

1. Simplify each of the following expressions.

(a)  $2\sqrt{2} + 6\sqrt{98} - 16\sqrt{8} =$  (9.4 Example 4)

(b)  $(3\sqrt{5} + 1)(\sqrt{5} - 4) =$

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

(d) Rationalize the denominator in  $\frac{15}{\sqrt{7} - 2} =$

(e)  $\frac{(x+4) - 1}{6(x+4) - 6} =$  (6.3 Example 7)

(f)  $\frac{c}{5a} \cdot \frac{15a^2b}{3b^2c} =$  (6.4 Example 2)

(g)  $\frac{1}{y-1} + \frac{y}{x} =$  (6.5 Example 9)

(h)  $\frac{10}{x-y} - \frac{5}{y-x} =$  (6.5 Example 12)

2. Solve each of the following equations. Make sure to check your solution(s).

(a)  $20x^2 + 5x^3 = 60x$

(b)  $x + 7 = \frac{2x + 6}{2} + 4$  (2.3 Problem 80)

(c)  $\left| \frac{1}{4}x + 12 \right| - 5 = -6$  (7.2 Example 6)

3. Solve  $-4 \leq 3x + 2 \leq 10$  (7.1 Example 9)

4. Solve the system of equations below. (3.5 Example 2)

$$3x + 2y = -11$$

$$2x - 3y = -29$$

5. Factor completely  $8x^4y - 72y$  (7.4 Example 6)

6. Factor  $34x + x^2 - 5187$  by completing the square.

7. Graph the parabola  $y = x^2 - 10x + 21$ . Clearly indicate the coordinates of at least five points, including vertex and intercepts.

8. The price of the tickets went up from \$48 to \$58.56. What percent of a change does this represent? (2.1 Example 11)

9. The number of bacteria has increased by 15% overnight. If in the morning we counted 69000 bacteria, how many were there last night? (2.1 Example 12)

10. One negative integer is 7 less than another, and their product is 120. Find the integers. (5.8 Example 1)

11. We have invested \$15000 into two accounts. One account earns 6% interest every year, the other account earns 9% every year. How much did we invest into each account if the combined interest was \$1230 after the first year? (2.4 Example 8, 3.6 Example 5)

12. How many gallons of 8% solution should be mixed with 20 gallons of 18% solution to obtain a mixture that is 12%? (2.5 Example 4, 3.6 Example 7)
13. There is an animal farm where chickens and cows live. All together, there are 105 heads and 306 legs. How many chickens, how many cows?