

## 2.3 Exercises



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### < Study Tips >

- What's on the final exam? If your instructor thinks a problem is important enough for a test or quiz, it is probably important enough for the final exam. You should be thinking of the final exam all semester.
- Write all of the test and quiz questions on note cards, one to a card. To prepare for the final, shuffle the cards and try to answer the questions in a random order.

**Reading and Writing** After reading this section, write out the answers to these questions. Use complete sentences.

1. What is the usual first step when solving an equation involving fractions?
2. What is a good first step for solving an equation involving decimals?
3. What is an identity?
4. What is a conditional equation?
5. What is an inconsistent equation?
6. What is the solution set to an inconsistent equation?

### < 1 > Equations Involving Fractions

Solve each equation by first eliminating the fractions. See Example 1.

7.  $\frac{x}{4} - \frac{3}{10} = 0$
8.  $\frac{x}{15} + \frac{1}{6} = 0$
9.  $3x - \frac{1}{6} = \frac{1}{2}$
10.  $5x + \frac{1}{2} = \frac{3}{4}$
11.  $\frac{x}{2} + 3 = x - \frac{1}{2}$
12.  $13 - \frac{x}{2} = x - \frac{1}{2}$
13.  $\frac{x}{2} + \frac{x}{3} = 20$
14.  $\frac{x}{2} - \frac{x}{3} = 5$
15.  $\frac{w}{2} + \frac{w}{4} = 12$
16.  $\frac{a}{4} - \frac{a}{2} = -5$
17.  $\frac{3z}{2} - \frac{2z}{3} = -10$
18.  $\frac{3m}{4} + \frac{m}{2} = -5$
19.  $\frac{1}{3}p - 5 = \frac{1}{4}p$
20.  $\frac{1}{2}q - 6 = \frac{1}{5}q$

$$21. \frac{1}{6}v + 1 = \frac{1}{4}v - 1$$

$$22. \frac{1}{15}k + 5 = \frac{1}{6}k - 10$$

$$23. \frac{1}{2}x + \frac{1}{3} = \frac{1}{4}x$$

$$24. \frac{1}{3}x - \frac{2}{5}x = \frac{5}{6}$$

### < 2 > Equations Involving Decimals

Solve each equation by first eliminating the decimal numbers. See Examples 2 and 3.

25.  $x - 0.2x = 72$
26.  $x - 0.1x = 63$
27.  $0.3x + 1.2 = 0.5x$
28.  $0.4x - 1.6 = 0.6x$
29.  $0.02x - 1.56 = 0.8x$
30.  $0.6x + 10.4 = 0.08x$
31.  $0.1a - 0.3 = 0.2a - 8.3$
32.  $0.5b + 3.4 = 0.2b + 12.4$
33.  $0.05r + 0.4r = 27$
34.  $0.08t + 28.3 = 0.5t - 9.5$
35.  $0.05y + 0.03(y + 50) = 17.5$
36.  $0.07y + 0.08(y - 100) = 44.5$
37.  $0.1x + 0.05(x - 300) = 105$
38.  $0.2x - 0.05(x - 100) = 35$



### < 3 > Simplifying the Process

Solve each equation. If you feel proficient enough, try simplifying the process, as described in Example 4.

39.  $2x - 9 = 0$
40.  $3x + 7 = 0$
41.  $-2x + 6 = 0$
42.  $-3x - 12 = 0$
43.  $\frac{z}{5} + 1 = 6$
44.  $\frac{s}{2} + 2 = 5$
45.  $\frac{c}{2} - 3 = -4$
46.  $\frac{b}{3} - 4 = -7$
47.  $3 = t + 6$
48.  $-5 = y - 9$

49.  $5 + 2q = 3q$   
 50.  $-4 - 5p = -4p$   
 51.  $8x - 1 = 9 + 9x$   
 52.  $4x - 2 = -8 + 5x$   
 53.  $-3x + 1 = -1 - 2x$   
 54.  $-6x + 3 = -7 - 5x$

#### ◀ 4 ▶ Identities, Conditional Equations, and Inconsistent Equations

Solve each equation. Identify each as a conditional equation, an inconsistent equation, or an identity.

See Examples 5 and 6.

See Recognizing Identities and Inconsistent Equations on page 107.

55.  $x + x = 2x$   
 56.  $2x - x = x$   
 57.  $a - 1 = a + 1$   
 58.  $r + 7 = r$   
 59.  $3y + 4y = 12y$   
 60.  $9t - 8t = 7$   
 61.  $-4 + 3(w - 1) = w + 2(w - 2) - 1$   
 62.  $4 - 5(w + 2) = 2(w - 1) - 7w - 4$

63.  $3(m + 1) = 3(m + 3)$   
 64.  $5(m - 1) - 6(m + 3) = 4 - m$   
 65.  $x + x = 2$   
 66.  $3x - 5 = 0$   
 67.  $2 - 3(5 - x) = 3x$   
 68.  $3 - 3(5 - x) = 0$   
 69.  $(3 - 3)(5 - z) = 0$   
 70.  $(2 \cdot 4 - 8)p = 0$   
 71.  $\frac{0}{x} = 0$   
 72.  $\frac{2x}{2} = x$   
 73.  $x \cdot x = x^2$   
 74.  $\frac{2x}{2x} = 1$

#### Miscellaneous

Solve each equation.

75.  $3x - 5 = 2x - 9$   
 76.  $5x - 9 = x - 4$   
 77.  $x + 2(x + 4) = 3(x + 3) - 1$

78.  $u + 3(u - 4) = 4(u - 5)$   
 79.  $23 - 5(3 - n) = -4(n - 2) + 9n$   
 80.  $-3 - 4(t - 5) = -2(t + 3) + 11$   
 81.  $0.05x + 30 = 0.4x - 5$   
 82.  $x - 0.08x = 460$

83.  $-\frac{2}{3}a + 1 = 2$

84.  $-\frac{3}{4}t = \frac{1}{2}$

85.  $\frac{y}{2} + \frac{y}{6} = 20$

86.  $\frac{3w}{5} - 1 = \frac{w}{2} + 1$

87.  $0.09x - 0.2(x + 4) = -1.46$

88.  $0.08x + 0.5(x + 100) = 73.2$

89.  $436x - 789 = -571$

90.  $0.08x + 4533 = 10x + 69$

91.  $\frac{x}{344} + 235 = 292$

92.  $34(x - 98) = \frac{x}{2} + 475$

#### ◀ 5 ▶ Applications

Solve each problem. See Example 7.

93. **Sales commission.** Danielle sold her house through an agent who charged 8% of the selling price. After the commission was paid, Danielle received \$117,760. If  $x$  is the selling price, then  $x$  satisfies

$$x - 0.08x = 117,760.$$

Solve this equation to find the selling price.

94. **Raising rabbits.** Before Roland sold two female rabbits, half of his rabbits were female. After the sale, only one-third of his rabbits were female. If  $x$  represents his original number of rabbits, then

$$\frac{1}{2}x - 2 = \frac{1}{3}(x - 2).$$

Solve this equation to find the number of rabbits that he had before the sale.

95. **Eavesdropping.** Reginald overheard his boss complaining that his federal income tax for 2006 was \$60,531.

- a) Use the accompanying graph to estimate his boss's taxable income for 2006.  
 b) Find his boss's exact taxable income for 2006 by solving the equation

$$42,170 + 0.33(x - 188,450) = 60,531.$$