It is not necessary to graph if the inequality has no solution or is true for all real numbers.

1. \( x > 3 \)
2. \( -\frac{1}{4}x + 3 \geq 9 \)
3. \( 5x - 3 \leq 7x \)
4. \( -3x + 4(x - 1) < x - 1 \)
Solutions

1. a) real, rational  
   b) real, rational  
   c) real, rational, integer, whole, natural  
   d) real, irrational  
   e) real, rational, integer  
   f) real, rational, integer, whole, natural  
   g) real, rational, integer

Simplify each expression.

1. $7y - 4$  
2. $x + 12y$  
3. $y - 3$  
4. $-3a - 5$  
5. $18b^7$  
6. $6x^4 - 8x$  
7. $x^{15}$  
8. $3x^{12}$  
9. $-4x^3 - 4x$

Solve each equation.

1. $m = 43$  
2. $h = -\frac{25}{3}$  
3. $a = \frac{2}{3}$  
4. $n = 3$  
5. $x = -7$  
6. $\varnothing$  
7. all real numbers  
8. $b = -\frac{1}{2}$  
9. $y = \frac{2}{3}$  
10. $x = -2$  
11. $x = 42$  
12. $x = -41$  
13. $x = \frac{22}{7}$  
14. $x = 2$

Rewrite each equation in slope-intercept form.

1. $y = 3x + 9$  
2. $y = -\frac{4}{3}x + 6$  
3. $y = -\frac{1}{2}x + \frac{9}{10}$

Rewrite each equation in standard form.

1. $-2x + 5y = -15$  
2. $-2x + y = 14$  
3. $x - 3y = 10$

Inequalities

1. $(3, \infty); \{x| x > 3\}$  
2. $(-\infty, -24]; \{x| x \leq -24\}$  
3. $[-\frac{1}{2}, \infty); \{x| x \geq -\frac{1}{2}\}$  
4. all real numbers