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**Online Instructor's Solutions Manual**
*for*

# Mathematics for Business

**Tenth Edition**

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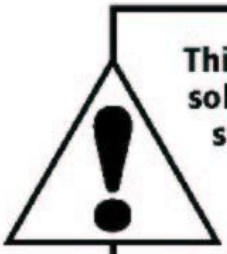

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# Chapter 1 Problem Solving and Operations with Fractions

## 1.1 Problem Solving

**1.** $80 + 75 + 135 + 40 + 52 = 382$
Beth rode 382 miles.

**2.** $325 + 75 + 137 + 495 + 105 = 1137$
1137 pounds of these coffees were sold.

**3.** $1815 - 1348 = 467$
467 passengers remain on the ship.

**4.** $\$250,000 - \$15,000 = \$235,000$
There is $235,000 more in the large machines than in the small machines.

**5.** $2.5 - 0.8 = 1.7$

The required reduction is 1.7 billion tons.

**6.** $397,012 - 364,383 = 32,629$
The decrease in the rate at which world population is growing is 32,629 people per day.

**7.** $2425 - 582 + 634 = 2477$
The car will weigh 2477 pounds.

**8.** $\$2324 - \$734 + \$568 = \$2158$
The balance in the account is $2158.

**9.** $24,000,000 - 7000 = 23,993,000$
There are 23,993,000 small and midsize businesses.

**10.** $21,375 - 9250 = 12,125$
The weight of the firewood is 12,125 pounds.

**11.** $900 \cdot 365 = 328,500$
328,500 World War II veterans are projected to die in the next year.

**12.** $\$30,000 \cdot 12,600 = 378,000,000$
The total cost would be $378,000,000.

**13.** $\$239 - \$89 = \$150$
$\$150 \cdot 5 = \$750$
The amount saved is $750.

**14.** $\$625 - \$75 = \$550$
$\$550 \cdot 4 = \$2200$
The amount saved is $2200.

**15.** $(6 \cdot \$1256) + (15 \cdot \$895) = \$20,961$
The total cost is $20,961.

**16.** $(23 \cdot \$479) + (8 \cdot \$247) = \$12,993$
The total cost is $12,993.

**17.** $1250 - (30 \cdot 25) = 500$
There are 500 balcony seats
$500 \div 25 = 20$
There must be 20 seats in each row.

**18.** $(24 \cdot 30) \div 6 = 120$
A total of 120 boxes of wreaths are shipped.
$120 \div 5 = 24$
Each shop will receive 24 boxes.

**19.** $4.4 \cdot 8 = 35.2$
35.2 hours would be needed.

**20.** $\$2679.99 \cdot 14 = \$37,519.86$
The cost is $37,519.86.

**21.** $38 \div 0.58 \approx 65.5$
There are 65.5 million shares.

**22.** $42 \div 0.65 \approx 64.6 \approx 65$
There are 65 million shares (rounded).

**23.** $221 \div 8.359 \approx 26$
26 coins can be produced.

**24.** $57.13 \div 1.62 \approx 35$
35 dosages can be made.

**25.** **(a)** $100 \times 0.0043 = 0.43$
The pile is 0.43 inch high.

**(b)** $1000 \times 0.0043 = 4.3$
The pile is 4.3 inches high.

**26. (a)** $43 \div 0.0043 = 10,000$
There are 10,000 bills.

**(b)** $10,000 \times \$20 = \$200,000$

You would have \$200,000.

**27. (a)** $42 \times 4.3 = 180.6$
The manager worked 180.6 hours each month.

**(b)** $\$3250 \div 180.6 \approx \$18.00$
The manager earned \$18.00 per hour.

**28. (a)** $48 \times 4.3 = 206.4$
The assistant manager worked 206.4 hours each month.

**(b)** $\$3539.76 \div 206.4 \approx \$17.15$
The assistant manager earned \$17.15 per hour.

**29.** $\$246,500 \times 0.06 = \$14,790$
The commission was \$14,790.

**30.** $6.5 \times \$8.70 = \$56.55$
Her total cost was \$56.55.

## 1.2 Addition and Subtraction of Fractions

**1.** $1\frac{3}{8} = \frac{(1\times 8)+3}{8} = \frac{11}{8}$

**2.** $2\frac{4}{5} = \frac{(2\times 5)+4}{5} = \frac{14}{5}$

**3.** $4\frac{1}{4} = \frac{(4\times 4)+1}{4} = \frac{17}{4}$

**4.** $2\frac{8}{11} = \frac{(2\times 11)+8}{11} = \frac{30}{11}$

**5.** $22\frac{7}{8} = \frac{(22\times 8)+7}{8} = \frac{183}{8}$

**6.** $15\frac{2}{3} = \frac{(15\times 3)+2}{3} = \frac{47}{3}$

**7.** $12\frac{5}{8} = \frac{(12\times 8)+5}{8} = \frac{101}{8}$

**8.** $17\frac{5}{8} = \frac{(17\times 8)+5}{8} = \frac{141}{8}$

**9.** $\frac{8}{16} = \frac{8\div 8}{16\div 8} = \frac{1}{2}$

**10.** $\frac{15}{20} = \frac{15\div 5}{20\div 5} = \frac{3}{4}$

**11.** $\frac{40}{75} = \frac{40\div 5}{75\div 5} = \frac{8}{15}$

**12.** $\frac{36}{42} = \frac{36\div 6}{42\div 6} = \frac{6}{7}$

**13.** $\frac{25}{40} = \frac{25\div 5}{40\div 5} = \frac{5}{8}$

**14.** $\frac{27}{45} = \frac{27\div 9}{45\div 9} = \frac{3}{5}$

**15.** $\frac{120}{150} = \frac{120\div 30}{150\div 30} = \frac{4}{5}$

**16.** $\frac{24}{64} = \frac{24\div 8}{64\div 8} = \frac{3}{8}$

**17.** $\frac{132}{144} = \frac{132\div 12}{144\div 12} = \frac{11}{12}$

**18.** $\frac{40}{96} = \frac{40\div 8}{96\div 8} = \frac{5}{12}$

**19.** $\frac{96}{180} = \frac{96\div 12}{180\div 12} = \frac{8}{15}$

**20.** $\frac{32}{128} = \frac{32\div 32}{128\div 32} = \frac{1}{4}$

**21.** $2\overline{)7}\ 3$ remainder $1$ $\qquad \frac{7}{2} = 3\frac{1}{2}$

**22.** $5\overline{)9}\ 1$ remainder $4$ $\qquad \frac{9}{5} = 1\frac{4}{5}$

**23.** $20\overline{)76}$ R $16$ $\quad \frac{76}{20} = 3\frac{16}{20} = 3\frac{4}{5}$

**24.** $15\overline{)42}$ R $12$ $\quad \frac{42}{15} = 2\frac{12}{15} = 2\frac{4}{5}$

**25.** $11\overline{)14}$ R $3$ $\quad \frac{14}{11} = 1\frac{3}{11}$

**26.** $8\overline{)55}$ R $7$ $\quad \frac{55}{8} = 6\frac{7}{8}$

**27.** $15\overline{)21}$ R $6$ $\quad \frac{21}{15} = 1\frac{6}{15} = 1\frac{2}{5}$

**28.** $52\overline{)85}$ R $33$ $\quad \frac{85}{52} = 1\frac{33}{52}$

**29.** $64\overline{)124}$ R $60$ $\quad \frac{124}{64} = 1\frac{60}{64} = 1\frac{15}{16}$

**30.** $35\overline{)190}$ R $15$ $\quad \frac{190}{35} = 5\frac{15}{35} = 5\frac{3}{7}$

**31.** $32\overline{)81}$ R $17$ $\quad \frac{81}{32} = 2\frac{17}{32}$

**33.** Answers will vary.

**36.** $\frac{}{9} + \frac{}{9} = \frac{\quad}{9} = \frac{}{9} = \frac{}{3}$

**37.** $\frac{7}{10} + \frac{3}{20} = \frac{14}{20} + \frac{3}{20} = \frac{14+3}{20} = \frac{17}{20}$

**38.** $\frac{3}{8} + \frac{1}{4} = \frac{3}{8} + \frac{2}{8} = \frac{3+2}{8} = \frac{5}{8}$

**39.** $\frac{7}{12} + \frac{8}{15} = \frac{35}{60} + \frac{32}{60} = \frac{35+32}{60} = \frac{67}{60} = 1\frac{7}{60}$

**40.** $\frac{5}{8} + \frac{7}{12} = \frac{15}{24} + \frac{14}{24} = \frac{15+14}{24} = \frac{29}{24} = 1\frac{5}{24}$

**41.** $\frac{9}{11} + \frac{1}{22} = \frac{18}{22} + \frac{1}{22} = \frac{18+1}{22} = \frac{19}{22}$

**42.** $\frac{5}{6} + \frac{7}{9} = \frac{15}{18} + \frac{14}{18} = \frac{15+14}{18} = \frac{29}{18} = 1\frac{11}{18}$

**43.** $\frac{3}{4} + \frac{5}{9} + \frac{1}{3} = \frac{27}{36} + \frac{20}{36} + \frac{12}{36}$

$= \frac{27+20+12}{36} = \frac{59}{36} = 1\frac{23}{36}$

**44.** $\frac{1}{4} + \frac{1}{8} + \frac{1}{12} = \frac{6}{24} + \frac{3}{24} + \frac{2}{24}$

$= \frac{6+3+2}{24} = \frac{11}{24}$

**45.** $\frac{5}{6} + \frac{3}{4} + \frac{5}{8} = \frac{20}{24} + \frac{18}{24} + \frac{15}{24}$

$\frac{20+18+15}{} \quad \frac{53}{} \quad \frac{5}{}$

17

**32.** $64\overline{)360}$ $\quad \frac{360}{64} = 5\frac{40}{64} = 5\frac{5}{8}$

$\underline{320}$

40

$= \frac{48}{24} = 2$

**46.** $\frac{7}{10} + \frac{8}{15} + \frac{5}{6} = \frac{21}{30} + \frac{16}{30} + \frac{25}{30}$

$= \frac{21+16+25}{30} = \frac{62}{30} = 2\frac{2}{30} = 2\frac{1}{15}$

**47.** $82\frac{3}{5} + 15\frac{1}{5} = 97\frac{4}{5}$

**48.** $25\frac{2}{7} + 14\frac{3}{7} = 39\frac{5}{7}$

**49.** $51\frac{1}{4} = 51\frac{1}{4}$

$+ 29\frac{1}{2} = 29\frac{2}{4}$

$80\frac{3}{4}$

**50.** $38\frac{5}{6} = 38\frac{15}{18}$

$29\frac{1}{3} = 29\frac{6}{18}$

$+ 47\frac{1}{2} = 47\frac{9}{18}$

$114\frac{30}{18} = 114 + 1\frac{12}{18} = 115\frac{12}{18} = 115\frac{2}{3}$

**51.** $32\frac{3}{4} = 32\frac{18}{24}$

$6\frac{1}{3} = 6\frac{8}{24}$

$+ 14\frac{5}{8} = 14\frac{15}{24}$

$52\frac{41}{24} = 52 + 1\frac{17}{24} = 53\frac{17}{24}$

**52.** $16\frac{7}{10} = 16\frac{28}{40}$

**53.** $89\frac{5}{9} = 89\frac{5}{9}$

$10\frac{1}{3} = 10\frac{3}{9}$

$+ 87\frac{1}{9} = 87\frac{1}{9}$

$186\frac{9}{9} = 186 + 1 = 187$

**54.** $74\frac{1}{5} = 74\frac{14}{70}$

$58\frac{3}{7} = 58\frac{30}{70}$

$+ 21\frac{3}{10} = 21\frac{21}{70}$

$153\frac{65}{70} = 153\frac{13}{14}$

**55.** $\frac{7}{8} - \frac{3}{8} = \frac{4}{8} = \frac{1}{2}$

**56.** $\frac{11}{12} - \frac{5}{12} = \frac{6}{12} = \frac{1}{2}$

**57.** $\frac{2}{3} - \frac{1}{6} = \frac{4}{6} - \frac{1}{6} = \frac{4-1}{6} = \frac{3}{6} = \frac{1}{2}$

**58.** $\frac{7}{8} - \frac{1}{2} = \frac{7}{8} - \frac{4}{8} = \frac{7-4}{8} = \frac{3}{8}$

**59.** $\frac{5}{12} - \frac{1}{16} = \frac{20}{48} - \frac{3}{48} = \frac{17}{48}$

**60.** $\frac{5}{6} - \frac{7}{9} = \frac{15}{18} - \frac{14}{18} = \frac{15-14}{18} = \frac{1}{18}$

**61.** $\frac{3}{4} - \frac{5}{12} = \frac{9}{12} - \frac{5}{12} = \frac{9-5}{12} = \frac{4}{12} = \frac{1}{3}$

**62.** $\frac{5}{7} - \frac{1}{3} = \frac{15}{21} - \frac{7}{21} = \frac{15-7}{21} = \frac{8}{21}$

$$26\frac{1}{5} = 26\frac{8}{40}$$

$$+\,8\frac{3}{8} = 8\frac{15}{40}$$

$$50\frac{51}{40} = 50 + 1\frac{11}{40} = 51\frac{11}{40}$$

**63.** $16\frac{3}{4} = 16\frac{6}{8}$

$$-\,12\frac{3}{8} = 12\frac{3}{8}$$

$$4\frac{3}{8}$$

**64.** $25\frac{13}{24} = 25\frac{13}{24}$

$-\ 18\frac{5}{12} = 18\frac{10}{24}$

$7\frac{3}{24} = 7\frac{1}{8}$

**65.** $9\frac{7}{8} = 9\frac{21}{24}$

$-\ 6\frac{5}{12} = 6\frac{10}{24}$

$3\frac{11}{24}$

**66.** $24\frac{5}{6} = 24\frac{15}{18}$

$-\ 18\frac{5}{9} = 18\frac{10}{18}$

$6\frac{5}{18}$

**67.** $71\frac{3}{8} = 71\frac{9}{24}$

$-\ 62\frac{1}{3} = 62\frac{8}{24}$

$9\frac{1}{24}$

**68.** $19\frac{5}{6} = 19\frac{10}{12}$

$-\ 12\frac{3}{4} = 12\frac{9}{12}$

$7\frac{1}{12}$

**69.** $19 = 18\frac{4}{4}$

$-\ 12\frac{3}{4} = 12\frac{3}{4}$

$6\frac{1}{4}$

**71.** Answers will vary.

**72.** Answers will vary.

**73.** Answers will vary.

**74.** Answers will vary.

**75.** $\frac{1}{8} + \frac{1}{4} + \frac{2}{5} = \frac{5}{40} + \frac{10}{40} + \frac{16}{40}$

$= \frac{5+10+16}{40} = \frac{31}{40}$

The total length of the screw is $\frac{31}{40}$ inch.

**76.** $\frac{1}{5} + \frac{1}{3} + \frac{1}{4} = \frac{12}{60} + \frac{20}{60} + \frac{15}{60}$

$= \frac{12+20+15}{60} = \frac{47}{60}$

The total length of the bolt is $\frac{47}{60}$ inch.

**77.** $1\frac{7}{8} + \frac{1}{2} + 1\frac{2}{3} + \frac{1}{3} = 1\frac{21}{24} + \frac{12}{24} + 1\frac{16}{24} + \frac{8}{24}$

$= 2\frac{57}{24} = 4\frac{9}{24} = 4\frac{3}{8}$

The total distance around the wetlands reserve is $4\frac{3}{8}$ miles.

**78.** $9\frac{7}{8} + 5\frac{1}{8} + 9\frac{7}{8} + 5\frac{1}{8} = 28\frac{16}{8} = 30$

The length of trim needed is 30 inches.

**79.** $\frac{15}{16} - \left(\frac{3}{8} + \frac{3}{8}\right) = \frac{15}{16} - \frac{6}{8} = \frac{15}{16} - \frac{12}{16} = \frac{3}{16}$

The diameter of the hole is $\frac{3}{16}$ inch.

**80.** $\frac{7}{8} - \left(\frac{1}{6} + \frac{1}{3}\right) = \frac{7}{8} - \left(\frac{1}{6} + \frac{2}{6}\right) = \frac{7}{8} - \frac{3}{6}$

**70.**

$$374 = 373\frac{6}{6}$$

$$-211\frac{5}{6} = 211\frac{5}{6}$$

$$162\frac{1}{6}$$

$$= \frac{7}{8} - \frac{1}{2} = \frac{7}{8} - \frac{4}{8} = \frac{3}{8}$$

There is $\frac{3}{8}$ liter of fluid remaining.

**81.** $5\frac{1}{2}+6\frac{1}{4}+3\frac{3}{4}+7$

$=5\frac{2}{4}+6\frac{1}{4}+3\frac{3}{4}+7$

$=21\frac{6}{4}$

$=22\frac{2}{4}=22\frac{1}{2}$

Hernando drove $22\frac{1}{2}$ hours.

**82.** $3\frac{1}{4}+2\frac{3}{8}+7\frac{1}{2}+1\frac{5}{16}$

$=3\frac{4}{16}+2\frac{6}{16}+7\frac{8}{16}+1\frac{5}{16}$

$=13\frac{23}{16}=14\frac{7}{16}$

A total of $14\frac{7}{16}$ tons of vegetables were sold.

**83.** $8\frac{7}{8}-\left(2\frac{1}{4}+3+1\frac{3}{8}\right)$

$8\frac{7}{8}-\left(2\frac{2}{4}+3+1\frac{3}{8}\right)$

$=8\frac{7}{8}-\left(6+\frac{5}{8}\right)$

$=8\frac{7}{8}-6\frac{5}{8}$

$=8\frac{7}{8}-7\frac{13}{8}$

$=8\frac{7}{8}-7\frac{5}{8}$

$=1\frac{2}{8}=1\frac{1}{4}$

$1\frac{5}{8}$ cubic yards of concrete remain in the truck.

**84.** $15-\left(3\frac{3}{4}+4\frac{1}{8}+3\frac{7}{8}\right)$

$=15-\left(3\frac{6}{8}+4\frac{1}{8}+3\frac{7}{8}\right)$

**85.** $4\frac{1}{2}+5\frac{1}{4}+3\frac{3}{4}+6\frac{1}{3}$

$=4\frac{6}{12}+5\frac{3}{12}+3\frac{9}{12}+6\frac{4}{12}$

$=18\frac{22}{12}$

$=18+1\frac{10}{12}$

$=18+1\frac{5}{6}$

$=19\frac{5}{6}$

A total of $19\frac{5}{6}$ cases were sold.

**86.** $3\frac{3}{8}+5\frac{1}{2}+4\frac{3}{4}+3\frac{1}{4}+6$

$=3\frac{3}{8}+5\frac{4}{8}+4\frac{6}{8}+3\frac{2}{8}+6$

$=21\frac{15}{8}$

$=21+1\frac{7}{8}$

$=22\frac{7}{8}$

Altogether, Andrea worked $22\frac{7}{8}$ hours.

**87.** $40-\left(8\frac{1}{4}+6\frac{1}{6}+7\frac{2}{3}+8\frac{3}{4}\right)$

$=40-\left(8\frac{3}{12}+6\frac{2}{12}+7\frac{8}{12}+8\frac{9}{12}\right)$

$=40-29\frac{22}{12}$

$=40-30\frac{10}{12}$

$$= 15 - \left(10 + \frac{8}{8} + \frac{8}{8}\right)$$

$$= 15 - \left(10 + \frac{14}{8}\right)$$

$$= 15 - \left(11 + \frac{6}{8}\right)$$

$$= 14\frac{4}{4} - 11\frac{3}{4} = 3\frac{1}{4}$$

There are $3\frac{1}{4}$ yards of material remaining.

$$= 40 - \left(30 + \frac{5}{6}\right)$$

$$= 39\frac{6}{6} - 30\frac{5}{6}$$

$$= 9\frac{1}{6}$$

Julie worked $9\frac{1}{6}$ hours on Friday.

**88.** $34\frac{1}{2}+23\frac{3}{4}+34\frac{1}{2}+23\frac{3}{4}$

$=34\frac{2}{4}+23\frac{3}{4}+34\frac{2}{4}+23\frac{3}{4}$

$=114\frac{10}{4}$

$=116\frac{2}{4}$

$=116\frac{1}{2}$

The length needed is $116\frac{1}{2}$ inches.

**89.** $518\frac{3}{4}-\left(108\frac{1}{4}+162\frac{3}{8}+143\frac{1}{2}\right)$

$=518\frac{3}{4}-\left(108\frac{2}{8}+162\frac{3}{8}+143\frac{4}{8}\right)$

$=518\frac{3}{4}-413\frac{9}{8}$

$=518\frac{3}{4}-414\frac{1}{8}$

$=104\frac{6}{8}-414\frac{1}{8}$

$=104\frac{5}{8}$

The length of the fourth side is $104\frac{5}{8}$ feet.

**90.** $527-\left(107\frac{1}{24}+150\frac{2}{3}+138\frac{3}{4}\right)$

$=527-\left(107\frac{1}{24}+150\frac{16}{24}+138\frac{18}{24}\right)$

$=527-395\frac{35}{24}$

$527-397\frac{11}{24}$

$=130$

## 1.3 Multiplication and Division of Fractions

**1.** $5\cdot\frac{2}{3}=\frac{5}{1}\cdot\frac{2}{3}=\frac{5\cdot 2}{1\cdot 3}=\frac{10}{3}$

**2.** $\frac{3}{8}\cdot\frac{1}{6}=\frac{1\cdot 1}{8\cdot 2}=\frac{1}{16}$

**3.** $\frac{9}{10}\cdot\frac{11}{16}=\frac{9\cdot 11}{10\cdot 16}=\frac{99}{160}$

**4.** $1\frac{1}{4}\cdot 3\frac{1}{2}=\frac{5}{4}\cdot\frac{7}{2}=\frac{5\cdot 7}{4\cdot 2}=\frac{35}{8}=4\frac{3}{8}$

**5.** $1\frac{2}{3}\cdot 2\frac{7}{10}=\frac{5}{3}\cdot\frac{27}{10}=\frac{1\cdot 9}{1\cdot 2}=\frac{9}{2}=4\frac{1}{2}$

**6.** $6\cdot 4\frac{2}{3}=\frac{6}{1}\cdot\frac{14}{3}=\frac{2\cdot 14}{1\cdot 1}=28$

**7.** $4\frac{3}{5}\cdot 15=\frac{23}{5}\cdot\frac{15}{1}=\frac{23\cdot 3}{1\cdot 1}=69$

**8.** $\frac{3}{4}\cdot\frac{8}{9}\cdot 2\frac{1}{2}=\frac{3}{1}\cdot\frac{8}{9}\cdot\frac{5}{2}$

$=\frac{1\cdot 2\cdot 5}{1\cdot 3\cdot 2}=\frac{10}{6}=1\frac{4}{6}=1\frac{2}{3}$

**9.** $\frac{5}{9}\cdot 2\frac{1}{4}\cdot 3\frac{2}{3}=\frac{5}{9}\cdot\frac{9}{4}\cdot\frac{11}{3}$

The length of the fourth side is 130 feet.

$$= \frac{5 \cdot 1 \cdot 11}{1 \cdot 4 \cdot 3} = \frac{55}{12} = 4\frac{7}{12}$$

**10.** $\frac{2}{3} \cdot \frac{9}{8} \cdot 3\frac{1}{4} = \frac{\cancel{2}^{1}}{\cancel{3}_{1}} \cdot \frac{\cancel{9}^{3}}{\cancel{8}_{4}} \cdot \frac{13}{4}$

$$= \frac{1 \cdot 3 \cdot 13}{1 \cdot 4 \cdot 4} = \frac{39}{16} = 2\frac{7}{16}$$

**11.** $12 \cdot 2\frac{1}{2} \cdot 3 = \frac{\cancel{12}^{6}}{1} \cdot \frac{5}{\cancel{2}_{1}} \cdot \frac{3}{1}$

$= \frac{6 \cdot 5 \cdot 3}{1 \cdot 1 \cdot 1} = 90$

**12.** $18 \cdot 1\frac{2}{3} \cdot 2 = \frac{\cancel{18}^{6}}{1} \cdot \frac{5}{\cancel{3}_{1}} \cdot \frac{2}{1}$

$= \frac{6 \cdot 5 \cdot 2}{1 \cdot 1 \cdot 1} = 60$

**13.** $\frac{1}{6} \div \frac{1}{3} = \frac{1}{\cancel{6}_{2}} \cdot \frac{\cancel{3}^{1}}{1} = \frac{1 \cdot 1}{2 \cdot 1} = \frac{1}{2}$

**14.** $\frac{5}{8} \div \frac{3}{16} = \frac{5}{\cancel{8}_{1}} \cdot \frac{\cancel{16}^{2}}{3} = \frac{5 \cdot 2}{1 \cdot 3} = \frac{10}{3} = 3\frac{1}{3}$

**15.** $\frac{13}{20} \div \frac{26}{30} = \frac{\cancel{13}}{\cancel{20}_{2}} \cdot \frac{\cancel{30}^{3}}{\cancel{26}_{2}} = \frac{1 \cdot 3}{2 \cdot 2} = \frac{3}{4}$

**16.** $\frac{7}{8} \div \frac{3}{4} = \frac{7}{\cancel{8}_{2}} \cdot \frac{\cancel{4}^{1}}{3} = \frac{7 \cdot 1}{2 \cdot 3} = \frac{7}{6} = 1\frac{1}{6}$

**17.** $\frac{15}{16} \div \frac{5}{8} = \frac{\cancel{15}^{3}}{\cancel{16}_{2}} \cdot \frac{\cancel{8}^{1}}{\cancel{5}_{1}} = \frac{3 \cdot 1}{2 \cdot 1} = \frac{3}{2} = 1\frac{1}{2}$

**18.** $\frac{12}{11} \div \frac{3}{22} = \frac{\cancel{12}^{4}}{\cancel{11}_{1}} \cdot \frac{\cancel{22}^{2}}{\cancel{3}_{1}} = \frac{4 \cdot 2}{1 \cdot 1} = \frac{8}{1} = 8$

**21.** $3\frac{1}{8} \div \frac{15}{16} = \frac{25}{8} \div \frac{15}{16}$

$= \frac{\cancel{25}^{5}}{\cancel{8}_{1}} \cdot \frac{\cancel{16}^{2}}{\cancel{15}_{3}} = \frac{5 \cdot 2}{1 \cdot 3} = \frac{10}{3} = 3\frac{1}{3}$

**22.** $5\frac{1}{2} \div 4 = \frac{11}{2} \div \frac{4}{1}$

$= \frac{11}{2} \cdot \frac{1}{4} = \frac{11 \cdot 1}{2 \cdot 4} = \frac{11}{8} = 1\frac{3}{8}$

**23.** $6 \div 1\frac{1}{4} = 6 \div \frac{5}{4}$

$= \frac{\cancel{6}^{3}}{1} \cdot \frac{4}{\cancel{5}} = \frac{3 \cdot 4}{5} = \frac{12}{5} = 2\frac{2}{5}$

**24.** $3 \div 1\frac{1}{4} = 3 \div \frac{5}{4}$

$= \frac{3}{1} \cdot \frac{4}{5} = \frac{3 \cdot 4}{5} = \frac{12}{5} = 2\frac{2}{5}$

**25.** Answers will vary.

**26.** Answers will vary.

**27.** $\$8 \cdot 1\frac{1}{2} = \frac{\$\cancel{8}^{4}}{1} \cdot \frac{3}{\cancel{2}_{1}} = \frac{\$4 \cdot 3}{1 \cdot 1} = \$12$

**28.** $\$14 \cdot 1\frac{1}{2} = \frac{\$\cancel{14}^{7}}{1} \cdot \frac{3}{\cancel{2}_{1}} = \frac{\$7 \cdot 3}{1 \cdot 1} = \$21$

**29.** $\$17 \cdot 1\frac{1}{2} = \frac{\$17}{2} \cdot \frac{3}{1}$

$= \frac{\$17 \cdot 3}{2 \cdot 1} = \frac{\$51}{2} = \$25.50$

**19.** $2\frac{1}{2} \div 3\frac{3}{4} = \frac{5}{2} \div \frac{15}{4} = \frac{5}{2} \cdot \frac{4}{15} = \frac{1 \cdot 2}{1 \cdot 3} = \frac{2}{3}$

**20.** $6\frac{1}{2} \div \frac{1}{2} = \frac{13}{2} \div \frac{1}{2}$

$= \frac{13}{2} \cdot \frac{1}{1} = \frac{13 \cdot 1}{2 \cdot 1} = \frac{13}{1} = 13$

**30.** $\$9 \cdot 1\frac{1}{2} = \$9 \cdot \frac{3}{2}$

$= \frac{\$9 \cdot 3}{1 \cdot 2} = \frac{\$27}{2} = \$13.50$

**31.** $\$10.50 \cdot 1\frac{1}{2} = \frac{\$21}{2} \cdot \frac{3}{2}$

$= \frac{\$21 \cdot 3}{2 \cdot 2} = \frac{\$63}{4} = \$15.75$

**32.** $\$18.50 \div 1\frac{1}{2} = \frac{\$37}{2} \div \frac{3}{2}$

$= \frac{\$37 \cdot 3}{2 \cdot 2} = \frac{\$111}{4} =$

$\$27.75$

**33.**

$0.8 = \frac{8}{10} = \frac{4}{5}$

**34.**

$0.6 = \frac{6}{10} = \frac{3}{5}$

**35.**

$0.24 = \frac{24}{100} = \frac{6}{25}$

**36.**

$0.64 = \frac{64}{100} = \frac{16}{25}$

**37.**

$0.73 = \frac{73}{100}$

**38.**

$0.625 = \frac{625}{1000} = \frac{5}{8}$

**39.**

$0.875 = \frac{875}{1000} = \frac{7}{8}$

**40.**

$0.805 = \frac{805}{1000} = \frac{161}{200}$

**41.**

$0.0375 = \frac{375}{10,000} = \frac{3}{80}$

**42.**

$0.8125 = \frac{8125}{10,000} = \frac{13}{16}$

**43.**

$0.1875 = \frac{1875}{10,000} = \frac{3}{16}$

**44.**

$0.3125 = \frac{3125}{10,000} = \frac{5}{16}$

**45.** 3.5218 to the nearest tenth is 3.5.
Locate the tenths digit and draw a line.

$3.5 \mid 218$

Since the digit to the right of the line is 2, leave the tenths digit alone.

3.5218 to the nearest hundredth is 3.52.
Locate the hundredths digit and draw a line.

$3.52 \mid 18$

Since the digit to the right of the line is 1, leave the hundredths digit alone.

**46.** 4.8361 to the nearest tenth is 4.8.
Locate the tenths digit and draw a line.

$4.8 \mid 361$

Since the digit to the right of the line is 3, leave the tenths digit alone.

4.8361 to the nearest hundredth is 4.84.
Locate the hundredths digit and draw a line.

$4.83 \mid 61$

Since the digit to the right of the line is 6, increase the tenths digit by 1.

**47.** 0.0837 to the nearest tenth is 0.1.
Locate the tenths digit and draw a line.

$0.0 \mid 837$

Since the digit to the right of the line is 8, increase the tenths digit by 1.

0.0837 to the nearest hundredth is 0.08.
Locate the hundredths digit and draw a line.

$0.08 \mid 37$

Since the digit to the right of the line is 3, leave the hundredths digit alone.

**48.** 2.548 to the nearest tenth is 2.5.
Locate the tenths digit and draw a line.

$2.5 \mid 48$

Since the digit to the right of the line is 4, leave the tenths digit alone.

2.548 to the nearest hundredth is 2.55.
Locate the hundredths digit and draw a line.

$2.54 \mid 8$

Since the digit to the right of the line is 8, increase the tenths digit by 1.

**49.** 8.643 to the nearest tenth is 8.6.
Locate the tenths digit and draw a line.

8.6|43

Since the digit to the right of the line is 4, leave the tenths digit alone.

8.643 to the nearest hundredth is 8.64.
Locate the hundredths digit and draw a line.

8.64|3

Since the digit to the right of the line is 3, leave the hundredths digit alone.

**50.** 86.472 to the nearest tenth is 86.5.
Locate the tenths digit and draw a line.

86.4|72

Since the digit to the right of the line is 7, increase the tenths digit by 1.

86.472 to the nearest hundredth is 86.47.
Locate the hundredths digit and draw a line.

86.47|2

Since the digit to the right of the line is 2, leave the hundredths digit alone.

**51.** 58.956 to the nearest tenth is 59.0.
Locate the tenths digit and draw a line.

58.9|56

Since the digit to the right of the line is 5, increase the tenths digit by 1 (which increases the ones digit by 1).

58.956 to the nearest hundredth is 58.96.
Locate the hundredths digit and draw a line.

58.95|6

Since the digit to the right of the line is 6, increase the hundredths digit by 1.

**52.** 8.065 to the nearest tenth is 8.1.
Locate the tenths digit and draw a line.

8.0|65

Since the digit to the right of the line is 6, increase the tenths digit by 1.

8.065 to the nearest hundredth is 8.07.
Locate the hundredths digit and draw a line.

8.06|5

Since the digit to the right of the line is 5, increase the hundredths digit by 1.

**53.** 23.047 to the nearest tenth is 23.0.
Locate the tenths digit and draw a line.

23.0|47

Since the digit to the right of the line is 4, leave the tenths digit alone.

23.047 to the nearest hundredth is 23.05.
Locate the hundredths digit and draw a line.

23.04|7

Since the digit to the right of the line is 7, increase the hundredths digit by 1.

**54.** 65.464 to the nearest tenth is 65.5.
Locate the tenths digit and draw a line.

65.4|64

Since the digit to the right of the line is 6, increase the tenths digit by 1.

65.464 to the nearest hundredth is 65.46.
Locate the hundredths digit and draw a line.

65.46|4

Since the digit to the right of the line is 4, leave the hundredths digit alone.

**55.** 39.496 to the nearest tenth is 39.5.
Locate the tenths digit and draw a line.

39.4|96

Since the digit to the right of the line is 9, increase the tenths digit by 1.

39.496 to the nearest hundredth is 39.50.
Locate the hundredths digit and draw a line.

39.49|6

Since the digit to the right of the line is 6, increase the hundredths digit by 1 (which increases the tenths digit by 1).

**56.** 92.337 to the nearest tenth is 92.3.
Locate the tenths digit and draw a line.

92.3|37

Since the digit to the right of the line is 3, leave the tenths digit alone.

92.337 to the nearest hundredth is 92.34.
Locate the hundredths digit and draw a line.

92.33|7

Since the digit to the right of the line is 7, increase the hundredths digit by 1.

**57.** $\frac{3}{4} = 0.75$

$$4\overline{)3.00}\quad 0.75$$
$$\underline{28}$$
$$20$$
$$\underline{20}$$
$$0$$

**58.** $\frac{7}{8} = 0.875$

$$8\overline{)7.000}\quad 0.875$$
$$\underline{64}$$
$$60$$
$$\underline{56}$$
$$40$$
$$\underline{40}$$
$$0$$

**59.** $\frac{3}{8} = 0.375$

$$8\overline{)3.000}\quad 0.375$$
$$\underline{24}$$
$$60$$
$$\underline{56}$$
$$40$$
$$\underline{40}$$
$$0$$

**60.** $\frac{5}{6} = 0.8\overline{3} \approx 0.833$

$$6\overline{)5.0000}\quad 0.8333$$
$$\underline{48}$$
$$20$$
$$\underline{18}$$
$$20$$
$$\underline{18}$$
$$20$$
$$\underline{18}$$
$$2$$

**61.** $\frac{1}{6} = 0.1\overline{6} \approx 0.167$

$$6\overline{)1.0000}\quad 0.1666$$
$$\underline{6}$$
$$40$$
$$\underline{36}$$
$$40$$
$$\underline{36}$$
$$40$$
$$\underline{36}$$
$$4$$

**62.** $\frac{2}{3} = 0.\overline{6} \approx 0.667$

$$3\overline{)2.0000}\quad 0.6666$$
$$\underline{18}$$
$$20$$
$$\underline{18}$$
$$20$$
$$\underline{18}$$
$$20$$
$$\underline{18}$$
$$2$$

**63.** $\frac{13}{16} = 0.8125$

$$16\overline{)13.0000}\quad 0.8125$$
$$\underline{128}$$
$$20$$
$$\underline{16}$$
$$40$$
$$\underline{32}$$
$$80$$
$$\underline{80}$$
$$0$$

$\approx 0.813$

**64.** $\frac{19}{50} = 0.38$

$$50\overline{)19.00}\quad 0.38$$
$$\underline{150}$$
$$400$$
$$\underline{400}$$
$$0$$

**65.** $\frac{8}{25} = 0.32$

$$25\overline{)8.00}\quad 0.32$$
$$\underline{75}$$
$$50$$
$$\underline{50}$$
$$0$$

**66.** $\frac{1}{3} = 0.\overline{3} \approx 0.333$

$$3\overline{)1.0000}\quad 0.3333$$
$$\underline{9}$$
$$10$$
$$\underline{9}$$
$$10$$
$$\underline{9}$$
$$10$$
$$\underline{9}$$
$$1$$

**67.** $\frac{1}{99} = 0.01\overline{0} \approx 0.010$

$$\begin{array}{r} 0.0101 \\ 99\overline{)\,1.0000} \\ \underline{99} \\ 10 \\ \underline{0} \\ 100 \\ \underline{99} \\ 1 \end{array}$$

**68.** $\frac{73}{93} \approx 0.785$

$$\begin{array}{r} 0.7849 \\ 93\overline{)\,73.0000} \\ \underline{651} \\ 790 \\ \underline{744} \\ 460 \\ \underline{372} \\ 880 \\ \underline{837} \\ 43 \end{array}$$

**69.** $\frac{5}{8} = 0.625$

$$\begin{array}{r} 0.625 \\ 8\overline{)\,5.000} \\ \underline{48} \\ 20 \\ \underline{16} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

**70.** $\frac{5}{9} = 0.\overline{5} \approx 0.556$

$$\begin{array}{r} 0.5555 \\ 9\overline{)\,5.0000} \\ \underline{45} \\ 50 \\ \underline{45} \\ 50 \\ \underline{45} \\ 50 \\ \underline{45} \\ 5 \end{array}$$

**71.** $\frac{5}{6} = 0.8\overline{3} \approx 0.833$

$$\begin{array}{r} 0.8333 \\ 6\overline{)\,5.0000} \\ \underline{48} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \end{array}$$

**72.** $\frac{7}{16} = 0.4375 \approx 0.438$

$$\begin{array}{r} 0.4375 \\ 16\overline{)\,7.0000} \\ \underline{64} \\ 60 \\ \underline{48} \\ 120 \\ \underline{112} \\ 80 \\ \underline{80} \\ 0 \end{array}$$

**73.** Answers will vary.

**74.** Answers will vary.

**75.** Answers will vary.

**76.** Answers will vary.

**77.** $16 \cdot 2\frac{1}{4} = \frac{\overset{4}{\cancel{16}}}{1} \cdot \frac{9}{\cancel{4}_{1}} = \frac{4 \cdot 9}{1 \cdot 1} = 36$

Angela needs 36 yards of ribbon.

**78.** $345 \div 11\frac{1}{2} = \frac{345}{1} \div \frac{23}{2}$

$= \frac{\overset{15}{\cancel{345}}}{1} \cdot \frac{2}{\cancel{23}_{1}} = \frac{15 \cdot 2}{1 \cdot 1} = 30$

30 trips are required.

**79.** $11 \div \frac{1}{8} = 11 \cdot 8 = 88$

88 dispensers can be filled.

**80.** $10 \div \frac{\cancel{5}}{16} = \frac{\overset{2}{\cancel{10}}}{1} \cdot 16 = \frac{2 \cdot 16}{1 \cdot 1} = 32$

32 footings can be constructed.

**81.** $1314 \div 109\frac{1}{2} = \frac{\overset{6}{\cancel{1314}}}{1} \div \frac{219}{2}$

$= \frac{1314}{1} \cdot \frac{2}{\cancel{219}_{1}} = \frac{6 \cdot 2}{1 \cdot 1} = 12$

2

12 homes can be fitted with baseboards.

**82.** $1200 \div 7\frac{1}{2} = \frac{1200}{1} \div \frac{15}{2}$

$= \frac{\overset{80}{\cancel{1200}}}{160} \cdot \frac{2}{\cancel{15}_{1}} = \frac{80 \cdot 2}{1 \cdot 1} =$

160 acres can be fertilized.

**83.** $12\frac{1}{2} \cdot 1\frac{3}{4} = \frac{25}{2} \cdot \frac{7}{4} = \frac{25 \cdot 7}{2 \cdot 4} = \frac{175}{8} =$
$21\frac{7}{8}$

$21\frac{7}{8}$ ounces of chemical are needed.

**84.** $36 \cdot 37\frac{3}{4} = \frac{\overset{9}{\cancel{36}}}{1} \cdot \frac{151}{\cancel{4}_{1}} = \frac{9 \cdot 151}{1 \cdot 1} = 1359$

1359 pounds of roofing nails are needed.

**85.** $12\frac{3}{4} \cdot 28 = \frac{51}{\cancel{4}_{1}} \cdot \frac{\overset{7}{\cancel{28}}}{1} = \frac{51 \cdot 7}{1 \cdot 1} =$
357

$7\frac{1}{8} \cdot 16 = \frac{57}{\cancel{8}_{1}} \cdot \frac{\overset{2}{\cancel{16}}}{1} = \frac{57 \cdot 2}{1 \cdot 1} = 114$

$357 + 114 = 471$

471 gallons of fuel are used.

**86.** $6\frac{1}{2} \cdot 36 = \frac{13}{\cancel{2}_{1}} \cdot \frac{\overset{18}{\cancel{36}}}{1} = \frac{13 \cdot 18}{1 \cdot 1} =$
234

$3\frac{1}{3} \cdot 22 = \frac{25}{\cancel{3}} \cdot \frac{\overset{11}{\cancel{22}}}{\cancel{8}_{4}} = \frac{25 \cdot 11}{4 \cdot 1} = \frac{275}{4} = 68\frac{3}{4}$

$234 + 68\frac{3}{4} = 302\frac{3}{4}$

It takes a total of $302\frac{3}{4}$ minutes.

**88.** $220 \cdot \frac{1}{5} = \frac{\overset{44}{\cancel{220}}}{1} \cdot \frac{1}{\cancel{5}_{1}} = \frac{44 \cdot 1}{1 \cdot 1} = 44$

44 cars were sold.

$220 - 44 = 176$

176 cars remain on the lot.

**89.** $135 \cdot 19\frac{1}{2} = \frac{135}{1} \cdot \frac{39}{2}$

$= \frac{135 \cdot 39}{1 \cdot 2} = \frac{5265}{2} = 2632\frac{1}{2}$

$2632\frac{1}{2}$ inches of steel tubing are needed.

**90.** $182 \cdot 61\frac{1}{2} = \frac{\overset{91}{\cancel{182}}}{1} \cdot \frac{123}{\cancel{2}_{1}}$

$= \frac{91 \cdot 123}{1 \cdot 1} = 11{,}193$

11,193 inches of wood are necessary.

## Chapter 1 Review Exercises

**1.** $\frac{24}{40} = \frac{24 \div 8}{40 \div 8} = \frac{3}{5}$

**2.** $\frac{32}{64} = \frac{32 \div 32}{64 \div 32} = \frac{1}{2}$

**3.** $\frac{27}{81} = \frac{27 \div 27}{81 \div 27} = \frac{1}{3}$

**4.** $\frac{147}{294} = \frac{147 \div 147}{294 \div 147} = \frac{1}{2}$

$\frac{63}{} \quad \frac{63 \div 7}{} \quad \frac{9}{}$

4

**87.** $40 \cdot \frac{2}{60} = \frac{\cancel{40}^{20}}{1} \cdot \frac{3}{\cancel{2}_{1}} = \frac{20 \cdot 3}{1} =$

$3 \quad 1 \quad 2 \quad 1 \cdot 1$

60 trips are needed.

**5.** $\frac{70}{70} = \frac{70 \div 7}{70 \div 7} = \frac{10}{10}$

**6.** $\frac{84}{132} = \frac{84 \div 12}{132 \div 12} = \frac{7}{11}$

**7.** $\frac{24}{1200} = \frac{24 \div 24}{1200 \div 24} = \frac{1}{50}$

**8.** $\frac{375}{1000} = \frac{375 \div 125}{1000 \div 125} = \frac{3}{8}$

**9.** $8\overline{)65}$ $\quad \frac{65}{8} = 8\frac{1}{8}$

$\underline{64}$

$1$

**10.** $12\overline{)56}$ $\quad \frac{56}{12} = 4\frac{8}{12} = 4\frac{2}{3}$

$\underline{48}$

$8$

**11.** $24\overline{)38}$ $\quad \frac{38}{24} = 1\frac{14}{24} = 1\frac{7}{12}$

$\underline{24}$

$14$

**12.** $7\overline{)55}$ $\quad \frac{55}{7} = 7\frac{6}{7}$

$\underline{49}$

$6$

**13.** $45\overline{)120}$ $\quad \frac{120}{45} = 2\frac{30}{45} = 2\frac{2}{3}$

$\underline{90}$

$30$

**14.** $24\overline{)196}$ $\quad \frac{196}{24} = 8\frac{4}{24} = 8\frac{1}{6}$

$\underline{192}$

$4$

**15.** $32\overline{)258}$ $\quad \frac{258}{32} = 8\frac{2}{32} = 8\frac{1}{16}$

$\underline{256}$

$2$

**16.** $64\overline{)194}$ $\quad \frac{194}{64} = 3\frac{2}{64} = 3\frac{1}{32}$

$\underline{192}$

$2$

**17.** $\frac{5}{8} + \frac{7}{12} = \frac{15}{24} + \frac{14}{24} = \frac{15+14}{24} = \frac{29}{24} = 1\frac{5}{24}$

**18.** $\frac{1}{5} + \frac{3}{10} + \frac{3}{8} = \frac{8}{40} + \frac{12}{40} + \frac{15}{40}$

$= \frac{8+12+15}{40} = \frac{35}{40} = \frac{7}{8}$

**19.** $\frac{5}{7} - \frac{1}{3} = \frac{15}{21} - \frac{7}{21} = \frac{15-7}{21} = \frac{8}{21}$

**20.** $\frac{3}{4} - \frac{2}{3} = \frac{9}{12} - \frac{8}{12} = \frac{9-8}{12} = \frac{1}{12}$

**21.** $25\frac{1}{6} = 25\frac{1}{6}$

$+ 46\frac{2}{3} = 46\frac{4}{6}$

$\underline{\quad\quad}$

$5$

$71\frac{}{6}$

**22.** $18\frac{3}{5} = 18\frac{18}{30}$

$47\frac{7}{10} = 47\frac{21}{30}$

$+ 25\frac{8}{15} = 25\frac{16}{30}$

$\underline{\quad\quad}$

$55 \qquad 25$

$90\frac{}{30} = 90 + 1\frac{}{30}$

$= 91\frac{25}{30} = 91\frac{5}{6}$

**23.** $6\frac{7}{12} = 6\frac{7}{12}$

$- 2\frac{1}{3} = 2\frac{4}{12}$

$\underline{\quad\quad}$

$3 \qquad 1$

$4\frac{}{12} = 4\frac{}{4}$

**24.** $92\frac{5}{16} = 92\frac{5}{16}$

$- 11\frac{1}{\quad} = 11\frac{4}{\quad}$

$$\frac{4}{81\frac{1}{16}} \quad \frac{16}{}$$

**25.** $\$4.95 + \$3.40 = \$8.35$
The cost per square foot is $8.35.

$\$8.35 \cdot 580 = \$4843$
The total cost is $4843.

**26.** $3.4-1.6=1.8$

1.8 gallons are saved per flush.

$1.8\cdot 22\cdot 365=14,454$

14,454 gallons are saved in one year.

**27.** $5\frac{1}{2}+6\frac{1}{4}+3\frac{3}{4}+7=5\frac{2}{4}+6\frac{1}{4}+3\frac{3}{4}+7$

$=21\frac{6}{4}=22\frac{2}{4}=22\frac{1}{2}$

Desiree worked $22\frac{1}{2}$ hours altogether.

**28.** $68\frac{1}{6}+37\frac{3}{8}+5\frac{3}{8}=68\frac{4}{6}+37\frac{3}{8}+5$

$=110\frac{13}{8}=111\frac{5}{8}$

$111\frac{5}{8}$ gallons of paint were used.

$147\frac{1}{8}=147\frac{4}{8}=146\frac{12}{8}$

$-111\frac{5}{8}=111\frac{5}{8}=111\frac{5}{8}$

$35\frac{7}{8}$

There are $35\frac{7}{8}$ gallons of paint remaining.

**29.** $202\frac{1}{8}=202\frac{1}{8}$

$370\frac{3}{8}=370\frac{6}{8}$

$+274\frac{1}{2}=274\frac{4}{8}$

$846\frac{11}{8}=846+1\frac{3}{8}=847\frac{3}{8}$

The three sides measure $847\frac{3}{8}$ feet.

**30.** $12\frac{2}{3}=12\frac{16}{24}$

$16\frac{1}{8}=16\frac{3}{24}$

$15\frac{1}{2}=15\frac{12}{24}$

$+10\frac{1}{6}=10\frac{4}{24}$

$53\frac{35}{24}=53+1\frac{11}{24}=54\frac{11}{24}$

The total weight is $54\frac{11}{24}$ pounds.

**31.** $\frac{5}{8}\cdot\frac{2}{3}=\frac{5\cdot 1}{4\cdot 3}=\frac{5}{12}$

**32.** $\frac{1}{3}\cdot\frac{7}{8}\cdot\frac{3}{5}=\frac{1\cdot 7\cdot 1}{1\cdot 8\cdot 5}=\frac{7}{40}$

**33.** $\frac{1}{6}\div\frac{1}{3}=\frac{1}{6}\cdot\frac{3}{1}=\frac{1\cdot 1}{2\cdot 1}=\frac{1}{2}$

**34.** $10\div\frac{5}{8}=\frac{10}{1}\cdot\frac{8}{5}=\frac{2\cdot 8}{1\cdot 1}=16$

**35.** $2\frac{1}{2}\div 3\frac{3}{4}=\frac{5}{2}\div\frac{15}{4}=\frac{\cancel{5}^{1}}{2}\cdot\frac{4}{\cancel{15}_{3}}=\frac{1\cdot 2}{1\cdot 3}=\frac{2}{3}$

**36.** $3\frac{3}{4}\div\frac{27}{16}=\frac{15}{4}\div\frac{27}{16}$

$=\frac{\cancel{15}^{5}}{4}\cdot\frac{16}{27}=\frac{5\cdot 4}{1\cdot 9}=\frac{20}{9}=2\frac{2}{9}$

$$\begin{array}{r} 8 \\ 1166\frac{7}{8} \\ -\,847\frac{3}{8} \\ \hline 319\frac{4}{8} = 319\frac{1}{2} \end{array}$$

The length of the fourth side is $319\frac{1}{2}$ feet.

$$\frac{\overset{1}{\cancel{4}}}{\cancel{9}} \cdot \frac{27}{1} \div 9 \cdot \frac{1}{9}$$

**37.** $12\frac{1}{2} \div 1\frac{2}{3} = \frac{25}{2} \div \frac{5}{3} = \frac{25 \cdot 5}{2 \cdot 3} = \frac{125}{6} = 20\frac{5}{6}$

**38.** $12\frac{1}{3} \cdot 2 = \frac{37}{3} \cdot \frac{2}{1} = \frac{37}{3} \cdot \frac{1}{2}$

$= \frac{37 \cdot 1}{3 \cdot 2} = \frac{37}{6} = 6\frac{1}{6}$

**39.** $11 \cdot \$985 = \$10,835$

$8 \cdot \$540 = \$4320$

$3 \cdot \$349 = \$1047$

$\$10,835 + \$4320 + \$1047 = \$16,202$

The total amount is \$16,202.

$\$19,200 - \$16,202 = \$2998$

The amount remaining is \$2998.

**40.** $\$1.4 \text{ billion} \approx \$0.39 \times 3.59 \approx 3.6$

There are 3.6 million shares.

**41.** One-third is sold, so two-thirds is left.

$$\frac{2}{3} \cdot 63\frac{3}{4} = \frac{\cancel{2}^{1}}{\cancel{3}_{1}} \cdot \frac{\cancel{255}^{85}}{\cancel{4}_{2}} = \frac{1 \cdot 85}{1 \cdot 2} = \frac{85}{2} = 42\frac{1}{2}$$

There are $42\frac{1}{2}$ acres left.

**42.** $25,730 \text{ cm} \approx 10\frac{3}{8} = \frac{25,730}{1} \text{ cm}$

$$= \frac{\cancel{25,730}^{310}}{1} \text{ cm} \cdot \frac{8}{\cancel{83}_{1}} = \frac{310 \cdot 8}{1 \cdot 1} = 2480$$

2480 anchors can be manufactured.

**43.** $157\frac{1}{2} \text{ cm} \approx 4\frac{3}{8} = \frac{315}{2} \text{ cm} \approx \frac{35}{8}$

$$= \frac{\cancel{315}^{9}}{\cancel{2}_{1}} \cdot \frac{\cancel{8}^{4}}{\cancel{35}_{1}} = \frac{9 \cdot 4}{1 \cdot 1} = 36$$

36 pull cords can be made.

**44.** $\frac{1}{4}$ of the profits will be retained for remodeling costs, so $\frac{3}{4}$ will be disbursed equally to each of three partners.

$$\frac{\cancel{3}^{1}}{4} \cdot \frac{1}{\cancel{3}_{1}} \cdot \frac{\$562,200}{1} = \frac{1 \cdot 1 \cdot \$562,200}{4 \cdot 1 \cdot 1}$$

$$= \frac{\$562,200}{4} = \$140,550$$

Each partner receives \$140,550.

**45.** $0.25 = \frac{25}{100} = \frac{1}{4}$

**46.** $0.625 = \frac{625}{1000} = \frac{5}{8}$

**47.** $0.93 = \frac{93}{100}$

**48.** $0.005 = \frac{5}{1000} = \frac{1}{200}$

**49.** 68.433 to the nearest tenth is 68.4.

Locate the tenths digit and draw a line.

68.4|33

Since the digit to the right of the line is 3, leave the tenths digit alone.

68.433 to the nearest hundredth is 68.43.
Locate the hundredths digit and draw a line.

68.43|3

Since the digit to the right of the line is 3, leave the hundredths digit alone.

**50.** 975.536 to the nearest tenth is 975.5.
Locate the tenths digit and draw a line.

975.5|36

Since the digit to the right of the line is 3, leave the tenths digit alone.

975.536 to the nearest hundredth is 975.54.
Locate the hundredths digit and draw a line.

975.53|6

Since the digit to the right of the line is 6, increase the hundredths digit by 1.

**51.** 0.3549 to the nearest tenth is 0.4.
Locate the tenths digit and draw a line.

0.3|549

Since the digit to the right of the line is 5, increase the tenths digit by 1.

0.3549 to the nearest hundredth is 0.35.
Locate the hundredths digit and draw a line.

0.35|49

Since the digit to the right of the line is 4, leave the hundredths digit alone.

**52.** 8.025 to the nearest tenth is 8.0.
Locate the tenths digit and draw a line.

$$8.0\,|\,25$$

Since the digit to the right of the line is 2, leave the tenths digit alone.

8.025 to the nearest hundredth is 8.03.
Locate the hundredths digit and draw a line.

$$8.02\,|\,5$$

Since the digit to the right of the line is 5, increase the hundredths digit by 1.

**53.** 6.965 to the nearest tenth is 7.0.

Locate the tenths digit and draw a line.

$$6.9\,|\,65$$

Since the digit to the right of the line is 6, increase the tenths digit by 1 (which increases the ones digit by 1).

6.965 to the nearest hundredth is 6.97.
Locate the hundredths digit and draw a line.

$$6.96\,|\,5$$

Since the digit to the right of the line is 5, increase the hundredths digit by 1.

**54.** 0.428 to the nearest tenth is 0.4.
Locate the tenths digit and draw a line.

$$0.4\,|\,28$$

Since the digit to the right of the line is 2,

leave the tenths digit alone.

0.428 to the nearest hundredth is 0.43.
Locate the hundredths digit and draw a line.

$$0.42\,|\,8$$

Since the digit to the right of the line is 8, increase the hundredths digit by 1.

**55.** 0.955 to the nearest tenth is 1.0.
Locate the tenths digit and draw a line.

$$0.9\,|\,55$$

Since the digit to the right of the line is 5, increase the tenths digit by 1 (which increases the ones digit by 1).

0.955 to the nearest hundredth is 0.96.
Locate the hundredths digit and draw a line.

$$0.95\,|\,5$$

Since the digit to the right of the line is 5, increase the hundredths digit by 1.

**56.** 71.249 to the nearest tenth is 71.2.
Locate the tenths digit and draw a line.

$$71.2\,|\,49$$

Since the digit to the right of the line is 4, leave the tenths digit alone.

71.249 to the nearest hundredth is 71.25.
Locate the hundredths digit and draw a line.

$$71.24\,|\,9$$

Since the digit to the right of the line is 9, increase the hundredths digit by 1.

**57.** $\frac{5}{8} = 0.625$

$$\begin{array}{r} 0.625 \\ 8\overline{)5.000} \\ \underline{48} \\ 20 \\ \underline{16} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

**58.** $\frac{3}{4} = 0.75$

$$\begin{array}{r} 0.75 \\ 4\overline{)3.00} \\ \underline{28} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

**59.** $\frac{5}{6} = 8.\overline{3} \approx 0.833$

$$\begin{array}{r} 0.8333 \\ 6\overline{)5.0000} \\ \underline{48} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

**60.** $\frac{7}{16} \approx 0.438$

$$\begin{array}{r} 0.4375 \\ 16\overline{)7.0000} \\ \underline{64} \\ 60 \\ \underline{48} \\ 120 \\ \underline{112} \\ 80 \\ \underline{80} \\ 0 \end{array}$$

## Business Application Case #1
## Operating Expenses

**(a)** Multiply each monthly amount by 12.
Salaries: $\$15,000 \times 12 = \$180,000$
Rent: $\$9000 \times 12 = \$108,000$
Utilities: $\$3000 \times 12 = \$36,000$
Insurance: $\$2250 \times 12 = \$27,000$
Advertising: $\$2250 \times 12 = \$27,000$
Miscellaneous: $\$4500 \times 12 = \$54,000$

$\$180,000 + \$108,000 + \$36,000 + \$27,000 + \$27,000 + \$54,000 = \$432,000$

The total annual operating expenses are $432,000.

**(b)** Divide each annual amount by the total annual operating expenses.

Salaries: $\frac{\$180,000}{\$432,000} = \frac{5}{12}$

Rent: $\frac{\$108,000}{\$432,000} = \frac{1}{4}$

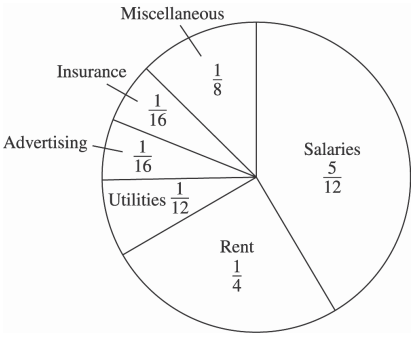
Utilities: $\frac{\$36,000}{\$432,000} = \frac{1}{12}$

Insurance: $\frac{\$27,000}{\$432,000} = \frac{1}{16}$

Advertising: $\frac{\$27,000}{\$432,000} = \frac{1}{16}$

Miscellaneous: $\frac{\$54,000}{\$432,000} = \frac{1}{8}$

**(c)**




## Business Application Case #2
## Home Repair

**(a)** $10 \text{ feet} = 10 \times 12 = 120 \text{ inches}$
$8 \text{ feet} = 8 \times 12 = 96 \text{ inches}$

$8 \text{ feet } 8\frac{3}{8} \text{ inches} = 96 + 8\frac{3}{8} = 104\frac{3}{8} \text{ inches}$

$120 - 104\frac{3}{8} = 119\frac{8}{8} - 104\frac{3}{8} = 15\frac{5}{8} \text{ inches}$

$= 1 \text{foot } 3\frac{5}{8} \text{ inches}$

The length of the remaining piece is $1 \text{foot } 3\frac{5}{8}$ inches.

**(b)** $\$10,000 \div \$34.40 \approx 290.7$
290 shares can be purchased for $10,000.

**(c)** Answers will vary.

**(d)** Answers will vary.

# Chapter 2 Equations and Formulas

## 2.1 Solving Equations

**1.** $z + 8 = 50$

$z + 8 - 8 = 50 - 8$ *Subtract* 8.

$z = 42$

**2.** $r + 13 = 83$

$r + 13 - 13 = 83 - 13$ *Subtract* 13.

$r = 70$

**3.** $z + 95 = 400$

$z + 95 - 95 = 400 - 95$ *Subtract* 95.

$z = 305$

**4.** $25 = x + 12$

$25 - 12 = x + 12 - 12$ *Subtract* 12.

$13 = x$

**5.** $v - 29 = 17$

$v - 29 + 29 = 17 + 29$ *Add* 29.

$v = 46$

**6.** $312 = m - 40$

$312 + 40 = m - 40 + 40$ *Add* 40.

$352 = m$

**7.** $10k = 42$

$\frac{10k}{10} = \frac{42}{10}$ *Divide by* 10.

$k = 4.2$

**8.** $7s = 84$

$\frac{7s}{7} = \frac{84}{7}$ *Divide by* 7.

$s = 12$

**9.** $12q = 144$

$\frac{12q}{12} = \frac{144}{12}$

$q = 12$

**10.** $8z = 136$

$\frac{8z}{8} = \frac{136}{8}$ *Divide by* 8.

$z = 17$

**11.** $60 = 30m$

$\frac{60}{30} = \frac{30m}{30}$ *Divide by* 30.

$2 = m$

**12.** $94 = 2z$

$\frac{94}{2} = \frac{2z}{2}$ *Divide by* 2.

$47 = z$

**13.** $5.9y = 17.7$

$\frac{5.9y}{5.9} = \frac{17.7}{5.9}$ *Divide by* 5.9.

$y = 3$

**14.** $16.5x = 39.6$

$\frac{16.5x}{16.5} = \frac{39.6}{16.5}$ *Divide by* 16.5.

$x = 2.4$

**15.** $1.54 = 0.7y$

$\frac{1.54}{0.7} = \frac{0.7y}{0.7}$ *Divide by* 0.7.

$2.2 = y$

**16.** $3.9a = 15.6$

$\frac{3.9a}{3.9} = \frac{15.6}{3.9}$ *Divide by* 3.9.

$a = 4$

**17.** $3.92w = 3.136$

$\frac{3.92w}{3.92} = \frac{3.136}{3.92}$ *Divide by* 3.92.

$w = 0.8$

**18.** $2.773m = 3.3276$

$\frac{2.773m}{2.773} = \frac{3.3276}{2.773}$ *Divide by* 2.773.

$m = 1.2$

**19.** $0.0002x = 0.08$

$\frac{0.0002x}{0.0002} = \frac{0.08}{0.0002}$ *Divide by* 0.0002.

$x = 400$

**20.** $0.0324 = 0.0135y$

$\frac{0.0324}{0.0135} = \frac{0.0135y}{0.0135}$ *Divide by* 0.0135.

$2.4 = y$

**21.** $\frac{s}{7} = 42$

$\frac{s}{7} \cdot 7 = 42 \cdot 7$ *Multiply by* 7.

$s = 294$

**22.** $\frac{m}{5} = 6$

$\frac{m}{5} \cdot 5 = 6 \cdot 5$ *Multiply by* 5.

$m = 30$

**23.** $\frac{r}{7} = 1$

$\frac{r}{7} \cdot 7 = 1 \cdot 7$ *Multiply by* 7.

$r = 7$

**24.** $\frac{c}{7} = 2$

$\frac{c}{7} \cdot 7 = 2 \cdot 7$ *Multiply by* 7.

$c = 14$

**25.** $\frac{2}{3}b = 8$

$\frac{3}{2} \cdot \frac{2}{3}b = \frac{3}{2} \cdot 8$ *Multiply by* $\frac{3}{2}$.

$b = 12$

**26.** $22 = \frac{5}{4}s$

$\frac{4}{5} \cdot 22 = \frac{4}{5} \cdot \frac{5}{4}s$ *Multiply by* $\frac{4}{5}$.

**27.**

**28.** $\frac{7}{3}s = 21$

$\frac{3}{7} \cdot \frac{7}{3}s = \frac{3}{7} \cdot 21$ *Multiply by* $\frac{3}{7}$.

$s = 9$

**29.** $2x = \frac{5}{3}$

$\frac{1}{2} \cdot 2x = \frac{1}{2} \cdot \frac{5}{3}$ *Multiply by* $\frac{1}{2}$.

$x = \frac{5}{6}$

**30.** $4y = \frac{1}{3}$

$\frac{1}{4} \cdot 4y = \frac{1}{4} \cdot \frac{1}{3}$ *Multiply by* $\frac{1}{4}$.

$y = \frac{1}{12}$

**31.** $3p = \frac{5}{12}$

$\frac{1}{3} \cdot 3p = \frac{1}{3} \cdot \frac{5}{12}$ *Multiply by* $\frac{1}{3}$.

$p = \frac{5}{36}$

**32.** $\frac{3}{4} = 9a$

$\frac{1}{9} \cdot \frac{3}{4} = \frac{1}{9} \cdot 9a$ *Multiply by* $\frac{1}{9}$.

$\frac{1}{12} = a$

**33.** $7b + 9 = 37$

$7b + 9 - 9 = 37 - 9$ *Subtract* 9.

$7b = 28$

$\frac{7b}{7} = \frac{28}{7}$ *Divide by* 7.

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$\frac{8}{8} = \frac{s}{5}$

$b = 4$

**34.** $4x + 12 = 75$

$4x + 12 - 12 = 75 - 12$ *Subtract* 12.

$4x = 63$

$\frac{4x}{4} = \frac{63}{4}$ *Divide by* 4.

$17.6 = s$

$\frac{35}{7} = \frac{t}{5}$

$\frac{5}{5} \cdot \frac{35}{7} = \frac{5}{5} \cdot \frac{t}{5}$ *Multiply by* $\frac{5}{5}$.

$7 = 7 \cdot 5 \cdot 7$

$25 = t$

$x = 15\frac{3}{4} = 15.75$

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**35.** $7y - 23 = 58$

$7y - 23 + 23 = 58 + 23$ *Add* 23.

$7y = 81$

$\frac{7y}{7} = \frac{81}{7}$ *Divide by* 7.

$y = \frac{81}{7} = 11\frac{4}{7}$

**36.** $12r - 60 = 100$

$12r - 60 + 60 = 100 + 60$ *Add* 60.

$12r = 160$

$\frac{12r}{12} = \frac{160}{12}$ *Divide by* 12.

$r = \frac{40}{3} = 13\frac{1}{3}$

**37.** $6p + 41.5 = 69.4$

$6p + 41.5 - 41.5 = 69.4 - 41.5$ *Subtract* 41.5.

$6p = 27.9$

$\frac{6p}{6} = \frac{27.9}{6}$ *Divide by* 6.

$p = 4.65$

**38.** $12.2s + 13.8 = 47.96$

$12.2s + 13.8 - 13.8 = 47.96 - 13.8$ *Subtract* 13.8.

$12.2s = 34.16$

$\frac{12.2s}{12.2} = \frac{34.16}{12.2}$ *Divide by* 12.2.

$s = 2.8$

**39.** $6c + \frac{3}{4} = 8$

$6c + \frac{3}{4} - \frac{3}{4} = 8 - \frac{3}{4}$ *Subtract* $\frac{3}{4}$.

$6c = \frac{29}{4}$

$\frac{1}{6} \cdot 6c = \frac{1}{6} \cdot \frac{29}{4}$ *Multiply by* $\frac{1}{6}$.

$c = \frac{29}{24} = 1\frac{5}{24}$

**40.** $5z + \frac{2}{3} = 2$

$5z + \frac{2}{3} - \frac{2}{3} = 2 - \frac{2}{3}$ *Subtract* $\frac{2}{3}$.

$5z = \frac{4}{3}$

$\frac{1}{5} \cdot 5z = \frac{1}{5} \cdot \frac{4}{3}$ *Multiply by* $\frac{1}{5}$.

$z = \frac{4}{15}$

**41.** $7q - \frac{2}{3} = 4$

$7q - \frac{2}{3} + \frac{2}{3} = 4 + \frac{2}{3}$ *Add* $\frac{2}{3}$.

$7q = \frac{14}{3}$

$\frac{1}{7} \cdot 7q = \frac{1}{7} \cdot \frac{14}{3}$ *Multiply by* $\frac{1}{7}$.

$q = \frac{2}{3}$

**42.** $7a - \frac{5}{4} = \frac{9}{4}$

$7a - \frac{5}{4} + \frac{5}{4} = \frac{9}{4} + \frac{5}{4}$ *Add* $\frac{5}{4}$.

$7a = \frac{7}{2}$

$\frac{1}{7} \cdot 7a = \frac{1}{7} \cdot \frac{7}{2}$ *Multiply by* $\frac{1}{7}$.

$a = \frac{1}{2}$

**43.** $5.2z - 4 = 1.2$

$5.2z - 4 + 4 = 1.2 + 4$ *Add* 4.

$5.2z = 5.2$

$\frac{5.2z}{5.2} = \frac{5.2}{5.2}$ *Divide by* 5.2.

24 24

**Chapter 2** *Equations and Formulas* 25

$z = 1$

**44.** $3.6m + 2 = 6.32$

$3.6m + 2 - 2 = 6.32 - 2$ *Subtract* 2.

$3.6m = 4.32$

$\frac{3.6m}{3.6} = \frac{4.32}{3.6}$ *Divide by* 3.6.

$m = 1.2$

**45.** $27.85 = 3 + 7.1p$

$27.85 - 3 = 3 - 3 + 7.1p$ *Subtract* 3.

$24.85 = 7.1p$

$\frac{24.85}{7.1} = \frac{7.1p}{7.1}$ *Divide by* 7.1.

$3.5 = p$

**46.** $0.9 = 4t - 3.5$

$0.9 + 3.5 = 4t - 3.5 + 3.5$ *Add* 3.5.

$4.4 = 4t$

$\frac{4.4}{4} = \frac{4t}{4}$ *Divide by* 4.

$1.1 = t$

**47.** $7m + 4m - 5m = 78$

$6m = 78$ *Combine like terms.*

$\frac{6m}{6} = \frac{78}{6}$ *Divide by* 6.

$m = 13$

**48.** $13r - 7r + 3r = 81$

$9r = 81$ *Combine like terms.*

$\frac{9r}{9} = \frac{81}{9}$ *Divide by* 9.

$r = 9$

**49.** $2s + s + 3s = 12$

$6s = 12$ *Combine like terms.*

$\frac{6s}{6} = \frac{12}{6}$ *Divide by* 6.

$s = 2$

**50.** $3.5k + k + k = 11.55$

$5.5k = 11.55$

$\frac{5.5k}{5.5} = \frac{11.55}{5.5}$



**51.** $5y + 2 = 3(y + 4)$ *Distribute.*

$5y + 2 = 3y + 12$ *Subtract* 2.

$5y + 2 - 2 = 3y + 12 - 2$

$5y = 3y + 10$ *Subtract* $3y$.

$5y - 3y = 3y - 3y + 10$

$2y = 10$ *Divide by* 2.

$\frac{2y}{2} = \frac{10}{2}$

$y = 5$

**52.** $4z + 2 = 2(z + 2)$

$4z + 2 = 2z + 4$ *Distribute.*

$4z + 2 - 2 = 2z + 4 - 2$ *Subtract* 2.

$4z = 2z + 2$

$4z - 2z = 2z - 2z + 2$ *Subtract* $2z$.

$2z = 2$

$\frac{2z}{2} = \frac{2}{2}$ *Divide by* 2.

$z = 1$

**53.** $3(m - 4) = \frac{m}{2} + 2$

$3m - 12 = \frac{m}{2} + 2$ *Distribute.*

$3m - 12 + 12 = \frac{m}{2} + 2 + 12$ *Add* 12.

$3m = \frac{m}{2} + 14$

$3m - m = \frac{m}{2} - m + 14$ *Subtract m.*

$2m = 14$

$\frac{2m}{2} = \frac{14}{2}$ *Divide by* 2.

$m = 7$

**54.** *Distribute.*

$s + 8 = 3(s - 6)$

$s + 8 = 3s - 18$

$s + 8 + 18 = 3s - 18 + 18$ *Add* 18.

$s + 26 = 3s$

$k = 2.1$

*Combine like terms.*

*Divide by* 5.5.



$$s - s + 26 = 3s - s \qquad \textit{Subtract } s.$$
$$26 = 2s$$
$$\frac{26}{2} = \frac{2s}{2} \qquad \textit{Divide by } 2.$$
$$13 = s$$

**55.** $4(y+8)=3(y+14)$

$4y+32=3y+42$ *Distribute.*

$4y+32-32=3y+42-32$ *Subtract* 32.

$4y=3y+10$

$4y-3y=3y-3y+10$ *Subtract* $3y$.

$y=10$

**56.** $7(z-5)=4(z+8)$

$7z-35=4z+32$ *Distribute.*

$7z-35+35=4z+32+35$ *Add* 35.

$7z=4z+67$

$7z-4z=4z-4z+67$ *Subtract* $4z$.

$3z=67$

$\frac{3z}{3}=\frac{67}{3}$ *Divide by* 3.

$z=22\frac{1}{3}$

**57.** $\frac{3}{4}s+\frac{1}{5}s=\frac{4}{5}$

$\frac{15}{20}s+\frac{4}{20}s=\frac{4}{5}$

$\frac{19}{20}s=\frac{4}{5}$ *Combine like terms.*

$\frac{20}{4}\cdot\frac{19}{20}s=\frac{20}{4}\cdot$ *Multiply by* $\frac{20}{4}$.

$s=\frac{16}{19}$

**58.** $\frac{3}{4}q-\frac{1}{9}=\frac{1}{3}+\frac{1}{4}q$

$\frac{3}{4}q-\frac{1}{9}+\frac{1}{9}=\frac{1}{3}+\frac{1}{9}+\frac{1}{4}q$ *Add* $\frac{1}{9}$.

$\frac{3}{4}q=\frac{3}{9}+\frac{1}{9}+\frac{1}{4}q$

$\frac{3}{4}q=\frac{4}{9}+\frac{1}{4}q$

$\frac{3}{4}q-\frac{1}{4}q=\frac{4}{9}+\frac{1}{4}q-\frac{1}{4}q$ *Subtract* $\frac{1}{4}q$.



**59.** $\frac{3}{8}y+\frac{1}{4}=\frac{9}{8}y-\frac{1}{4}$

$\frac{3}{8}y+\frac{1}{4}+\frac{1}{4}=\frac{9}{8}y-\frac{1}{4}+\frac{1}{4}$ *Add* $\frac{1}{4}$.

$\frac{3}{8}y+\frac{1}{2}=\frac{9}{8}y$

$-y--y+-=-y--y$ *Subtract* $-y$.

$\frac{1}{2}=\frac{3}{4}y$

$\frac{4}{3}\cdot\frac{1}{2}=\frac{4}{3}\cdot\frac{3}{4}y$ *Multiply by* $\frac{4}{3}$.

$\frac{2}{3}=y$

**60.** $(\quad-\quad)=(\quad-\quad)$

$6p-3=8.8-4p$ *Distribute.*

$6p-3+3=8.8+3-4p$ *Add* 3.

$6p=11.8-4p$

$6p+4p=11.8-4p+4p$ *Add* $4p$.

$10p=11.8$

$\frac{10p}{10}=\frac{11.8}{10}$ *Divide by* 10.

$p=1.18$

**61.** $2(y+1)=4(4-2.5y)$

$2y+2=16-10y$ *Distribute.*

$2y+10y+2=16-10y+10y$ *Add* $10y$.

$12y+2=16$

$12y+2-2=16-2$ *Subtract* 2.

$12y=14$

$\frac{12y}{12}=\frac{14}{12}$ *Divide by* 12.

$y=1\frac{2}{12}=1\frac{1}{6}$

**62.** $9.1765y+0.3284y=6.65343$

$9.5049y=6.65343$ *Combine like terms.*

$$\frac{1}{2}q = \frac{4}{9}$$

$$\frac{2}{1}\cdot\frac{1}{2}q = \frac{2}{1}\cdot\frac{4}{9} \qquad \textit{Multiply by } \frac{2}{1}.$$

$$q = \frac{8}{9}$$



$$\frac{9.5049y}{9.5049} = \frac{6.65343}{9.5049}$$

*Divide by* 9.5049.

$$y = 0.7$$

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**63.** $0.7452(3k-1)=3.94956$

$2.2356k-0.7452=3.94956$

*Distribute.*

$2.2356k-0.7452+0.7452=3.94956+0.7452$

*Add* 0.7452.

$2.2356k=4.69476$

$\frac{2.2356k}{2.2356}=\frac{4.69476}{2.2356}$

*Divide by* 2.2356.

**64.** $k=2.1$

$0.3255(1+7.5s)=6.67275$

$0.3255+2.44125s=6.67275$

*Distribute.*

$0.3255-0.3255+2.44125s=6.67275-0.3255$

*Subtract* 0.3255.

$2.44125s=6.34725$

$\frac{2.44125s}{2.44125}=\frac{6.34725}{2.44125}$

*Divide by* 2.44125.

$s=2.6$

**65.** $1.2(2+3r)=0.8(2r+5)$

$2.4+3.6r=1.6r+4$ *Distribute.*

$2.4-2.4+3.6r=1.6r+4-2.4$ *Subtract* 2.4.

$3.6r=1.6r+1.6$

$3.6r-1.6r=1.6r-1.6r+1.6$ *Subtract* 1.6*r*.

$2r=1.6$

$\frac{2r}{2}=\frac{1.6}{2}$ *Divide by* 2.

$r=0.8$

**66.** Answers will vary.

**67.** Answers will vary.

**68.** Answers will vary.

## 2.2 Applications of Equations

**1.** 27 plus a number

$27+x$

**2.** the sum of a number and $16\frac{1}{2}$

$x+16\frac{1}{2}$

**3.** a number added to 22

$22+x$

**4.** 6.8 added to a number

$6.8+x$

**5.** 4 less than a number

$x-4$

**6.** 12 fewer than a number

$x-12$

$\frac{1}{}$

**7.** subtract $3_2$ from a number

$x-3\frac{1}{2}$

**8.** subtract a number from 5.4

$5.4-x$

**9.** triple a number

$3x$

**10.** the product of a number and 9

$9x$

**11.** three-fifths of a number

$\frac{3}{5}x$

**12.** four-thirds of a number

$\frac{4}{3}x$

**13.** the quotient of 9 and a number

$\frac{9}{x}$

**14.** the quotient of a number and 11

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$$\frac{x}{11}$$

**15.** 16 divided by a number

$\frac{16}{x}$

**16.** a number divided by 4

$\frac{x}{4}$

**17.** the product of 2.1 and the sum of 4 and a number

$2.1(4+x)$

**18.** the quantity of a number plus 4, divided by 9

$(x+4)\div 9$

**19.** 7 times the difference of a number and 3

$7(x-3)$

**20.** the difference of a number and 2, multiplied by 7

$(x-2)7$

**21.** The cost of 12 DVDs at $y$ dollars each is $12y$.

**22.** The cost of $x$ students paying tuition of

$2800 each is $2800x$.

**23.** The amount that should be ordered is $472-x$.

**24.** $x-83$ employees do not have laptops.

**25.** $73-x$ employees are not union members.

**26.** The value of the rest of the inventory is $73{,}000-x$.

**27.** The cost of one textbook is $\frac{20{,}210}{x}$.

**28.** The cost per person is $\frac{1853}{x}$.

**29.** Robin has $21-x$ books left.

**30.** The tire shop was $x-8$ years old.



**31.** 4 times a number, plus 6 equals 58

$4 \cdot n + 6 = 58$

Solve the equation.

$4n+6=58$

$4n=52$

$n=13$

**32.** 17 times a number, plus 5 equals 107

$17 \cdot n + 5 = 107$

Solve the equation.

$17n+5=107$

$17n=102$

$n=6$

**33.** 6 times quantity 4 minus a number is 15

$6 \cdot (4 - n) = 15$

Solve the equation.

$6(4-n)=15$

$24-6n=15$

$-6n=-9$

$n=\frac{3}{2}=1.5$

**34.** 12 times quantity a number less 1 is 72

$12 \cdot (n - 1) = 72$

Solve the equation.

$12(n-1)=72$

$12n-12=72$

$12n=84$

$n=7$

**35.** 6 added to a number is 7 times the number.

$6 + n = 7 \cdot n$

Solve the equation.

$6+n=7n$

$6=6n$

$1=n$

**36.** 3 times number subtract 6 is 4 more than number.

$3 \times n - 6 = 4 + n$

Solve the equation.

$3n-6=4+n$

$3n=10+n$

$2n=10$

$n=5$

**37.** 5 times number added to twice number is 10

$5 \cdot n + 2n = 10$

Solve the equation.

$5n + 2n = 10$

$7n = 10$

$n = \frac{10}{7} = 1\frac{3}{7}$

**38.** 11 times number subtract 7 times number is 9

$11 \cdot n - 7 \cdot n = 9$

Solve the equation.

$11n - 7n = 9$

$4n = 9$

$n = \frac{9}{4} = 2\frac{1}{4}$

**39.** $x$ = stereos sold by Jamison

$x - 17$ = stereos sold by other salesperson

sold by Jamison + sold by other = total sold

$x + (x - 17) = 101$

Solve the equation.

$x + (x - 17) = 101$

$x + x - 17 = 101$

$2x - 17 = 101$

$2x = 118$

$x = 59$

Jamison sold 59 stereos.

**40.** $x$ = cases of Coke sold

$x - 19$ = cases of Sprite sold

cases of Coke + cases of Sprite = total sold

$x + (x - 19) = 43$

Solve the equation.

$x + (x - 19) = 43$

$x + x - 19 = 43$

$2x - 19 = 43$

$2x = 62$

$x = 31$

31 cases of Coke were sold.



**41.** $x$ = employees building boats

$x - 185$ = other employees

building + other = total employees

$x + x - 185 = 229$

Solve the equation.

$x + (x - 185) = 229$

$x + x - 185 = 229$

$2x - 185 = 229$

$2x = 414$

$x = 207$

207 employees work building the boats.

**42.** $x$ = number of women

$x - 11$ = number of men

women + men = total students

$x + x - 11 = 21$

Solve the equation.

$x + (x - 11) = 21$

$x + x - 11 = 21$

$2x - 11 = 21$

$2x = 32$

$x = 16$

There are 16 women.

**43.** $p$ = original price

$\frac{9}{10}p$ = sale price

Solve the equation.

$\$18,450 = \frac{9}{10}p$

$\frac{10}{9} \cdot \$18,450 = \frac{10}{9} \cdot \frac{9}{10}p$

$\$20,500 = p$

The original price was \$20,500.

**44.** $p$ = list price

$\frac{5}{4}p$ = price charged

Solve the equation.

$\$725 = \frac{5}{4}p$

$\frac{4}{5} \cdot \$725 = \frac{4}{5} \cdot \frac{5}{4}p$

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5 5 4
$
5
8
0
=
*p*

The list price was $580.

**45.** $x$ = number of deluxe models

$\frac{3}{2}x$ = number of economy models

deluxe + economy = total homes

$$x + \frac{3}{2}x = 105$$

Solve the equation.

$$x + \frac{3}{2}x = 105$$
$$\frac{5}{2}x = 105$$
$$\frac{2}{5}\cdot\frac{5}{2}x = \frac{2}{5}\cdot 105$$
$$x = 42$$
$$\frac{3}{2}x = \frac{3}{2}\cdot 42 = 63$$

There were 42 deluxe models.
There were 63 economy models.

**46.** $x$ = amount spend on radio advertising

$\frac{5}{4}x$ = amount spend on newspaper advertising

radio + newspaper = total advertising

$$x + \frac{5}{4}x = \$18,000$$

Solve the equation.

$$x + \frac{5}{4}x = \$18,000$$
$$\frac{9}{4}x = \$18,000$$
$$\frac{4}{9}\cdot\frac{9}{4}x = \frac{4}{9}\cdot\$18,000$$
$$x = \$8000$$
$$\frac{5}{4}x = \frac{5}{4}\cdot\$8000 = \$10,000$$

$8000 was spent on radio ads.
$10,000 was spent on newspaper ads.



**47.** $a$ = amount spent on all other employees

$\frac{4}{5}a$ = amount spent on announcers

other employees + announcers = total

$$a + \frac{4}{5}a = \$32,490$$

Solve the equation.

$$a + \frac{4}{5}a = \$32,490$$
$$\frac{9}{5}a = \$32,490$$
$$\frac{5}{9}\cdot\frac{9}{5}a = \frac{5}{9}\cdot\$32,490$$
$$a = \$18,050$$
$$\frac{4}{5}a = \frac{4}{5}\cdot\$18,050 = \$14,440$$

$14,440 was spent on announcers.
$18,050 was spent on all other employees.

**48.** $x$ = cars going east-west

$\frac{3}{4}x$ = cars going north-south

east-west + north-south = total

$$x + \frac{3}{4}x = 1400$$

Solve the equation.

$$x + \frac{3}{4}x = 1400$$
$$\frac{7}{4}x = 1400$$
$$\frac{4}{7}\cdot\frac{7}{4}x = \frac{4}{7}\cdot 1400$$
$$x = 800$$
$$\frac{3}{4}x = \frac{3}{4}\cdot 800 = 600$$

800 cars were going east-west.
600 cars were going north-south.

**49.** $r$ = rent from offices

$3\frac{1}{2}r$ = rent from retail stores

offices + retail stores = total annual rent

$$r + 3\frac{1}{2}r = \$135{,}000$$

Solve the equation.

$$r + 3\frac{1}{2}r = \$135{,}000$$

$$\frac{2}{2}r + \frac{7}{2}r = \$135{,}000$$

$$\frac{9}{2}r = \$135{,}000$$

$$\frac{2}{9}\cdot\frac{9}{2}r = \frac{2}{9}\cdot\$135{,}000$$

$$r = \$30{,}000$$

$$3\frac{1}{2}r = 3\frac{1}{2}\cdot\$30{,}000 = \$105{,}000$$

She expects rent of $30,000 from office space.

She expects rent of $105,000 from retail stores.

**50.** $x$ = length of one piece of wood

$x + 12$ = length of other piece of wood

piece 1 + piece 2 = total length

$$x + x + 12 = 106$$

Solve the equation.

$$x + (x + 12) = 106$$

$$x + x + 12 = 106$$

$$2x + 12 = 106$$

$$2x = 94$$

$$x = 47$$

$$x + 12 = 47 + 12 = 59$$

One piece of wood is 47 inches long.

The other piece of wood is 59 inches long.



**51.** $n$ = number of new employees

$22 - n$ = number of experienced employees

new wage + experienced wage = total wage

$$\$9.50n + \$12.90(22 - n) = \$273.60$$

Solve the equation.

$$\$9.50n + \$12.90(22 - n) = \$273.60$$

$$\$9.50n + \$283.80 - \$12.90n = \$273.60$$

$$-\$3.40n + \$283.80 = \$273.60$$

$$-\$3.40n = -\$10.20$$

$$n = 3$$

$$22 - n = 22 - 3 = 19$$

There are 3 new employees.

There are 19 experienced employees.

**52.** $n$ = number of heads of lettuce

$12{,}900 - n$ = number of bunches of carrots

profit/lettuce + profit/carrots = total profit

$$\$0.10n + \$0.08(12{,}900 - n) = \$1174$$

Solve the equation.

$$\$0.10n + \$0.08(12{,}900 - n) = \$1174$$

$$\$0.10n + \$1032 - \$0.08n = \$1174$$

$$\$0.02 + \$1032 = \$1174$$

$$\$0.02 = \$142$$

$$n = 7100$$

$$12{,}900 - n = 12{,}900 - 7100 = 5800$$

7100 heads of lettuce were sold.

5800 bunches of carrots were sold.

**53.** $n$ = number of Altimas
$120 - n$ = number of Sentras

Altimas profit + Sentras profit = total profit

$$\$1200n + \$850(120 - n) = \$130,350$$

Solve the equation.

$$\$1200n + \$850(120 - n) = \$130,350$$
$$\$1200n + \$102,000 - \$850n = \$130,350$$
$$\$350n + \$102,000 = \$130,350$$
$$\$350n = \$28,350$$
$$n = 81$$
$$120 - n = 120 - 81 = 39$$

81 Altimas were sold.
39 Sentras were sold.

**54.** $n$ = personal vehicle repairs (PVR)
$95 - n$ = commercial vehicle repairs (CVR)

PVR revenue + CVR revenue = total revenue

$$\$250n + \$180(95 - n) = \$20,040$$

Solve the equation.

$$\$250n + \$180(95 - n) = \$20,040$$
$$\$250n + \$17,100 - \$180n = \$20,040$$
$$\$70n + \$17,100 = \$20,040$$
$$\$70n = \$2940$$
$$n = 42$$
$$95 - n = 95 - 42 = 53$$

42 personal vehicles were repaired.
53 commercial vehicles were repaired.

**55.** Answers will vary.

**56.** Answers will vary.



## 2.3 Formulas

**1.** $I = PRT$; $P = \$4600, R = 0.085, T = 1\frac{1}{2}$

$I = \$4600 \cdot 0.085 \cdot 1.5$

$I = \$586.50$

**2.** $F = ma$; $m = 820$, $a = 12$
$I = 820 \cdot 12$
$I = 9840$

**3.** $P = B \cdot R$; $B = \$168,000$, $R = 0.06$
$P = \$168,000 \cdot 0.06$
$P = \$10,080$

**4.** $B = \frac{P}{R}$; $P = \$1200$, $R = 0.08$

$$R = \frac{\$1200}{0.08}$$

$R = \$15,000$

**5.** $s = c + m$; $c = \$14$, $m = \$2.50$
$s = \$14 + \$2.50$
$s = \$16.50$

**6.** $m = s - c$; $s = \$24,200, c = \$2800$
$m = \$24,200 - \$2800$
$m = \$21,400$

**7.** $P = 2L + 2W$; $P = 40, W = 6$
$40 = 2L + 2 \cdot 6$
$40 = 2L + 12$
$28 = 2L$
$14 = L$

**8.** $P = 2L + 2W$; $P = 340, L = 70$
$340 = 2 \cdot 70 + 2W$
$340 = 140 + 2W$
$200 = 2W$
$100 = W$

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**9.** $P = \frac{I}{RT}$; $T = 3, I = 540, R = 0.08$

$R = \frac{540}{0.08(3)}$

$R = \frac{540}{0.24}$

$R = 2250$

**10.** $M = P(1 + RT)$; $R = 0.15, T = 2$, $M = 481$

$481 = P(1 + 0.15 \cdot 2)$

$481 = P(1 + 0.3)$

$481 = P(1.3)$

$\frac{481}{1.3} = \frac{1.3P}{1.3}$

$370 = P$

**11.** $y = mx^2 + c$; $m = 3, x = 7$, $c = 4.2$

$y = 3(7)^2 + 4.2$

$y = 3(49) + 4.2$

$y = 147 + 4.2$

$y = 151.2$

**12.** $C = \$5 + \$0.10N$; $N = 38$

$C = \$5 + \$0.10 \cdot 38$

$C = \$5 + \$3.80$

$C = \$8.80$

**13.** $M = P(1 + i)^n$; $P = \$640, i = 0.02$, $n = 8$

$M = \$640(1 + 0.02)^8$

$M = \$640(1.02)^8$

$M \approx \$640(1.171659381)$

$M \approx \$749.86$

**14.** $M = P(1 + i)^n$; $P = \$2400$, $i = 0.05$, $n = 4$

**15.** $E = mc^2$; $m = 7.5$, $c = 1$

$E = 7.5(1)^2$

$E = 7.5(1)$

$E = 7.5$

**16.** $x = \frac{1}{2}at^2$; $t = 5, x = 150$

$150 = \frac{1}{2}a(5)^2$

$150 = \frac{1}{2}a(25)$

$150 = \frac{25}{2}a$

$12 = a$

**17.** $A = \frac{1}{2}(b + B)h$; $A = 105, b = 19, B = 11$

$105 = \frac{1}{2}(19 + 11)h$

$105 = \frac{1}{2}(30)h$

$105 = 15h$

$7 = h$

**18.** $A = \frac{1}{2}(b + B)h$; $A = 70, b = 15, B = 20$

$70 = \frac{1}{2}(15 + 20)h$

$70 = \frac{1}{2}(35)h$

$70 = \frac{35}{2}h$

$4 = h$

**19.** $P = \frac{S}{\quad}$; $S = 24,600, R = 0.06, T = \frac{5}{\quad}$

$\$2400 = P(1 + 0.05)^4$

$\$2400 = P(1.05)^4$

$$\left(1+\frac{R}{T}\right)^{12} P = \frac{24,600}{\left(1+\frac{0.06}{12}\right)^{12}}$$

$$\frac{\$2400}{(1.05)^4} = \frac{P(1.05)^4}{(1.05)^4}$$

$$P = \frac{24,600}{1+0.025}$$

$$\frac{\$2400}{(1.21550625)} \approx P$$

$$P = \frac{24,600}{1.025}$$

$$\$1974.49 \approx P$$

$$P = 24,000$$

**20.** $P = \dfrac{S}{1+RT}$; $S = 23{,}815, R = 0.09, T = \dfrac{11}{12}$

$$P = \frac{23{,}815}{1+0.09\left(\frac{11}{12}\right)}$$

$$P = \frac{23{,}815}{1+0.0825}$$

$$P = \frac{23{,}815}{1.0825}$$

$$P = 22{,}000$$

**21.** $A = LW$; for $L$

$$\frac{A}{W} = \frac{LW}{W} \qquad \textit{Divide by W.}$$

$$\frac{A}{W} = L$$

**22.** $d = rt$; for $t$

$$\frac{d}{r} = \frac{rt}{r} \qquad \textit{Divide by } r.$$

$$\frac{d}{r} = t$$

**23.** $PV = nRT$; for $V$

$$\frac{PV}{P} = \frac{nRT}{P} \qquad \textit{Divide by } P.$$

$$V = \frac{nRT}{P}$$

**24.** $I = PRT$; for $R$

$$\frac{I}{PT} = \frac{PRT}{PT} \qquad \textit{Divide by } PT.$$

$$\frac{I}{PT} = R$$

**25.** $M = P(1+i)^n$; for $P$

$$\frac{M}{(1+i)^n} = \frac{P(1+i)^n}{(1+i)^n} \qquad \textit{Divide by } (1+i)^n.$$



**26.** $R(1-DT) = D$; for $R$

$$\frac{R(1-DT)}{1-DT} = \frac{D}{1-DT} \qquad \textit{Divide by } (1-DT).$$

$$R = \frac{D}{1-DT}$$

**27.** $P = \dfrac{A}{1+i}$; for $i$.

$$P(1+i) = \frac{A}{1+i}(1+i) \qquad \textit{Multiply by } (1+i).$$

$$P(1+i) = A$$

$$P + Pi = A \qquad \textit{Distribute.}$$

$$Pi = A - P \qquad \textit{Subtract } P.$$

$$\frac{Pi}{P} = \frac{A-P}{P} \qquad \textit{Divide by } P.$$

$$i = \frac{A-P}{P}$$

**28.** $M = P(1+RT)$; for $R$

$$M = P + PRT \qquad \textit{Distribute.}$$

$$M - P = PRT \qquad \textit{Subtract } P.$$

$$\frac{M-P}{PT} = \frac{PRT}{PT} \qquad \textit{Divide by } PT.$$

$$\frac{M-P}{PT} = R$$

**29.** $P = M(1-DT)$; for $D$

$$P = M - MDT \qquad \textit{Distribute.}$$

$$P - M = -MDT \qquad \textit{Subtract } M.$$

$$\frac{P-M}{-MT} = \frac{-MDT}{-MT} \qquad \textit{Divide by } -MT.$$

$$\frac{M-P}{MT} = D$$

**30.** $P = \dfrac{M}{1+RT}$; for $R$

$$P(1+RT) = M \qquad \textit{Multiply by } 1+RT.$$

$$\frac{M}{(1+i)^n} = P$$



$$\begin{aligned} P + PRT &= M && \textit{Distribute.} \\ PRT &= M - P && \textit{Subtract } P. \\ \frac{PRT}{PT} &= \frac{M-P}{PT} && \textit{Divide by } PT. \\ R &= \frac{M-P}{PT} \end{aligned}$$

**31.** $A = \frac{1}{2}(b + B)h$; for $h$

$2 \cdot A = 2 \cdot \frac{1}{2}(b + B)h$ *Multiply by* 2.

$2A = (b + B)h$

$\frac{2A}{(b + B)} = \frac{(b + B)h}{(b + B)}$ *Divide by* $(b + B)$.

$\frac{2A}{(b + B)} = h$

**32.** $P = 2L + 2W$; for $L$

$P - 2W = 2L$ *Subtract* $2W$.

$\frac{P - 2W}{2} = L$ *Divide by* 2.

**33.** $x =$ the cost per stuffed animal

$1800x = 4320$

$\frac{1800x}{1800} = \frac{4320}{1800}$

$x = 2.4$

The cost per stuffed animal is \$2.40.

**34.** $x =$ the cost per Web page

$15x = 1305$

$\frac{15x}{15} = \frac{1305}{15}$

$x = 87$

The cost per Web page is \$87.

**35.** $x =$ the cost for a set of bongo drums

$6x + 7 \cdot 269 = 2445.80$

$6x + 1883 = 2445.80$

$6x = 562.80$

$x = 93.8$

The cost for a set of bongo drums is \$93.80.

**36.** $x =$ the cost of a refrigerator

$8x + 10 \cdot 462 = 10{,}860$

$8x + 4620 = 10{,}860$

$8x = 6240$

$x = 780$

The cost of a refrigerator is \$780.



**37.** Use the formula $S = 280 + 0.05x$, where $x$ is the employee's total sales for the week and $S$ is the salary.

**(a)** $x =$ \$2940

$S = 280 + 0.05(2940)$

$S = 280 + 147$

$S =$ \$427

**(b)** $x =$ \$4450

$S = 280 + 0.05(4450)$

$S = 280 + 222.50$

$S =$ \$502.50

**38.** $I = PRT$;

$P =$ \$3500, $R = 0.095$, $I =$ \$748.13

$\$748.13 = \$3500 \cdot 0.095 \cdot T$

$\$748.13 = \$332.50T$

$\frac{\$748.13}{\$332.50} = \frac{\$332.50T}{\$332.50}$

$2.25 \approx T$

The time is approximately 2.25 years.

**39.** $x =$ gross sales

$\frac{1}{40}x =$ returns

net sales = gross sales − returns

$230 = x - \frac{1}{40}x$

Solve the equation.

$230 = x - \frac{1}{40}x$

$230 = \frac{40}{40}x - \frac{1}{40}x$

$230 = \frac{39}{40}x$

$\frac{40}{39} \cdot 230 = \frac{40}{39} \cdot \frac{39}{40}x$

$236 \approx x$

Gross sales are approximately \$236 million.

**40.** $x$ = gross sales; $\frac{1}{12}x$ = returns

net sales = gross sales − returns

$$33{,}000 = x - \frac{1}{12}x$$

Solve the equation.

$$33{,}000 = x - \frac{1}{12}x$$

$$33{,}000 = \frac{12}{12}x - \frac{1}{12}x$$

$$33{,}000 = \frac{11}{12}x$$

$$\frac{12}{11}\cdot 33{,}000 = \frac{12}{11}\cdot\frac{11}{12}x$$

$$36{,}000 = x$$

Gross sales are $36,000.

**41.** $x$ = cost of chocolate-covered raisins

$\frac{3}{4}x$ = markup

selling price = cost + markup

$$5.95 = x + \frac{3}{4}x$$

Solve the equation.

$$5.95 = x + \frac{3}{4}x$$

$$5.95 = \frac{4}{4}x + \frac{3}{4}x$$

$$5.95 = \frac{7}{4}x$$

$$\frac{4}{7}\cdot 5.95 = \frac{4}{7}\cdot\frac{7}{4}x$$

$$3.40 = x$$

The cost is $3.40.

**42.** $x$ = cost of textbook; $\frac{1}{4}x$ = markup

selling price = cost + markup

$$160 = x + \frac{1}{4}x$$

Solve the equation.

$$160 = x + \frac{1}{4}x$$



**42. (continued)**

$$160 = \frac{5}{4}x$$

$$\frac{4}{5}\cdot 160 = \frac{4}{5}\cdot\frac{5}{4}x$$

$$128 = x$$

The cost to the bookstore is $128.

**43.** $x$ = revenue

$\frac{5}{6}x$ = expenses

profit = revenue − expenses

$$107{,}400 = x - \frac{5}{6}x$$

Solve the equation.

$$107{,}400 = x - \frac{5}{6}x$$

$$107{,}400 = \frac{6x}{6} - \frac{5}{6}x$$

$$107{,}400 = \frac{1}{6}x$$

$$6\cdot 107{,}400 = 6\cdot\frac{1}{6}x$$

$$644{,}400 = x$$

The total revenue was $644,400.

**44.** $x$ = revenue

$\frac{15}{16}x$ = expenses

profit = revenue − expenses

$$18{,}000 = x - \frac{15}{16}x$$

Solve the equation.

$$18{,}000 = x - \frac{15}{16}x$$

$$18{,}000 = \frac{16x}{16} - \frac{15}{16}x$$

$$18{,}000 = \frac{1}{16}x$$

$$160 = \frac{4}{1}x + \frac{1}{1}x$$

$$16 \cdot 18{,}000 = 16 \cdot \frac{1}{6} x$$

$$\frac{4}{4}$$

$$160 = \frac{5}{4} x$$



$$288{,}000 = x$$

The revenue was \$288,000.

**45.** $I = PRT$; $P = \$5200$, $R = 0.075$, $T = 1$

$$I = \$5200 \cdot 0.075 \cdot 1$$

$$I = \$390$$

The interest would be \$390.

**46.** $I = PRT$; $P = \$8000$, $T = 4$, $I = \$1920$

$$\$1920 = \$8000 \cdot R \cdot 4$$
$$\$1920 = \$32,000R$$
$$\frac{\$1920}{\$32,000} = \frac{\$32,000R}{\$32,000}$$
$$0.06 = R$$

The interest rate was 0.06 or 6%.

**47.** $I = PRT$; $P = \$22,000$, $T = 2$, $I = \$5720$

$$\$5720 = \$22,000 \cdot R \cdot 2$$
$$\$5720 = \$44,000R$$
$$\frac{\$5720}{\$44,000} = \frac{\$44,000R}{\$44,000}$$
$$0.13 = R$$

The rate of interest was 0.13, or 13%.

**48.** $I = PRT$;
$P = \$39,000$, $R = 0.07$, $I = \$13,650$

$$\$13,650 = \$39,000 \cdot 0.07 \cdot T$$
$$\$13,650 = \$2730T$$
$$\frac{\$13,650}{\$2730} = \frac{\$2730T}{\$2730}$$
$$5 = T$$

The time for the loan is 5 years.

**49.** $I = PRT$;
$P = \$5850$, $R = 0.03$, $I = \$702$

$$\$702 = \$5850 \cdot 0.03 \cdot T$$
$$\$702 = \$175.50T$$
$$\frac{\$702}{\$175.50} = \frac{\$175.50T}{\$175.50}$$
$$4 = T$$

The time for the loan is 4 years.

**50.**
$M = P(1 + RT)$;
$P = \$1000$, $R = 0.04$, $T = 5$
$M = \$1000(1 + 0.04 \cdot 5)$
$M = \$1000(1 + 0.2)$
$M = \$1000(1.2)$
$M = \$1200$

Mary had \$1200 in her account.



**51.** $M = P(1 + RT)$;

$M = \$4560$, $R = 0.07$, $T = 2$
$\$4560 = P(1 + 0.07 \cdot 2)$
$\$4560 = P(1 + 0.14)$
$\$4560 = P(1.14)$
$\frac{\$4560}{1.14} = \frac{1.14P}{1.14}$
$\$4000 = P$

John initially deposited \$4000.

**52.** $M = P(1 + RT)$;
$M = \$14,750$, $P = \$12,500$, $T = 2$
$\$14,750 = \$12,500(1 + R \cdot 2)$
$\$14,750 = \$12,500(1 + 2R)$
$\$14,750 = \$12,500 + 25,000R$
$\$2250 = 25,000R$
$\frac{\$2250}{25,000} = \frac{25,000R}{25,000}$

$0.09 = R$

The interest rate was 9%.

**53.** $M = P(1 + i)^n$;
$M = \$5668.20$, $i = 0.08$, $n = 3$
$\$5668.20 = P(1 + 0.08)^3$
$\$5668.20 = P(1.08)^3$
$\$5668.20 = P(1.259712)$
$\frac{\$5668.20}{1.259712} = \frac{1.259712P}{1.259712}$
$\$4499.60 = P$
$\$4500 \approx P$

The amount borrowed was \$4500.

**54.** $M = P(1 + i)^n$;
$P = \$8500$, $i = 0.035$, $n = 20$
$M = \$8500(1 + 0.035)^{20}$
$M = \$8500(1.035)^{20}$
$M \approx \$8500(1.98978886)$
$M \approx \$16,913.21$

The maturity value is \$16,913.21.

**55.** Answers will vary.

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**56.** Answers will vary.

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## 2.4 Ratios and Proportions

**1**. 18 kilometers to 64 kilometers

$$\frac{18}{64} = \frac{9}{32}$$

**2**. 18 defects out of 580 items

$$\frac{18}{580} = \frac{9}{290}$$

**3.** 216 students to 8 faculty

$$\frac{216}{8} = \frac{27}{1}$$

**4**. \$80 in returns to \$8360 in sales

$$\frac{80}{8360} = \frac{2}{209}$$

**5.** 8 men to 6 women

$$\frac{8}{6} = \frac{4}{3}$$

**6.** 12 feet to 1 inch

12 feet = 144 inches

$$\frac{144}{1}$$

**7.** 30 kilometers (30,000 meters) to 8 meters

$$\frac{30{,}000}{8} = \frac{3750}{1}$$

**8.** 30 inches to 5 yards

5 yards = 180 inches

$$\frac{30}{180} = \frac{1}{6}$$

**9.** 90 dollars to 40 cents

90 dollars = 9000 cents

$$\frac{9000}{40} = \frac{225}{1}$$

**10.** 148 minutes to 4 hours

4 hours = 240 minutes

$$\frac{148}{240} = \frac{37}{60}$$

**11.** 4 dollars to 10 quarters

4 dollars = 16 quarters

$$\frac{16}{10} = \frac{8}{5}$$

**12.** 35 dimes to 6 dollars

6 dollars = 60 dimes

$$\frac{35}{60} = \frac{7}{12}$$

**13.** 20 hours to 5 days

5 days = 120 hours

$$\frac{20}{120} = \frac{1}{6}$$

**14.** 6 days to 9 hours

6 days = 144 hours

$$\frac{144}{9} = \frac{16}{1}$$

**15.** \$0.80 to \$3

$$\frac{0.8}{3} = \frac{8}{30} = \frac{4}{15}$$

**16.** \$1.20 to \$0.75

$$\frac{1.20}{0.75} = \frac{120}{75} = \frac{8}{5}$$

**17.** \$3.24 to \$0.72

$$\frac{3.24}{0.72} = \frac{324}{72} = \frac{9}{2}$$

**18.** \$3.57 to \$0.42

$$\frac{3.57}{0.42} = \frac{357}{42} = \frac{17}{2}$$

**19.**
$$\frac{3}{5} = \frac{21}{35}$$
$$3 \cdot 35 = 5 \cdot 21$$
$$105 = 105$$

The proportion is true.

**20.**
$$\frac{6}{13} = \frac{30}{65}$$
$$6 \cdot 65 = 13 \cdot 30$$
$$390 = 390$$

The proportion is true.

**21.**
$$\frac{9}{7} = \frac{720}{480}$$
$$9 \cdot 480 = 7 \cdot 720$$
$$4320 \neq 5040$$

The proportion is false.

**22.** $\frac{54}{14} = \frac{270}{70}$

$54 \cdot 70 = 14 \cdot 270$

$3780 = 3780$

The proportion is true.

**23.** $\frac{69}{320} = \frac{7}{102}$

$69 \cdot 102 = 320 \cdot 7$

$7038 \neq 2240$

The proportion is false.

**24.** $\frac{17}{19} = \frac{72}{84}$

$17 \cdot 84 = 19 \cdot 72$

$1428 \neq 1368$

The proportion is false.

**25.** $\frac{19}{32} = \frac{33}{77}$

$19 \cdot 77 = 32 \cdot 33$

$1463 \neq 1056$

The proportion is false.

**26.** $\frac{19}{30} = \frac{57}{90}$

$19 \cdot 90 = 30 \cdot 57$

$1710 = 1710$

The proportion is true.

**27.** $\frac{110}{18} = \frac{160}{27}$

$110 \cdot 27 = 18 \cdot 160$

$2970 \neq 2880$

The proportion is false.

**28.** $\frac{46}{17} = \frac{212}{95}$

$46 \cdot 95 = 17 \cdot 212$

$4370 \neq 3604$

The proportion is false.

**29.** $\frac{32}{75} = \frac{61}{108}$

$32 \cdot 108 = 75 \cdot 61$



**30.** $\frac{28}{75} = \frac{224}{600}$

$28 \cdot 600 = 75 \cdot 224$

$16{,}800 = 16{,}800$

The proportion is true.

**31.** $\frac{7.6}{10} = \frac{76}{100}$

$7.6 \cdot 100 = 10 \cdot 76$

$760 = 760$

The proportion is true.

**32.** $\frac{95}{64} = \frac{320}{217}$

$95 \cdot 217 = 64 \cdot 320$

$20{,}615 \neq 20{,}480$

The proportion is false.

**33.** $\frac{2\frac{1}{4}}{5} = \frac{9}{20}$

$2\frac{1}{4} \cdot 20 = 5 \cdot 9$

$45 = 45$

The proportion is true.

**34.** $\frac{\frac{3}{4}}{80} = \frac{9}{120}$

$\frac{3}{4} \cdot 120 = 80 \cdot \frac{9}{8}$

$90 = 90$

The proportion is true.

$\frac{1}{4}$

$\frac{5}{27}$

The proportion is false.

3

4

5

6

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h

**35.**



.2=1 165.375

6 The proportion is false.

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8

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41

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6.

12

5·

27

1

7

2

$1\frac{1}{12} \quad 5\frac{1}{42}$

**36.** $\frac{2}{12} = \frac{4}{42}$

$1\frac{1}{12} \cdot 42 = 12 \cdot 5\frac{1}{42}$

$1.5 \cdot 42 = 12 \cdot 5.25$

$63 = 63$

The proportion is true.

**37.** $\frac{8.15}{2.03} = \frac{61.125}{15.225}$

$8.15 \cdot 15.225 = 2.03 \cdot 61.125$

$124.08375 = 124.08375$

The proportion is true.

**38.** $\frac{423.88}{17.119} = \frac{330.6264}{13.35282}$

$423.88 \cdot 13.35282 = 17.119 \cdot 330.6264$

$5659.993342 = 5659.993342$

The proportion is true.

**39.** $\frac{x}{15} = \frac{49}{105}$

$x \cdot 105 = 15 \cdot 49$

$105x = 735$

$\frac{105x}{105} = \frac{735}{105}$

$x = 7$

**40.** $\frac{y}{35} = \frac{27}{315}$

$y \cdot 315 = 35 \cdot 27$

$315y = 945$

$\frac{315y}{315} = \frac{945}{315}$

$y = 3$

**41.** $\frac{6}{9} = \frac{r}{108}$

$6 \cdot 108 = 9 \cdot r$

**42.** $\frac{16}{41} = \frac{112}{t}$

$16 \cdot t = 41 \cdot 112$

$16t = 4592$

$\frac{16t}{16} = \frac{4592}{16}$

$t = 287$

**43.** $\frac{63}{s} = \frac{3}{5}$

$63 \cdot 5 = s \cdot 3$

$315 = 3s$

$\frac{315}{3} = \frac{3s}{3}$

$105 = s$

**44.** $\frac{260}{390} = \frac{x}{3}$

$260 \cdot 3 = 390 \cdot x$

$780 = 390x$

$\frac{780}{390} = \frac{390x}{390}$

$2 = x$

**45.** $\frac{1}{2} = \frac{r}{7}$

$1 \cdot 7 = 2 \cdot r$

$7 = 2r$

$\frac{7}{2} = \frac{2r}{2}$

$3\frac{1}{2} = r$

**46.** $\frac{2}{3} = \frac{5}{s}$

$2 \cdot s = 3 \cdot 5$

$2s = 15$

$\frac{2s}{2} = \frac{15}{2}$

$s = 7\frac{1}{2}$

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$$648 = 9r$$
$$\frac{648}{9} = \frac{9r}{9}$$
$$72 = r$$

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**47.** $\frac{\frac{3}{4}}{3} = \frac{6}{x}$

$3 \cdot x = 6 \cdot 3$

$\frac{3}{4}x = 18$

$\frac{4}{3} \cdot \frac{3}{4}x = \frac{4}{3} \cdot 18$

$x = 24$

**48.** $\frac{3}{x} = \frac{11}{9}$

$3 \cdot 9 = x \cdot 11$

$27 = 11x$

$\frac{27}{11} = \frac{11x}{11}$

$\frac{27}{11} = x$

$2\frac{5}{11} = x$

**49.** $\frac{12}{p} = \frac{23.571}{15.714}$

$12 \cdot 15.714 = p \cdot 23.571$

$188.568 = 23.571p$

$\frac{188.568}{23.571} = \frac{23.571p}{23.571}$

$8 = p$

**50.** $\frac{86.112}{57.408} = \frac{k}{15}$

$86.112 \cdot 15 = 57.408 \cdot k$

$1291.68 = 57.408k$

$\frac{1291.68}{57.408} = \frac{57.408k}{57.408}$

$22.5 = k$

**51.** Answers will vary.

**52.** Answers will vary.

**53.** $x$ = number of tickets it can expect to sell in 9 days
Set up and solve a proportion.

$\frac{2}{9} = \frac{350}{x}$

**54.** $x$ = number of blood cells in a 140-pound person

Set up and solve a proportion.

$\frac{170}{1} = \frac{30}{140}$

$170 \cdot x = 140 \cdot 30$

$170x = 4200$

$x \approx 24.7$

There are approximately 24.7 trillion blood cells in a 140-pound person.

**55.** $x$ = cost for a 12-unit apartment house

Set up and solve a proportion.

$\frac{5}{12} = \frac{215,000}{x}$

$5 \cdot x = 12 \cdot 215,000$

$5x = 2,580,000$

$x = 516,000$

The cost for a 12-unit apartment house is $516,000.

**56.** $x$ = number of pounds of meat that a 360-pound tiger eats per day
Set up and solve a proportion.

$\frac{450}{360} = \frac{15}{x}$

$450 \cdot x = 360 \cdot 15$

$450x = 5400$

$x = 12$

You would expect a 360-pound tiger to eat 12 pounds of meat per day.

**57.** $x$ = cost of 12 dresses
Set up and solve a proportion.

$\frac{22}{12} = \frac{660}{x}$

$22 \cdot x = 12 \cdot 660$

$22x = 7920$

$x = 360$

The cost of 12 dresses is $360.

**58.** $x$ = amount of flour needed to make biscuits for 125 people
Set up and solve a proportion.

$\frac{7}{2} = \frac{125}{x}$

$7 \cdot x = 2 \cdot 125$

$2 \cdot x = 9 \cdot 350$

$2x = 3150$

$x = 1575$

It can expect to sell 1575 tickets in 9 days.



$7x = 250$

$x \approx 36$

Approximately 36 cups of flour are needed for biscuits to feed a church group of 125.

**59.** $x$ = number of red sports models produced
Set up and solve a proportion.

$$\frac{3}{7} = \frac{x}{868}$$
$$3 \cdot 868 = 7 \cdot x$$
$$2604 = 7x$$
$$372 = x$$

There are 372 red sports models produced.

**60.** $x$ = number of sacks needed to cover 7125 square feet
Set up and solve a proportion.

$$\frac{3325}{7125} = \frac{7}{x}$$
$$3325 \cdot x = 7125 \cdot 7$$
$$3325x = 49{,}875$$
$$x = 15$$

15 sacks are needed for 7125 square feet.

**61.** $x$ = distance between the two other cities
Set up and solve a proportion.

$$\frac{2}{17} = \frac{120}{x}$$
$$2 \cdot x = 17 \cdot 120$$
$$2x = 2040$$
$$x = 1020$$

The cities are 1020 miles apart.

**62.** $x$ = sales for the first 4 weeks
Set up and solve a proportion.

$$\frac{3}{4} = \frac{3720}{x}$$
$$3 \cdot x = 4 \cdot 3720$$
$$3x = 14{,}880$$
$$x = 4960$$

Sales for the first 4 weeks were $4960.

**63.** $x$ = sales for the entire 52-week year
Set up and solve a proportion.

$$\frac{20}{52} = \frac{\$274{,}312}{x}$$
$$20 \cdot x = 52 \cdot \$274{,}312$$
$$20x = \$14{,}264{,}224$$
$$x = \$713{,}211.20$$

Sales for the entire year are $713,211.20.

**64.** $x$ = amount that goes to Chester
Set up and solve a proportion.

$$\frac{2}{5} = \frac{x}{45{,}000}$$
$$2 \cdot 45{,}000 = 5 \cdot x$$
$$90{,}000 = 5x$$
$$18{,}000 = x$$

$18,000 goes to Chester.

**65.** $x$ = profits for the second partner
Set up and solve a proportion.

$$\frac{3}{8} = \frac{48{,}000}{x}$$
$$3 \cdot x = 8 \cdot 48{,}000$$
$$3x = 384{,}000$$
$$x = 128{,}000$$

The profit earned by the second partner is $128,000.

**66.** $x$ = number of production employees
Set up and solve a proportion.

$$\frac{2}{7} = \frac{24}{x}$$
$$2 \cdot x = 7 \cdot 24$$
$$2x = 168$$
$$x = 84$$

There are 84 production employees.

**67.** $x$ = distance eider ducks migrate in the amount of time it takes songbirds to migrate 200 miles

Set up and solve a proportion.

$$\frac{20}{35} = \frac{200}{x}$$
$$20 \cdot x = 35 \cdot 200$$
$$20x = 7000$$
$$x = 350$$

Eider ducks migrate 350 miles in the same amount of time it would take songbirds to migrate 200 miles.

**68.** $x$ = number of islands
Set up and solve a proportion.

$$\frac{741{,}101}{3{,}618{,}770} = \frac{13{,}677}{x}$$
$$741{,}101 \cdot x = 3{,}618{,}770 \cdot 13{,}677$$
$$741{,}101x = 49{,}493{,}917{,}290$$
$$x \approx 66{,}784$$

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There would be about 66,784 islands.

**69.** $x$ = amount of an iceberg that is underwater
Set up and solve a proportion.

$$\frac{1}{8} = \frac{500,000}{x}$$

$$\frac{1}{8} \cdot x = \frac{7}{8} \cdot 500,000$$
$$\frac{1}{8}x = 437,500$$
$$8 \cdot \frac{1}{8}x = 8 \cdot 437,500$$
$$x = 3,500,000$$

3,500,000 cubic meters of the iceberg is underwater.

**70.** $x$ = increase in global average temperature
Set up and solve a proportion.

$$\frac{380 - 315}{1} = \frac{550 - 380}{x}$$
$$\frac{65}{1} = \frac{170}{x}$$
$$65 \cdot x = 1 \cdot 170$$
$$65x = 170$$
$$x \approx 2.6$$

There is a further increase of $2.6^\circ$ Fahrenheit.

**71.** $x$ = number of U.S. dollars he will receive
Set up and solve a proportion.

$$\frac{80}{20,355} = \frac{1}{x}$$

$$80 \cdot x = 20,355 \cdot 1$$
$$80x = 20,355$$
$$x \approx 254.44$$

Benjamin will receive U.S. $254.44.

**72.** $x$ = salary in U.S. dollars

Set up and solve a proportion.

$$\frac{7.25}{471,200} = \frac{1}{x}$$

$$7.25 \cdot x = 471,200 \cdot 1$$
$$7.25x = 471,200$$



## 2.5 Exponents and the Order of Operations

**1.** $p \cdot p = p^2$

**2.** $3 \cdot 3 = 3^2$

**3.** $r \cdot r \cdot r = r^3$

**4.** $7 \cdot 7 \cdot 7 = 7^3$

**5.** $x \cdot x \cdot x \cdot x = x^4$

**6.** $5 \cdot 5 \cdot 5 = 5^3$

**7.** $7^2 = 7 \cdot 7 = 49$

**8.** $(0.75)^2 = 0.75 \cdot 0.75 = 0.5625$

**9.** $X^0 = 7^0 = 1$

**10.** $5^1 = 5$

**11.** $19^0 = 1$

**12.** $12^3 = 12 \cdot 12 \cdot 12 = 1728$

**13.** $(t \cdot g)^4 = t^4 g^4$

**14.** $\left(S^3\right)^2 = S^{3 \cdot 2} = S^6$

**15.** $9^2 \cdot 9^2 = 9^{(2+2)} = 9^4$

**16.** $\frac{6^5}{6^3} = 6^{(5-3)} = 6^2$

**17.** $\left(\frac{3}{4}\right)^2 = \frac{3^2}{4^2}$

$x \approx 64.3$ 993.10

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**18**.

The salary is $64,993.10 U.S.

$\frac{7^m}{7^n} = 7^{(m-n)}$

**19**. $(x \cdot y)^2 = x^2 y^2$

**20**. $\left(\frac{Y}{R}\right)^3 = \frac{Y^3}{R^3}$

**21.** $17-3\cdot 4=17-12$
$=5$

**22.** $9\cdot 8-7=72-7$
$=65$

**23.** $5\cdot 4^2+3=5\cdot 16+3$
$=80+3$
$=83$

**24.** $(9.1-1)\cdot 13=8.1\cdot 13$
$=105.3$

**25.** $191-5^3=191-125$
$=66$

**26.** $(14-7)^2-3\cdot 8=(7)^2-3\cdot 8$
$=49-3\cdot 8$
$=49-24$
$=25$

**27.** $\left(\frac{2}{2^3}\right)^5\cdot 5=2^2\cdot 5$
$=4\cdot 5$
$=20$

**28.** $1-\left(\frac{3}{4}\right)^2=1-(0.75)^2$
$=1-0.5625$
$=0.4375$

**29.** $\left(\frac{12}{12^3}\right)^3\cdot 75^2=1\cdot 75^2$
$=5625$

**30.** $17.2^3+\left(5-2^2\right)=17.2^3+(5-4)$
$=17.2^3+1$
$=5088.448+1$
$=5089.448$



**32.** $\left(4^1+2^3\div 2\right)^1=(4+8\div 2)^1$
$=(4+4)^1$
$=(8)^1$
$=8$

**33.** $x^2-4\cdot 2=13^2-4\cdot 2$
$=169-4\cdot 2$
$=169-8$
$=161$

**34.** $(9-y)^2+5y=(9-3)^2+5\cdot 3$
$=(6)^2+5\cdot 3$
$=36+5\cdot 3$
$=36+15$
$=51$

**35.** $7r\div 3^2=7\cdot 27\div 3^2$
$=189\div 3^2$
$=189\div 9$
$=21$

**36.** $\left(\frac{s}{t}\right)^4\left(\frac{42}{t}\right)^4$
$\left(\frac{x}{t}\right)^{-}=\left(\frac{6}{t}\right)^{-}$
$=7-4$
$=3$

**37.** $\left(y^2-7.8\right)\cdot 3t=\left(10^2-7.8\right)\cdot 3(2)$
$=(100-7.8)\cdot 3(2)$
$=(92.2)\cdot 3(2)$
$=92.2\cdot 6$
$=553.2$

**38.** $\left(\frac{12}{r}\right)^2\left(\frac{12}{9}\right)^2$
$\left(\frac{\quad}{r}\right)^{\cdot}=\left(\frac{\quad}{9}\right)^{\cdot}$

**31.** $(16-2-7)^0=(7)^0$
$=1$

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$$
\begin{aligned}
x \phi \quad & \text{€ } 3 \phi \\
&= (4)^2 \cdot 9^2 \\
&= 16 \cdot 81 \\
&= 1296
\end{aligned}
$$

**39.** $(S-7)^n \cdot 9.2 - 1 = (13-7)^1 \cdot 9.2 - 1$

$= (6)^1 \cdot 9.2 - 1$

$= 6 \cdot 9.2 - 1$

$= 55.2 - 1$

$= 54.2$

**40.** $\frac{Gr^2}{2} \cdot 7 - 2^2 = \frac{21 \cdot 6^2}{2} \cdot 7 - 2^2$

$= \frac{21 \cdot 36}{2} \cdot 7 - 2^2$

$= \frac{756}{2} \cdot 7 - 2^2$

$= 378 \cdot 7 - 2^2$

$= 378 \cdot 7 - 4$

$= 2646 - 4$

$= 2642$

**41.**

$C = 0.17N^2 + 12N + 18,900$

$= 0.17(420)^2 + 12(420) + 18,900$

$= 0.17(176,400) + 12(420) + 18,900$

$= 29,988 + 5040 + 18,900$

$= 53,928$

The daily cost is \$53,928.

**42.** $P = 0.027N^2 + 4.50N - 62,700$

$= 0.027(1860)^2 + 4.50(1860) - 62,700$

$= 0.027(3,459,600) + 4.50(1860) - 62,700$

$= 93,409.20 + 8370 - 62,700$

$= 39,079.20$

The daily profit is \$39,079.20.

**43.** $M = P(1+i)^t$

$= \$4800(1+0.05)^4$

$= \$4800(1.05)^4$

$= \$5834.43$

The future value is \$5834.43.



## Chapter 2 Review Exercises

**1.** $x + 45 = 96$

$x + 45 - 45 = 96 - 45$ *Subtract* 45.

$x = 51$

**2.** $r - 36 = 14.7$ *Add* 36.

$r - 36 + 36 = 14.7 + 36$

$r = 50.7$

**3.** $8t + 45 = 175.4$

$8t + 45 - 45 = 175.4 - 45$ *Subtract* 45.

$8t = 130.4$

$\frac{8t}{8} = \frac{130.4}{8}$ *Divide by* 8.

$t = 16.3$

**4.** $4t - 6 = 15$

$4t - 6 + 6 = 15 + 6$ *Add* 6.

$4t = 21$

$\frac{4t}{4} = \frac{21}{4}$ *Divide by* 4.

$t = 5\frac{1}{4}$

**5.** $\frac{s}{6} = 42$

$\frac{s}{6} \cdot 6 = 42 \cdot 6$ *Multiply by* 6.

$s = 252$

**6.** $\frac{5z}{8} = 85$

$\frac{8}{5} \cdot \frac{5z}{8} = \frac{8}{5} \cdot 85$ *Multiply by* $\frac{8}{5}$.

$s = 136$

**7.** $\frac{m}{4} - 5 = 9$

**44.** $M = P(1+i)^t$

$= \$15{,}000(1+0.07)^{40}$

$= \$15{,}000(1.07)^{40}$

$= \$224{,}616.87$

The future value is \$224,616.87 (rounded).



$\frac{m}{4} - 5 + 5 = 9 + 5$ *Add* 5.

$\frac{m}{4} = 14$

$4 \cdot \frac{m}{4} = 14 \cdot 4$ *Multiply by* 4.

$m = 56$

**8.** $5(x-3)=3(x+4)$

$5x-15=3x+12$ *Distribute.*

$5x-15+15=3x+12+15$ *Add* 15.

$5x=3x+27$

$5x-3x=3x-3x+27$ *Subtract* $3x$.

$2x=27$

$\frac{2x}{2}=\frac{27}{2}$ *Divide by* 2.

$x=\frac{27}{2}=13\frac{1}{2}$

**9.** $6y=2y+28$

$6y-2y=2y-2y+28$ *Subtract* $2y$.

$4y=28$

$\frac{4y}{4}=\frac{28}{4}$ *Divide by* 4.

$y=7$

**10.** $3r-7=2(4-3r)$

$3r-7=8-6r$ *Distribute.*

$3r-7+7=8+7-6r$ *Add* 7.

$3r=15-6r$

$3r+6r=15-6r+6r$ *Add* $6r$.

$9r=15$

$\frac{9r}{9}=\frac{15}{9}$ *Divide by* 9.

$x=\frac{15}{9}=1\frac{6}{9}=1\frac{2}{3}$

**11.** $0.15(2x-3)=5.85$

$0.3x-0.45=5.85$ *Distribute.*

$0.3x-0.45+0.45=5.85+0.45$ *Add* 0.45.

$0.3x=6.3$

$\frac{0.3x}{0.3}=\frac{6.3}{0.3}$ *Divide by* 0.3.

$x=21$



**12.** $0.6(y-3)=0.1y$

$0.6y-1.8=0.1y$ *Distribute.*

$0.6y-0.6y-1.8=0.1y-0.6y$ *Subtract* $0.6y$.

$-1.8=-0.5y$

$\frac{-1.8}{-0.5}=\frac{-0.5y}{-0.5}$ *Divide by* $-0.5$.

$3.6=y$

**13.** Ninety-four times a number

$94x$

**14.** One half times a number $\frac{1}{2}x$

**15.** Six times a number is added to the number

$6x+x$

**16.** Five times a number is decreased by 11

$5x-11$

**17.** The sum of 3 times a number and 7

$3x+7$

**18.** $(3\cdot\$14.95)+\$95=\$139.85$

Molly purchases will cost \$139.85.

$\$139.85-\$47.50=\$92.35$

The additional amount she needs is \$92.35.

**19.** $P=18.5A+4.5$

$60=18.5A+4.5$

$55.5=18.5A$

$3=A$

She must spend \$3000 on advertising.

**20.** $a=$ amount of water bill

$4a=$ amount of phone bill

water bill + phone bill = total

$a+4a=540$

Solve the equation.

$a+4a=540$

$5a=540$

$a=108$

$4a=432$

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The water bill is $108.
The phone bill is $432.

**21.** $n$ = number of employees

5 more than $\frac{1}{4}$ employees = 24

$$5 + \frac{1}{4}n = 24$$

Solve the equation.

$$5 + \frac{1}{4}n = 24$$
$$\frac{1}{4}n = 19$$
$$4 \cdot \frac{1}{4}n = 4 \cdot 19$$
$$n = 76$$

The company has 76 employees.

**22.** $n$ = number of children's tickets

$100 - n$ = number of adult tickets

children's + adult = total sales

$$\$6n + \$12(100 - n) = \$780$$

Solve the equation.

$$\$6n + \$12(100 - n) = \$780$$
$$\$6n + \$1200 - \$12n = \$780$$
$$-\$6n + \$1200 = \$780$$
$$-\$6n = -\$420$$
$$n = 70$$

$$100 - n = 100 - 70 = 30$$

There were 70 child tickets sold.
There were 30 adult tickets sold.

**23.** $I = PRT$; $I = \$960$, $R = 0.12$, $T = 2$

$$\$960 = P \cdot 0.12 \cdot 2$$
$$\$960 = 0.24P$$
$$\frac{\$960}{0.24} = \frac{0.24P}{0.24}$$
$$\$4000 = P$$

**24.** $M = P(1 + RT)$;

$M = \$3770$, $R = 0.04$, $T = 4$

$$\$3770 = P(1 + 0.04 \cdot 4)$$
$$\$3770 = P(1 + 0.16)$$
$$\$3770 = P(1.16)$$
$$\frac{\$3770}{1.16} = \frac{1.16P}{1.16}$$
$$\$3250 = P$$



**25.** $M = P(1 + i)^n$;

$M = \$14,526.80$, $i = 0.1$, $n = 6$

$$\$14,526.80 = P(1 + 0.1)^6$$
$$\$14,526.80 = P(1.1)^6$$
$$\$14,526.80 = P(1.771561)$$
$$\frac{\$14,526.80}{1.771561} = \frac{1.771561P}{1.771561}$$
$$\$8200 \approx P$$

**26.** $I = PRT$; for $R$

$$\frac{I}{PT} = \frac{PRT}{PT} \quad \textit{Divide by } PT.$$
$$\frac{I}{PT} = R$$

**27.** $M = P(1 + RT)$; for T

$$M = P + PRT \quad \textit{Distribute.}$$
$$M - P = PRT \quad \textit{Subtract } P.$$
$$\frac{M - P}{PR} = \frac{PRT}{PR} \quad \textit{Divide by } PR.$$
$$\frac{M - P}{PR} = T$$

**28.** $B = PR$; for $P$

$$\frac{B}{R} = \frac{PR}{R} \quad \textit{Divide by } PR.$$
$$\frac{B}{R} = P$$

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**29.** $17 to 50 cents

$17 = 1700 cents

$$\frac{1700}{50} = \frac{34}{1}$$

**30.** 9 days to 12 hours

9 days = 216 hours

$$\frac{216}{12} = \frac{18}{1}$$

**31.** $5000 to $250

$$\frac{5000}{250} = \frac{20}{1}$$

**32.** 3 years to 15 months

3 years = 36 months

$$\frac{36}{15} = \frac{12}{5}$$

**33.** \$2 to 75 cents
\$2 = 200 cents

$$\frac{200}{75} = \frac{8}{3}$$

**34.**

$$\frac{v}{14} = \frac{27}{126}$$
$$v \cdot 126 = 14 \cdot 27$$
$$126v = 378$$
$$\frac{126v}{126} = \frac{378}{126}$$
$$v = 3$$

**35.**

$$\frac{5}{y} = \frac{20}{27}$$
$$5 \cdot 27 = y \cdot 20$$
$$135 = 20y$$
$$\frac{135}{20} = \frac{20y}{20}$$
$$6\frac{3}{4} = y$$

**36.**

$$\frac{3}{8} = \frac{z}{12}$$
$$3 \cdot 12 = 8 \cdot z$$
$$36 = 8z$$
$$\frac{36}{8} = \frac{8z}{8}$$
$$4\frac{1}{2} = z$$

**37.**

$$\frac{6}{11} = \frac{90}{t}$$
$$6 \cdot t = 11 \cdot 90$$
$$6t = 990$$
$$\frac{6t}{6} = \frac{990}{6}$$
$$t = 165$$

**38.**

$$\frac{20}{r} = \frac{60}{72}$$
$$20 \cdot 72 = r \cdot 60$$
$$1440 = 60r$$
$$\frac{1440}{60} = \frac{60r}{60}$$
$$24 = r$$



**39.** $x$ = number of bass with parasites
Set up and solve a proportion.

$$\frac{14}{60} = \frac{x}{18,400}$$
$$14 \cdot 18,400 = 60 \cdot x$$
$$257,600 = 60x$$
$$4293 \approx x$$

Approximately 4293 bass have parasites.

**40.** $x$ = pressure at the 9850-foot depth
Set up and solve a proportion.

$$\frac{3220}{x} = \frac{6700}{9850}$$
$$3220 \cdot 9850 = x \cdot 6700$$
$$31,717,000 = 6700x$$
$$4734 \approx x$$

There is approximately 4734 lb per square inch of pressure at the 9850-foot depth.

**41.** $x$ = total amount of beef needed
Set up and solve a proportion.

$$\frac{5760}{x} = \frac{120}{138}$$
$$5760 \cdot 138 = x \cdot 120$$
$$794,880 = 120x$$
$$6624 = x$$

6624 pounds of beef are needed for 138 inhabitants.

**42.** $x$ = number of pages proofread in 3 hours
3 hours = 180 minutes
Set up and solve a proportion.

$$\frac{7}{12} = \frac{x}{180}$$
$$7 \cdot 180 = 12 \cdot x$$
$$1260 = 12x$$
$$105 = x$$

John proofreads 105 pages in 3 hours.

**43.** $x$ = new quarterly pension required
$83 + 21 = 104$ total employees

Set up and solve a proportion.

$$\frac{89,391}{x} = \frac{83}{104}$$
$$89,391 \cdot 104 = x \cdot 83$$
$$9,296,664 = 83x$$
$$112,008 = x$$

The new quarterly pension contribution required is \$112,008.

**44.** $x$ = cost of five shirts
Set up and solve a proportion.

$$\frac{8}{5} = \frac{\$223.20}{x}$$

$$8 \cdot x = 5 \cdot \$223.20$$
$$8x = \$1116$$
$$x = \$139.50$$

Five shirts would cost \$139.50.

**45.** $y \cdot y \cdot y = y^3$

**46.** $5 \cdot 5 = 5^2$

**47.** $9 \cdot 9 \cdot 9 \cdot 9 = 9^4$

**48.** $3.1 \cdot 3.1 = 3.1^2$

**49.** $\left(\frac{1}{2}\right)^3 = \frac{1^3}{2^3} = \frac{1}{8}$

**50.** $s^0 = 4^0 = 1$

**51.** $102^2 = 102$

**52.** $0^0$ is undefined

**53.** $7^2 \cdot 7^3 = 7^{(2+3)} = 7^5$

**54.** $\left(r^3\right)^2 = r^{3 \cdot 2} = r^6$

**55.** $(s \cdot t)^4 = s^4 t^4$

**56.** $\left(\frac{z}{y}\right)^2 = \frac{z^2}{y^2}$

**57.** $75 - 4^2 \cdot 2 = 75 - 16 \cdot 2$
$= 75 - 32$
$= 43$

**58.** $\left(1 + 2^3\right)^2 \div 3 = (1+8)^2 \div 3$
$= (9)^2 \div 3$
$= 81 \div 3$
$= 27$



**59.** $(16 - 8 \cdot 2)^0 = (16 - 16)^0$
$= (0)^0$

$(0)^0$ is undefined

**60.** $\left(5^1 + 2^3 - 2\right)^1 = (5 + 8 - 2)^1$
$= (11)^1$
$= 11$

**61.** $(y - 9)^2 + 5y = (50 - 9)^2 + 5 \cdot 50$
$= (41)^2 + 5 \cdot 50$
$= 1681 + 5 \cdot 50$
$= 1681 + 250$
$= 1931$

**62.** $4x^2 \div 3^2 = 4(27)^2 \div 3^2$
$= 4(729) \div 9$
$= 2916 \div 9$
$= 324$

**63.** $P = 1.85N^2 + 535.20N - 862,700$

$= 1.85(780)^2 + 535.20(780) - 862,700$
$= 1.85(608,400) + 535.20(780) - 862,700$
$= 1,125,540 + 417,456 - 862,700$

$= 680,296$

The total weekly profit is \$680,296.

**64.** $M = P(1+i)^t$

$= \$93,200(1 + 0.065)^{25}$

$= \$93,200(1.065)^{25}$
$= \$449,941.56$

The future value is \$449,941.56.

## Business Application Case #1
## Breakeven in Retail

**(a)** $\$8500 + \$2100 + \$350 + \$1620 = \$12,570$
The total monthly expenses are \$12,570.

**(b)** $1 - \frac{7}{10} = \frac{3}{10}$

$\frac{3}{10}$ of the revenue remains

**(c)** $N =$ number of books sold in a month

gross revenue $= \frac{3}{10} \cdot$ revenue

net profit = gross revenue − monthly expenses

$$P = \left(\frac{3}{10}\right) \cdot \$24.80 \cdot N - \$12,570$$

$$P = \left(\frac{3}{10}\right) \cdot \$24.80 \cdot N - \$12,570$$

$$P = \$7.44N - \$12,570$$

**(d)** The break even point occurs when $P = 0$.

$$P = \$7.44N - \$12,570$$
$$\$0 = \$7.44N - \$12,570$$
$$\$12,570 = \$7.44N$$
$$1690 \approx N$$

The store must sell 1690 books to break even.

**(e)** The owner would probably receive a lower salary.

**(f)**
$$P = \$7.44N - \$12,570$$
$$\$6000 = \$7.44N - \$12,570$$
$$\$18,570 = \$7.44N$$
$$2496 \approx N$$

The store must sell 2496 books to reach a profit of \$6000.



## Business Application Case #2
## Expanding the Number of Stores

**(a)**
$$\frac{\$25 \text{ billion}}{31{,}000} = \frac{\$25{,}000{,}000{,}000}{31{,}000} \approx \$806{,}452$$

The average sales per store are \$806,452.

**(b)** If they add $N$ restaurants next year, the total revenue will be $\$806,452(31{,}000 + N)$.

**(c)** $N = \frac{1}{5} \cdot 31{,}000 = 6200$

6200 restaurants will be added.

$$\$806,452 \cdot (31{,}000 + N)$$
$$= \$806,452 \cdot (31{,}000 + 6200)$$
$$= \$806,452 \cdot 37{,}200$$
$$\approx \$30 \text{ billion}$$

The estimated revenue will be \$30 billion.

**(d)** Answers will vary.