

1. Simplify each of the following expressions.

(a)  $3\sqrt{28} - 5\sqrt{63} + 2\sqrt{175} =$

(b)  $\frac{1}{\sqrt{5} - 2} =$

(c)  $(2 - 3\sqrt{7})(\sqrt{7} + 1) =$

(d)  $(3\sqrt{7} - 2)(3\sqrt{7} + 2) =$

(e)  $\frac{x^2 - 2x}{2x^2 + x - 15} \cdot \frac{2x^2 - x - 10}{x^2 - 4} =$

(f)  $(3x^2 - 2x - 6) + (-x^2 - 3x + 4) =$

(g)  $(2x)^{-3}(x^5) =$

(h)  $(-2xy^2)^2 =$

(i)  $(-2xy^{-2})^{-2} =$

(j)  $(-a^2b)^3(a^4b)^2 =$

(k)  $(-a^{-2}b)^{-3}(a^4b^{-1})^{-2} =$

(l)  $\left(\frac{-2a^3b^{-2}}{a^5b^{-3}}\right)^{-2} =$

(m)  $a^{-2}b^{-2} =$

(n)  $a^{-2} + b^{-2} =$

(o)  $\frac{\frac{4}{a^2} \cdot \frac{1}{b^2}}{\frac{2}{a} \cdot \frac{1}{b}} =$

(p)  $\frac{\frac{4}{a^2} - \frac{1}{b^2}}{\frac{2}{a} - \frac{1}{b}} =$

2. Factor completely:

(a)  $70x - x^2 - 1189 =$

(b)  $12x - x^2 + 45 =$

(c)  $128 - 2x^4 =$

(d)  $15x^2 - x - 2 =$

3. Solve the inequality  $\frac{3 - 4x}{3} - \frac{2x - 3}{7} \geq -x + 7$

4. Solve each of the following equations. Make sure to check your solutions.

(a)  $(x - 1)(x - 2) + 7 = 4 - (3 - x)(x - 5)$

(b)  $x^2 - 6x = 7$

(c)  $x^2 - 6x = -4$

(d)  $x^2 - 6x = -34$

5. Graph the parabola  $y = -21 + x^2 + 4x$ . Clearly indicate the coordinates of five points, including vertex and intercepts.
6. Find an equation of the line that passes through the points  $(1, -7)$  and  $(7, -4)$ . Graph the line.
7. Find the equation of the straight line that is parallel to  $y = 3x - 7$  and passes through the point  $(3, 11)$ .
8. Find the equation of the straight line that is perpendicular to  $2x - 7y = 42$  and passes through the point  $(2, 2)$ .
9. Julia is 5 years younger than her brother, Tom. How old are they if the sum of their ages is 43?
10. One side of a rectangle is 6 in shorter than the other side. Find the sides of the rectangle if its perimeter is 120 in.
11. One side of a rectangle is 6 in shorter than **twice** the other side. Find the sides of the rectangle if its perimeter is 120 in.
12. The largest angle in a triangle is three times as large as the smallest angle. The middle angle is  $35^\circ$  larger than the smallest angle. Find the angles in the triangle.
13. What a great ceremony! We had 150% more guests this year than last year. If the number of guests this year is 1875, how many guests were there last year?
14. The sum of two numbers is 27. Their difference is 11. Find these numbers.
15. The product of two numbers is 65. Their difference is 8. Find these numbers.
16. If we square a number, we get six times the number. Find all numbers with this property.
17. If we raise a number to the third power, we get four times the number. Find all numbers with this property.
18. There is a farm where chickens and cows live. There are 79 heads and 262 legs. How many chickens, how many cows?
19. We invested \$ 5000 in two bank accounts. One account earns 5% interest per year, the other earns 8% interest per year. How much did we invest into each account if the combined interest of the two accounts was \$ 337 after one year?
20. Paul got a 6% raise at work. Now he is making \$2226 per month. How much was he making before the raise?