1. Laura borrowed a total of $22,000 from two different banks to start a business. One bank charged the equivalent of 4% simple interest, and the other charged 5.5% simple interest. If the total interest after one year was $910, determine the amount borrowed from each bank.

2. A motorist drives on State Road 412 to and from work each day and pays $2.75 in tolls one way. Write a model for the cost for tolls C (in $) for \( x \) working days.

3. How many liters of a 20% alcohol solution should be added to 40 liters of a 50% alcohol solution to make a 30% alcohol solution?

4. Two passengers leave the airport at Denver, Colorado. One takes a 2.3-hr flight to Seattle, Washington, and the other takes a 3.3-hr flight to New York City. The plane flying to New York flies 60mph faster than the plane flying to Seattle. If the total distance traveled by both planes is 2662 Miles, determine the average speed of each plane.

5. A local eatery has a 12 yd by 15 yd patio with a surrounding walkway that is \( x \) yards wide. The perimeter around the outside of the walkway is 64 yards. Determine the width of the walkway.

6. Brian, Mark, and Jeff are painting a house. Working together they can paint the house in 6 hours. Working alone Brain can paint the house in 15 hours and Jeff can paint the house in 20 hours. How long would it take Mark to paint the house working alone?
7. The property tax on a $180,000 house is $1296. At this rate, what is the property tax on a house that is 240,000?

8. Express the following in simplest form
   a. $i^{27}$
   b. $i^{-14}$
   c. $i^{104}$
   d. $i^{621}$

9. Write $\sqrt{-6} \cdot \sqrt{-8}$ in terms of $i$ and simplify

Perform the indicated operations. Write your solution in standard form, $a + bi$.

10. $(6 - 10i) + (2 + 6i)$

11. $(2 - 4i)(3 + 5i)$

12. $(-4 + 5i) - (2 - 3i)$

13. $\frac{8-5i}{3+5i}$

14. Solve $(x + 11)^2 = 40$ using the square root property

15. Solve $x^2 - 10x + 7 = 0$ by completing the square to give exact solutions

16. Solve $3x^2 - 15x + 6 = 0$ by completing the square to give exact solutions

17. Solve $x^2 + 11x = -24$ by factoring and applying the zero product property

18. Solve $3x^2 - 5x - 6 = 0$ using the quadratic formula

19. Use the discriminant $b^2 - 4ac$ to determine the number and type of solution(s) of the quadratic equation $5x^2 + 2x - 3 = 0$
20. Solve $A = \pi r^2 + \pi rs$ for $r$ (hint -- quadratic formula)

21. Loreen plans to make several open-topped boxes in which to carry plants. She makes the boxes from rectangular sheets of cardboard from which she cuts 6” squares from each corner. The length of the original piece of cardboard is 12” more than the width. If the volume of the box is 1728in$^3$, determine the dimensions of the original piece of cardboard.

22. NBA basketball legend Michael Jordan had a 48” vertical leap. Suppose that Michael jumped from ground level with an initial velocity of 16ft/sec.

   a. Using $s = -\frac{1}{2}gt^2 + v_0t + s_o$ write a model to express Michael’s height (in ft) above ground level $t$ seconds after leaving the ground.
   b. Use the model from part (a) to determine how long it would take Michael to reach his maximum height of 48” (4 ft).

23. A patio is configured from a rectangle with two right triangles of equal size attached at the two ends. The length of the rectangle is 20 feet. The base of the right triangle is 3 feet less than the height of the triangle. If the total area if the patio is 348 ft$^2$, determine the base and height of the triangular portions. Answer with a complete sentence. Show all work.

24. Factor by grouping to solve the equation $75x^3 + 100x^2 - 3x - 4 = 0$

25. Solve the rational equation $\frac{48}{x^2-4x} + 3 = \frac{12}{x-4}$

26. Solve the rational equation $\frac{4x}{x-5} - \frac{1}{x+1} = \frac{3x^2+3}{x^2-4x-5}$

27. Solve the radical equation $\sqrt{x + 18} + 2 = x$
28. Solve the radical equation $2\sqrt{4x - 3} + 7 = 9$

29. Solve the equation $3(x + 2)^{5/6} = 21$

30. Solve $(2 + \frac{3}{x})^2 - (2 + \frac{3}{x}) = 12$ by making an appropriate substitution

31. Solve $3x - 13\sqrt{x} = 10$ by making an appropriate substitution.

32. Solve $-3 \leq -\frac{4}{3}x + 1$ Write the solution set in interval notation and graph the solution set.

33. Given $A = \{x|x < 9\}$ and $B = \{x|x \geq -1\}$ Find
   a. $A \cup B$
   b. $A \cap B$

34. Solve the compound inequality $x + 1 \leq 6$ or $\frac{1}{3}x < -2$ Write the solution set in interval notation and graph the solution set.

35. Solve the compound inequality $x - 6 > 1$ and $\frac{3}{4}x \geq 6$ Write the solution in interval notation and graph the solution set.

36. Solve the compound (double) inequality $-6 \leq -3x + 9 < 0$ Write the solution set in interval notation and graph the solution set.

37. Nancy wants to vacation in Austin, Texas. Hotel A charges $179 per night with a 14% nightly room tax and free parking. Hotel B charges $169 per night with an 18% nightly room tax plus a one-time $40 parking fee. After how many nights will Hotel B be less expensive?

38. Solve $4|2x + 7| + 2 = 22$

39. Solve the inequality $3|4 - x| - 2 < 16$ Write the solution in interval notation
40. Solve the inequality \(|x + 3| - 9 \geq -4\). Write the solution in interval notation.

41. The lengths of the sides of a triangle are given by three consecutive integers greater than 1. What are the possible values for the shortest side if the perimeter is not to exceed 24 feet?

42. The results of a political poll indicate that the leading candidate will receive 51% of the votes with a margin of error of no more than 3%. Let \(x\) represent the true percentage of votes received by this candidate.
   a. Write an absolute value inequality that represents an interval in which to estimate \(x\).
   b. Solve the inequality and interpret the answer.