

To receive full credit, show all steps and present the exact value of solutions.

1. Find the average of  $-\frac{2}{3}$ ,  $3\frac{1}{6}$ , 4, and  $-\frac{1}{2}$
2. Simplify each of the following expressions. Show all steps.

(a)  $(-1)^4 - 2 \cdot 3^2 \div (-2) \cdot 6 + (-3)^2 =$

(b)  $\left(3\frac{3}{5}\right) \div \left(1\frac{1}{3}\right) + \frac{3}{10} =$

(c)  $|-3^2 + 3 - |(-6)^2 + (-2)^3| - 2| + 1 =$

(d)  $(x + 6)(x^2 - 6x + 36) =$

(e)  $\frac{20 - 5x^2}{6x^2 + 3x^3} =$

(f)  $\frac{(x^2y^{-2})^4 xy^{-1} (xy)^{-1}}{xy^0 (x^{-2}y)^{-2}} =$

(g)  $\frac{2x - 5}{5 - 2x} =$

(h)  $\frac{a^2b^0a^{-2}(ab^{-1})^3}{b^2a^0b^{-4}a^2} =$

(i)  $\frac{\left(\frac{1}{2}\right)^{-1} + \left(\frac{1}{3}\right)^{-1}}{\left(\frac{1}{2}\right)^{-2} - \left(\frac{1}{3}\right)^{-2}} =$

(j)  $\frac{2^{-1} + 2^{-2}}{(-2)^{-1} + (-2)^{-2}} =$

3. Perform the indicated operations.

(a)  $\left(2x^3 - 4x^2 + \frac{1}{2}x - 5\right) - \left(-x^3 + 4x^2 + \frac{1}{2}x - 4\right) =$

(b)  $(p - 1)(p + p^2 + p^3 + p^4 + 1) =$

(c)  $(x - 1)^2 - 2x(x - 3) - (2x + 1)^2 =$

4. Factor completely each of the following expressions.

(a)  $2ax^2 - 18ay^2 - bx^2 + 9by^2 =$

(b)  $600ab^2 - 6ab^4 =$

(c)  $60st^2 - 44st^2x + 8st^2x^2 =$

(d)  $a^4 - 16 =$

5. Solve each of the following equations. Make sure to check your solutions.
- (a)  $15x^3 = 55x^2 + 20x$
  - (b)  $5(2x - 3) - 3(4x - 7) = -2x$
  - (c)  $7 - (2x - 1)(x + 5) = (3 - x)(2x + 7) - 17$
  - (d)  $3x^3 = 75x$
6. Solve each of the following inequalities. Make sure to check your solutions.
- (a)  $\frac{2x + 1}{3} - \frac{1 - 5x}{7} < 2x - 6$
  - (b)  $-\frac{2}{3}x + \frac{3}{5} \leq -3\frac{2}{5}$
7. Solve the system of linear equations. Make sure to check your solutions.
- (a) 
$$\begin{cases} 2x - 3y = 13 \\ 3x + 2y = 13 \end{cases}$$
  - (b) 
$$\begin{cases} 2x - y = 3 \\ x = \frac{y}{2} + \frac{3}{2} \end{cases}$$
8. Find the slope of the line  $3x - 5y = 12$ .
9. Graph the straight lines  $2x - y = 7$  and  $x + 2y = 6$  in the same coordinate system.
- (a) Use your graph to find the coordinates of the point where the lines intersect.
  - (b) Use algebraic methods to check your answer for part a).
10. Word Problems.
- (a) One number is 3 less than twice the other. The sum of the two numbers is 42. Find these numbers.
  - (b) One number is 3 less than twice the other. The product of the two numbers is 104. Find these numbers.
  - (c) Ann is four years younger than Tina. How old is Ann if the sum of their ages is 62?
  - (d) The difference between two numbers is 7, their product is 228. Find these numbers.
  - (e) One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its perimeter is 48 in.
  - (f) One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its area is  $319 \text{ in}^2$ .
  - (g) We have some ten-dollar bills and some twenty-dollar bills. All together, we have 47 bills, in the value of \$ 620. How many twenty-dollar bills do we have?
  - (h) We have invested \$ 3500 into two bank accounts. One account earns 7% interest per year, the other account earns 11% interest per year. How much did we invest in each account if the combined interest was 333?