

**Solution Manual for Mathematics for the
Trades A Guided Approach 10th Edition**

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**Solutions to
Odd-Numbered Problems**

CHAPTER 1

ARITHMETIC OF WHOLE NUMBERS

Preview 1

1. (a) Two hundred fifty thousand, three hundred seventy-four
 (b) 1,065,008
3. (a) $67 + 58 = 125$ (b) $7009 + 1598 = 8607$
5. (a)
$$\begin{array}{r} 64 \\ \times 37 \\ \hline 448 \\ 192 \\ \hline 2368 \end{array}$$
 (b)
$$\begin{array}{r} 305 \\ \times 243 \\ \hline 915 \\ 1220 \\ \hline 610 \\ 74115 \text{ or } 74,115 \end{array}$$
 (c)
$$\begin{array}{r} 908 \\ \times 705 \\ \hline 4540 \\ 63560 \\ \hline 640140 \text{ or } 640,010 \end{array}$$
7. 680 235 = 455 lb finished weight
9. (a) $6 + 9 \times 3 = 6 + 27 = 33$
 (b) $35 - 14 \div 7 = 35 - 2 = 33$
 (c) $56 \div 4 \times 2 + 9 - 4 = 14 \times 2 + 9 - 4 = 28 + 9 - 4 = 33$
 (d) $(23 - 7) \times 24 \div (12 - 4) = 16 \times 24 \div 8 = 384 \div 8 = 48$

Exercises 1-1 Reading, Writing, Rounding, and Adding Whole Numbers.

A.

1. Three hundred fifty-seven 3. Seventeen thousand, ninety-two
5. Two million, thirty-four
7. Seven hundred forty thousand, one hundred six
9. One hundred eighteen million, one hundred eighty thousand, eighteen
11. 3006 13. 11,100 15. 4,040,006
17. 360 19. 4000 21. 230,000

B.

1. 70 3. 80 5. 123 7. 132 9. 393
11. 1390 13. 1009 15. 861 17. 9461 19. 11,428
21. 25,717 23. 11,071 25. 175,728 27. 663,264

C.

1. 1042 3. 2442 5. 7083 7. 6352
 9. 6514 11. 64 13. 55 15. 357
 17. 1,166,040

D.

1.
$$\begin{array}{r} 387 \text{ ft} \\ 913 \\ 76 \\ 2640 \\ + \underline{845} \\ 4861 \text{ ft} \end{array}$$
3.
$$\begin{array}{r} 346 \\ 275 \\ 84 \\ 128 \\ 325 \\ 98 \\ 260 \\ + \underline{120} \\ 1636 \text{ screws} \end{array}$$
5.
$$\begin{array}{r} 78 \\ 428 \\ 143 \\ 96 \\ + \underline{384} \\ 1129 \text{ minutes} \end{array}$$
7. (a)
$$\begin{array}{r} 420 \\ 260 \\ 875 \\ 340 \\ 558 \\ 564 \\ 280 \\ + \underline{310} \\ 3607 \text{ watts} \end{array}$$
- (b)
$$\begin{array}{r} 875 \\ 564 \\ + \underline{558} \\ 1997 \text{ watts} \end{array}$$
- (c)
$$\begin{array}{r} 260 \\ 280 \\ + \underline{310} \\ 850 \text{ watts} \end{array}$$
9.
$$\begin{array}{r} 1205 \\ 865 \\ 742 \\ + \underline{257} \\ 3114 \text{ bricks} \end{array}$$
11.
$$\begin{array}{r} \$ 499 \\ 249 \\ 369 \\ + \underline{79} \\ \$ 1196 \end{array}$$
13.
$$\begin{array}{r} 520 \\ 1160 \\ 49 \\ + \underline{1200} \\ 2929 \text{ ohms} \end{array}$$
15.
$$\begin{array}{r} 485 \\ 74 \\ 251 \\ + \underline{146} \\ 756 \text{ grams} \end{array}$$
17.
$$\begin{array}{r} 1400 \\ 1800 \\ 600 \\ + \underline{100} \\ 3900 \text{ W} \end{array}$$
19. (a)
$$\begin{array}{r} 1172 \\ 1054 \\ 915 \\ + \underline{1123} \\ 4264 \text{ points} \end{array}$$
- (b)
$$\begin{array}{r} 1264 \\ 776 \\ + \underline{987} \\ 3027 \text{ points} \end{array}$$
- (c)
$$\begin{array}{r} 4264 \\ + \underline{3027} \\ 7291 \text{ points} \end{array}$$

E.

1.
$$\begin{array}{r} 35244 \\ + 61775 \\ \hline \end{array}$$

97001 kHz or 97,001 kHz

3. (a) \$307,225 (b) \$732,813 (c) \$2,298,502 (d) \$7156

5. (a) Total feet of each kind
 11,453 ft of #12 BHD
 258 ft of #TX
 12,715 ft of 410 AAC
 8792 ft of 110 ACSR
 7425 ft of 6B

(b) Total feet installed at each location
 3530 ft at A3
 8412 ft at A4
 4294 ft at B1
 5482 ft at B5
 5073 ft at B6
 6073 ft at C4
 7779 ft at C5

Exercises 1-2 Subtraction of Whole Numbers**A.**

1. 6 3. 2 5. 4 7. 3 9. 3 11. 8
 13. 9 15. 9 17. 3 19. 8 21. 7 23. 7
 25. 0 27. 8 29. 6 31. 6 33. 5 35. 4

B.

1. 13 3. 12 5. 15 7. 38 9. 46
 11. 25 13. 189 15. 281 17. 408 19. 273
 21. 574 23. 2809 25. 12,518 27. 4741 29. 47,593

C.

1.
$$\begin{array}{r} \$ 486 \\ \underline{27} \\ \$ 459 \end{array}$$
 3.
$$\begin{array}{r} 3540 \text{ ft} \\ \underline{1782} \\ 1758 \text{ ft} \end{array}$$
 5.
$$\begin{array}{r} \$ 1206512 \\ \underline{875977} \\ \$ 330535 \text{ or } \$330,535 \end{array}$$

7. The 4 drums contain $72 + 45 + 39 + 86 = 242$ liters
 3 drums contain $97 + 115 + 74 = 286$ liters
 The total volume of the 3 drums is greater by $(286 - 242) = 44$ liters.

9.
$$\begin{array}{r} 238 \\ \underline{64} \\ 174 \text{ gal} \end{array}$$

11.
$$\begin{array}{r} 22000 \\ \underline{14250} \\ 7750 \text{ impressions} \end{array}$$

13.
$$\begin{array}{r} 20000 \\ \underline{6500} \\ 13500 \text{ ohms or } 13,500 \text{ ohms} \end{array}$$

15.
$$\begin{array}{r} 1350000 \\ \underline{850000} \\ 500000 \text{ Hertz or } 500,000 \text{ Hertz} \end{array}$$

17.
$$\begin{array}{r} 8823 \\ \underline{8701} \\ 122 \text{ HCF} \end{array}$$

19. Hyundai Sonata:

$$\begin{array}{r} \$ 23219 \\ + 8410 \\ \hline \$ 31629 \\ \underline{8629} \\ \$ 23000 \text{ or } 23,000 \end{array}$$

Sonata Hybrid:

$$\begin{array}{r} \$ 25784 \\ + 6426 \\ \hline \$ 32210 \\ \underline{9053} \\ \$ 23157 \text{ or } \$23,157 \end{array}$$

Therefore, the Sonata costs less than the Sonata Hybrid by \$157.

D.

1. Total mileage of each

# 1	60,027	58,352 =	1675
# 2	43,302	42,135 =	1167
# 3	78,007	76,270 =	1737
# 4	41,322	40,006 =	1316
# 5	10,002	08,642 =	1360
# 6	35,700	35,401 =	299
# 7	80,101	79,002 =	1099
# 8	40,122	39,987 =	135
# 9	11,671	10,210 =	1461
#10	73,121	71,040 =	2081
Total mileage of all = 12330 or 12,330			

3.
$$\begin{array}{r} \$28245 \\ \underline{3814} \\ \$24431 \text{ or } 24,431 \end{array}$$

5. (a) Balance A = \$2065

(b)
$$\begin{array}{r} \$ 6375 \\ 6375 - 379 = 5996 \\ 5996 + 1683 = 7679 \\ 7679 + 474 = 8153 \\ 8153 + 487 = 8640 \\ 8640 - 2373 = 6267 \\ 6267 - 1990 = 4277 \\ 4277 - 308 = 3969 \\ 3969 - 1090 = 2879 \\ 2879 - 814 = 2065 \end{array}$$

Exercises 1-3 Multiplication of Whole Numbers

A.

- | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 1. | 42 | 3. | 48 | 5. | 63 | 7. | 54 | 9. | 45 | 11. | 296 |
| 13. | 576 | 15. | 320 | 17. | 290 | 19. | 416 | 21. | 792 | 23. | 1404 |

25. 282 27. 720 29. 5040 31. 1938 33. 4484 35. 3822

B.

$$\begin{array}{r} 1. \quad 305 \\ \times 123 \\ \hline 915 \\ 610 \\ \underline{305} \\ 37515 \\ \text{or } 37,515 \end{array}$$

$$\begin{array}{r} 3. \quad 8043 \\ \times 37 \\ \hline 56301 \\ \underline{24129} \\ 297591 \\ \text{or } 297,591 \end{array}$$

$$\begin{array}{r} 5. \quad 3706 \\ \times 102 \\ \hline 7412 \\ \underline{37060} \\ 378012 \\ \text{or } 378,012 \end{array}$$

$$\begin{array}{r} 7. \quad 684 \\ \times 45 \\ \hline 3420 \\ \underline{2736} \\ 30780 \\ \text{or } 30,780 \end{array}$$

$$\begin{array}{r} 9. \quad 2008 \\ \times 198 \\ \hline 16064 \\ 18072 \\ \underline{2008} \\ 397584 \\ \text{or } 397,584 \end{array}$$

$$\begin{array}{r} 11. \quad 809 \\ \times 9 \\ \hline 7281 \end{array}$$

$$\begin{array}{r} 13. \quad 500 \\ \times 50 \\ \hline 25000 \\ \text{or } 25,000 \end{array}$$

$$\begin{array}{r} 15. \quad 7009 \\ \times 504 \\ \hline 28036 \\ \underline{350450} \\ 3532536 \\ \text{or } 3,532,536 \end{array}$$

$$\begin{array}{r} 17. \quad 316 \\ \times 32 \\ \hline 632 \\ \underline{948} \\ 10112 \\ \text{or } 10,112 \end{array}$$

$$\begin{array}{r} 19. \quad 807 \\ \times 111 \\ \hline 807 \\ 807 \\ \underline{807} \\ 89577 \\ \text{or } 89,577 \end{array}$$

C.

$$\begin{array}{r} 1. \quad \$ 75 \\ \times 40 \\ \hline \$ 3000 \end{array}$$

$$\begin{array}{r} 3. \quad 65 \\ \times 20 \\ \hline 1300 \text{ ft} \end{array}$$

$$\begin{array}{r} 5. \quad 50 \\ \times 18 \\ \hline 400 \\ \underline{50} \\ 900 \end{array}$$

$$\begin{array}{r} 100 \\ \times 16 \\ \hline 1600 \end{array}$$

$$\begin{array}{r} 500 \\ \times 11 \\ \hline 500 \\ \underline{500} \\ 5500 \end{array}$$

$$\begin{array}{r} 900 \\ 1600 \\ + 5500 \\ \hline 8000 = \text{total envelopes} \end{array}$$

$$\begin{array}{r} 7. \quad 27 \\ \times 2 \\ \hline 54 \\ \times 45 \\ \hline 270 \\ \underline{216} \\ 2430 \text{ parts} \end{array}$$

$$\begin{array}{r} 9. \quad 60 \\ \times 4 \\ \hline 240 \\ \times 5 \\ \hline 1200 \text{ bolts} \end{array}$$

$$\begin{array}{r} 11. \quad 850 \\ \times 9 \\ \hline 7650 \text{ cards} \end{array}$$

$$\begin{array}{r} 13. \quad 60 \\ \times 24 \\ \hline 240 \\ \underline{120} \\ 1440 \text{ min} \end{array}$$

$$\begin{array}{r} 1440 \\ \times 16 \\ \hline 8640 \\ \underline{1440} \\ 23040 \text{ screws or } 23,040 \text{ screws} \end{array}$$

$$\begin{array}{r} 15. \quad 23 \\ \times 5 \\ \hline 115 \text{ in. (or } 9 \text{ ft } 7 \text{ in.)} \end{array}$$

$$\begin{array}{r} 17. \quad 850 \\ \times 25 \\ \hline 4250 \\ \underline{1700} \\ 21250 \text{ ohms or } 21,250 \text{ ohms,} \\ \text{No} \end{array}$$

$$\begin{array}{r} 19. \quad 170 \\ \times 220 \\ \hline 000 \\ 340 \\ \underline{340} \\ 37400 \text{ bu or } 37,400 \text{ bu} \end{array}$$

$$\begin{array}{r} 21. \quad 96 \\ \times 5 \\ \hline 480 \text{ A} \end{array}$$

$$\begin{array}{r}
 23. \quad 176 \\
 \times 500 \\
 \hline
 000 \\
 000 \\
 \hline
 880 \\
 \hline
 88000 \text{ mL or } 88,000 \text{ mL}
 \end{array}$$

$$\begin{array}{r}
 25. \quad \$ 16 \\
 \times 40 \\
 \hline
 00 \\
 64 \\
 \hline
 \$ 640
 \end{array}$$

$$\begin{array}{r}
 \$ 640 \\
 \times 52 \\
 \hline
 1280 \\
 3200 \\
 \hline
 \$ 33280 \text{ or } \$33,280
 \end{array}$$

$$\begin{array}{r}
 27. \quad 250 \\
 \times 60 \\
 \hline
 000 \\
 1500 \\
 \hline
 15000 \text{ gal/hr or } 15,000 \text{ gal/hr}
 \end{array}$$

$$\begin{array}{r}
 15000 \\
 \times 2 \\
 \hline
 30000 \text{ gal or } 30,000 \text{ gal}
 \end{array}$$

D.

1. $\$873 \times 365 = \$318,645$
 $\$1,000,000 - 318,645 = \$681,355$

3. (a)
$$\begin{array}{r}
 111,111,111 \\
 222,222,222 \\
 333,333,333
 \end{array}$$

(b)
$$\begin{array}{r}
 111,111 \\
 222,222 \\
 333,333
 \end{array}$$

(c)
$$\begin{array}{r}
 1 \\
 121 \\
 12,321 \\
 1,234,321 \\
 123,454,321
 \end{array}$$

(d)
$$\begin{array}{r}
 42 \\
 4422 \\
 444,222 \\
 44,442,222 \\
 4,444,422,222
 \end{array}$$

5. $8 \text{ hours/day} \times 5 \text{ days/week} = 40 \text{ hours/week}$
 Alpha $117 \times \$ 6 \times 40 = \$ 28,080$
 Beta $67 \times \$17 \times 40 = \$ 45,560$
 Gamma $29 \times \$32 \times 40 = \$ 37,120$
 Delta $37 \times \$49 \times 40 = \$ 72,520$
 Tau $18 \times \$78 \times 40 = \$ 56,160$

Exercises 1-4 Division of Whole Numbers**A.**

1.
$$\begin{array}{r}
 9 \\
 7 \overline{)63} \\
 \underline{63} \\
 0
 \end{array}$$

3. Not defined

5.
$$\begin{array}{r}
 10 \text{ r}1 \\
 7 \overline{)71} \\
 \underline{7} \\
 01 \\
 \underline{0} \\
 1
 \end{array}$$

7.
$$\begin{array}{r}
 8 \\
 4 \overline{)32} \\
 \underline{32} \\
 0
 \end{array}$$

$$\begin{array}{r}) \\ \hline 9 \overline{) 54} \\ \underline{54} \\ 0 \end{array}$$

9.

$$\begin{array}{r}) 23 \text{ r}6 \\ \hline 7 \overline{) 167} \\ \underline{14} \\ 27 \\ \underline{21} \\ 6 \end{array}$$

11.

$$\begin{array}{r}) 51 \text{ r}4 \\ \hline 6 \overline{) 310} \\ \underline{30} \\ 10 \\ \underline{6} \\ 4 \end{array}$$

13.

$$\begin{array}{r}) 21 \\ \hline 7 \overline{) 147} \\ \underline{14} \\ 07 \\ \underline{7} \\ 0 \end{array}$$

15.

$$\begin{array}{r}) 37 \\ \hline 6 \overline{) 222} \\ \underline{18} \\ 42 \\ \underline{42} \\ 0 \end{array}$$

17.

$$\begin{array}{r}) 23 \\ \hline 14 \overline{) 322} \\ \underline{28} \\ 42 \\ \underline{42} \\ 0 \end{array}$$

19.

$$\begin{array}{r}) 39 \\ \hline 24 \overline{) 936} \\ \underline{72} \\ 216 \\ \underline{216} \\ 0 \end{array}$$

21.

$$\begin{array}{r}) 9 \text{ r}1 \\ \hline 81 \overline{) 730} \\ \underline{729} \\ 1 \end{array}$$

23.

$$\begin{array}{r} 22 \\ \hline 31 \overline{) 682} \\ \underline{62} \\ 62 \\ \underline{62} \\ 0 \end{array}$$

25.

$$\begin{array}{r} 8 \text{ r}35 \\ \hline 42 \overline{) 371} \\ \underline{336} \\ 35 \end{array}$$

27.

B.

$$\begin{array}{r} 120 \\ \hline 61 \overline{) 7320} \\ \underline{61} \\ 122 \\ \underline{122} \\ 0 \end{array}$$

1.

$$\begin{array}{r}) 56 \text{ r}8 \\ \hline 16 \overline{) 904} \\ \underline{80} \\ 104 \\ \underline{96} \\ 8 \end{array}$$

3.

$$\begin{array}{r} 96 \\ \hline 21 \overline{) 2016} \\ \underline{189} \\ 126 \\ \underline{126} \\ 0 \end{array}$$

5.

$$\begin{array}{r} 222 \text{ r}2 \\ \hline 9 \overline{) 2000} \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

7.

$$\begin{array}{r} 305 \text{ r}5 \\ \hline 14 \overline{) 4275} \\ \underline{42} \\ 075 \\ \underline{70} \\ 5 \end{array}$$

9.

$$\begin{array}{r}) 119 \\ \hline 53 \overline{) 6307} \\ \underline{53} \\ 100 \\ \underline{53} \\ 477 \\ \underline{477} \\ 0 \end{array}$$

11.

$$\begin{array}{r} 501 \\ \hline 7 \overline{) 3507} \\ \underline{35} \\ 007 \\ \underline{7} \\ 0 \end{array}$$

13.

$$\begin{array}{r} 604 \\ \hline 6 \overline{) 3624} \\ \underline{36} \\ 024 \\ \underline{24} \\ 0 \end{array}$$

15.

$$\begin{array}{r} 200 \\ \hline 15 \overline{) 3000} \\ \underline{30} \\ 000 \end{array}$$

17.

$$\begin{array}{r} 108 \text{ r}4 \\ \hline 24 \overline{) 2596} \\ \underline{24} \\ 196 \\ \underline{192} \\ 4 \end{array}$$

19.

$$\begin{array}{r} 600 \\ \hline 38 \overline{) 22800} \\ \underline{228} \\ 000 \end{array}$$

21.

$$\begin{array}{r} 102 \text{ r}98 \\ \hline 411 \overline{) 42020} \\ \underline{411} \\ 920 \\ \underline{822} \\ 98 \end{array}$$

23.

$$\begin{array}{r} 100 \text{ r}11 \\ \hline 111 \overline{) 11111} \\ \underline{111} \\ 011 \\ \underline{0} \\ 11 \end{array}$$

25.

$$\begin{array}{r} 17 \text{ r}123 \\ \hline 405 \overline{) 7008} \\ \underline{405} \\ 2958 \\ \underline{2835} \\ 123 \end{array}$$

27.

C.

1. (a) 1, 2, 3, 6 (b) $6 = 2 \times 3$
3. (a) 1, 19 (b) prime
5. (a) 1, 2, 4, 5, 8, 10, 20, 40 (b) $40 = 2 \times 2 \times 2 \times 5$

D.

1.
$$\begin{array}{r} 27 \text{ in.} \\ 9 \overline{)243} \\ \underline{18} \\ 63 \\ \underline{63} \\ 0 \end{array}$$
3.
$$\begin{array}{r} 13 \text{ hr} \\ 85 \overline{)1105} \\ \underline{85} \\ 255 \\ \underline{255} \\ 0 \end{array}$$
5.
$$\begin{array}{r} 27 + 1 = 28 \text{ joists} \\ 16 \overline{)432} \\ \underline{32} \\ 112 \\ \underline{112} \\ 0 \end{array}$$
7.
$$\begin{array}{r} 7 \text{ in.} \\ 18 \overline{)126} \\ \underline{126} \\ 0 \end{array}$$
9.
$$\begin{array}{r} \$ 4696 \\ \underline{3400} \\ \$ 1296 \end{array}$$
- $$\begin{array}{r} \$72 \text{ per hour} \\ 18 \overline{)1296} \\ \underline{126} \\ 36 \\ \underline{36} \\ 0 \end{array}$$
11.
$$\begin{array}{r} 48 \text{ boxes} \\ 10 \overline{)480} \\ \underline{40} \\ 80 \\ \underline{80} \\ 0 \end{array}$$
13.
$$\begin{array}{r} 27 \text{ reams} \\ 500 \overline{)13500} \\ \underline{1000} \\ 3500 \\ \underline{3500} \\ 0 \end{array}$$
15.
$$\begin{array}{r} 6 \text{ loops} \\ 3 \overline{)18} \\ \underline{18} \\ 0 \end{array}$$
17.
$$\begin{array}{r} 230 \text{ months} \\ 30 \overline{)6900} \\ \underline{60} \\ 90 \\ \underline{90} \\ 0 \\ 0 \end{array}$$
- $$\begin{array}{r} 19 \\ 12 \overline{)230} \\ \underline{12} \\ 110 \\ \underline{108} \\ 2 \end{array}$$
- 19 years, 2 months
19.
$$\begin{array}{r} 250 \text{ minutes} \\ 200 \overline{)50000} \\ \underline{400} \\ 1000 \\ \underline{1000} \\ 0 \\ 0 \end{array}$$
- $$\begin{array}{r} 4 \\ 60 \overline{)250} \\ \underline{240} \\ 10 \end{array}$$
- 4 hr, 10 min

E.

1. (a) $1347 \times 46819 \div 3 = 21,021,731$
 (b) $(76459 + 93008 + 255) \div 378 = 449$
 (c) $(4008 + 408 + 48) \div 48 = 93$
 (d) $9909 \times 9090 \div 3303 = 27,270$
3. $6587 \div 344 = 19.148\dots$ or 20 rivets to be sure
5. $297600 \div 96 = 3100$ min
 $3100 \div 60 = 51.666\dots$ or 51 hr 40 min
7.
$$\begin{array}{r} 42 \text{ hours} \\ 115 \overline{)4830} \\ \underline{460} \\ 230 \\ \underline{230} \\ 0 \end{array}$$

Exercises 1-5 Order of Operations**A.**

1. $2 + 8 \times 6 = 2 + 48 = 50$ 3. $40 - 20 \div 5 = 40 - 4 = 36$
5. $16 \times 3 + 9 = 48 + 9 = 57$ 7. $48 \div 8 - 2 = 6 - 2 = 4$
9. $(5 + 9) \times 3 = 14 \times 3 = 42$ 11. $24 \div (6 - 2) = 24 \div 4 = 6$
13. $16 + 5 \times (3 + 6) = 16 + 5 \times 9 = 16 + 45 = 61$
15. $(23 + 5) \times (12 - 8) = 28 \times 4 = 112$
17. $6 + 4 \times 7 - 3 = 6 + 28 - 3 = 34 - 3 = 31$
19. $5 \times 8 + 6 \div 6 - 12 \times 2 = 40 + 1 - 24 = 41 - 24 = 17$
21. $2 \times (6 + 4 \times 9) = 2 \times (6 + 36) = 2 \times 42 = 84$
23. $(4 \times 3 + 8) \div 5 = (12 + 8) \div 5 = 20 \div 5 = 4$
25. $8 - 4 + 2 = 4 + 2 = 6$ 27. $18 \times 10 \div 5 = 180 \div 5 = 36$
29. $12 - 7 - 3 = 5 - 3 = 2$ 31. $12 - (7 - 3) = 12 - 4 = 8$
33. $\frac{36}{9} + \frac{27}{3} = 4 + 9 = 13$ 35. $\frac{44+12}{11-3} = \frac{56}{8} = 7$
37. $\frac{6+12 \times 4}{15-3 \times 2} = \frac{6+48}{15-6} = \frac{54}{9} = 6$

$$39. \quad \frac{12+6}{3+6} + \frac{24}{6} - 6 \div 6 = \frac{18}{9} + 4 - 1 = 2 + 4 - 1 = 6 - 1 = 5$$

B.

$$1. \quad 3 \times \$34 + 5 \times \$39 = \$102 + \$195 = \$297$$

$$3. \quad 12 \times \$25 - 3 \times \$6 = \$300 - \$18 = \$282$$

$$5. \quad \begin{aligned} \text{Cost} &= 2 \times \$12 \times 40 + 3 \times \$20 \times 40 + \$3240 + \$500 \\ &= \$960 + \$2400 + \$3240 + \$500 \\ &= \$7100 \end{aligned}$$

$$7. \quad 33 \times \$80 + 12 \times \$40 + 45 \times \$18 = \$2640 + \$480 + \$810 = \$3930$$

$$9. \quad \begin{aligned} \text{China: } &51 \times 5 + 21 \times 3 + 28 \times 1 = 255 + 63 - 28 = 346 \text{ points} \\ \text{U.S.: } &36 \times 5 + 38 \times 3 + 36 \times 1 = 180 + 114 + 36 = 330 \text{ points} \\ &\text{China "won."} \end{aligned}$$

$$11. \quad \begin{array}{r} 8 \text{ gal} \\ 22 \overline{)176} \\ \underline{176} \\ 0 \end{array} \qquad \begin{array}{r} 6 \text{ gal} \\ 30 \overline{)180} \\ \underline{180} \\ 0 \end{array} \qquad 8 \text{ gal} + 6 \text{ gal} = 14 \text{ gal}$$

C.

$$1. \quad 462 + 83 \times 95 = 462 + 7885 = 8347$$

$$3. \quad 7482 - 1152 \div 12 = 7482 - 96 = 7386$$

$$5. \quad (268 + 527) \div 159 = 795 \div 159 = 5$$

$$7. \quad 612 + 86 \times 9 - 1026 \div 38 = 612 + 774 - 27 = 1359$$

$$9. \quad 3579 - 16 \times (72 + 46) = 3579 - 16 \times 118 = 3579 - 1888 = 1691$$

$$11. \quad 864 \div 16 \times 27 = 54 \times 27 = 1458$$

$$13. \quad (296 + 18 \times 48) \times 12 = (296 + 864) \times 12 = 1160 \times 12 = 13,920$$

$$15. \quad (3297 + 1858 - 493) \div (48 \times 16 - 694) = 63$$

Problem Set 1**A.**

1. Five hundred ninety-three
3. Forty-five thousand, two hundred six
5. Two million, four hundred three thousand, five hundred sixty
7. Ten thousand twenty
9. 408 11. 230,056 13. 64,700
15. 690 17. 18,000 19. 700,000

B.

1.
$$\begin{array}{r} 24 \\ + 69 \\ \hline 93 \end{array}$$
3.
$$\begin{array}{r} 456 \\ + 72 \\ \hline 528 \end{array}$$
5.
$$\begin{array}{r} 396 \\ + 538 \\ \hline 934 \end{array}$$
7.
$$\begin{array}{r} 43 \\ \underline{28} \\ 15 \end{array}$$
9.
$$\begin{array}{r} 734 \\ \underline{85} \\ 649 \end{array}$$
11.
$$\begin{array}{r} 543 \\ - 348 \\ \hline 195 \end{array}$$
13.
$$\begin{array}{r} 376 \\ \times 4 \\ \hline 1504 \end{array}$$
15.
$$\begin{array}{r} 67 \\ \times 21 \\ \hline 67 \\ \underline{134} \\ 1407 \end{array}$$
17.
$$\begin{array}{r} 207 \\ \times 63 \\ \hline 621 \\ \underline{1242} \\ 13041 \text{ or } 13,041 \end{array}$$
19.
$$\begin{array}{r} 5,236 \\ \times 44 \\ \hline 20944 \\ \underline{20944} \\ 230384 \text{ or } 230,384 \end{array}$$
21.
$$\begin{array}{r} 37 \\ 7 \overline{) 259} \\ \underline{21} \\ 49 \\ \underline{49} \end{array}$$
23.
$$\begin{array}{r} 57 \\ 42 \overline{) 2394} \\ \underline{210} \\ 294 \\ \underline{294} \end{array}$$
25.
$$\begin{array}{r} 9 \\ 160 \overline{) 1440} \\ \underline{1440} \end{array}$$
27.
$$\begin{array}{r} 18 \\ 73 \overline{) 1314} \\ \underline{73} \\ 584 \\ \underline{584} \end{array}$$
29.
$$\frac{36 \times 91}{13 \times 42} = \frac{3276}{546}$$

$$= 546 \overline{) \begin{array}{r} 6 \\ 3276 \\ \underline{3276} \end{array}}$$

$$\begin{array}{r} 36 \\ \times 91 \\ \hline 36 \\ \underline{324} \\ 3276 \end{array}$$

$$\begin{array}{r} 42 \\ \times 13 \\ \hline 126 \\ \underline{42} \\ 546 \end{array}$$

31. 120 $40 \div 8 = 120$ $5 = 115$ 33. 3×4 $15 \div 3 = 12$ $5 = 7$

35.
$$\begin{array}{r} 308 \\ 793 \\ \underline{144} \\ 1245 \end{array}$$

C.

1. (a) 1, 2, 4, 8, (b) $8 = 2 \times 2 \times 2$
 3. (a) 1, 31 (b) prime
 5. (a) 1, 2, 3, 4, 6, 9, 12, 18, 36 (b) $36 = 2 \times 2 \times 3 \times 3$

D.

1. $6 \text{ ft} + 8 \text{ ft} + 20 \text{ ft} + 9 \text{ ft} = 43 \text{ ft}$
 3. $346 + 210 + 4 \times 164 + 2 \times 96 + 208 + 280 = 1892 \text{ sq ft}$

5.
$$\begin{array}{r} 6 \\ 35 \overline{)210} \\ \underline{210} \end{array}$$

7.
$$\begin{array}{r} 210 \\ 215 \\ 245 \\ \\ 217 \\ 220 \\ 227 \\ \underline{115} \\ 1449 \end{array} \quad \begin{array}{r} 207 \text{ lb average} \\ 7 \overline{)1449} \\ \underline{14} \end{array}$$

9. $\$500 + 12 \times \$110 = \$500 + \$1320 = \boxed{\$1820}$

$$\begin{array}{r} \$110 \\ \times 12 \\ \hline 220 \\ 110 \\ \hline \$1320 \end{array}$$

11.
$$\begin{array}{r} 136 \\ - 107 \\ \hline 29 \text{ psi, Yes} \end{array}$$

13.
$$\begin{array}{r} 39000 \text{ gal per hour} \\ 4 \overline{)156000} \\ \underline{12} \\ 36 \\ \underline{36} \end{array} \quad \begin{array}{r} 650 \text{ gal per min} \\ 60 \overline{)39000} \\ \underline{360} \\ 300 \\ \underline{300} \end{array}$$

15. $167 \times 17 = 2839 \text{ lb}$

17. $\frac{3}{4} \times 32 = 24 \text{ hours}$

Note: $45 \text{ min} = \frac{3}{4} \text{ hr}$

19.
$$\begin{array}{r} 380 \\ \times 231 \\ \hline 380 \\ 1140 \\ \hline 760 \\ 87780 \text{ or } 87,780 \text{ cu in.} \end{array}$$

$$\begin{array}{r}
 21. \quad \begin{array}{r} 506409 \\ \underline{460089} \\ 46320 \text{ or } 46,320 \text{ in } 4 \text{ hr} \end{array} \qquad \begin{array}{r} 11580 \text{ rph} \\ 4 \overline{)46320} \end{array} \qquad \begin{array}{r} 193 \text{ rpm} \\ 60 \overline{)11580} \\ \underline{60} \\ 558 \\ \underline{540} \\ 180 \\ \underline{180} \end{array}
 \end{array}$$

$$\begin{array}{r}
 23. \quad \begin{array}{r} 18 \\ \underline{6} \\ 12 \end{array} \quad 12 \div 2 = 6 \text{ ft from each wall}
 \end{array}$$

$$\begin{array}{l}
 25. \quad \$85 \times 36 + \$350 = \$3060 + \$350 = \$3410 \\
 \$3410 - \$3300 = \$110
 \end{array}$$

$$\begin{array}{l}
 27. \quad \text{Cost} = \$20 \times \$3 + 30 \times \$4 + (87 - 50) \times \$5 \\
 \quad \quad = 20 \times \$3 + 30 \times \$4 + 37 \times \$5 \\
 \quad \quad = \$60 + \$120 + \$185 \\
 \quad \quad = \$365
 \end{array}$$

$$\begin{array}{l}
 29. \quad (a) \quad 95 \div 19 + 300 \div 25 = 5 + 12 = 17 \text{ gal} \\
 \quad \quad (b) \quad 17 \times \$4 = \$68
 \end{array}$$

$$\begin{array}{r}
 31. \quad \begin{array}{r} 220 \\ \times 13 \\ \hline 660 \\ 220 \\ \hline 2860 \text{ calories} \end{array}
 \end{array}$$

$$\begin{array}{r}
 33. \quad \begin{array}{r} \text{Hybrid} \\ \$ 26915 \\ + \underline{3876} \\ \$ 30791 \\ \underline{17718} \\ \$ 13073 \text{ or } \$13,073 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{Non-Hybrid} \\
 \$ 24718 \\
 + \underline{4291} \\
 \$ 29639 \\
 \underline{15214} \\
 \$ 14425 \text{ or } \$14,425
 \end{array}
 \qquad
 \begin{array}{r}
 \$ 14425 \\
 \underline{13073} \\
 \$ 1352
 \end{array}$$

The 3-year cost of the hybrid is lower by \$1352

24 bushels

$$\begin{array}{r}
 35. \quad \begin{array}{r} 32 \overline{)768} \\ \underline{64} \\ 128 \\ \underline{128} \\ 0 \end{array}
 \end{array}$$

CHAPTER 2 FRACTIONS

Preview 2

$$1. \quad (a) \quad \frac{31}{4} = 4\frac{7}{4} = 7\frac{3}{4}$$

$$(b) \quad 3\frac{7}{8} = \frac{8 \times 3 + 7}{8} = \frac{24 + 7}{8} = \frac{31}{8}$$

$$(c) \quad \frac{5}{16} \times \frac{4}{4} = \frac{20}{64}$$

$$(d) \quad 1\frac{3}{4} = \frac{7}{4}, \frac{7}{4} \times \frac{8}{8} = \frac{56}{32}$$

$$(e) \quad \frac{10}{64} = \frac{5}{32}$$

$$(f) \quad 1\frac{7}{8} = \frac{15}{8} = \frac{45}{24}, \frac{5}{3} = \frac{40}{24}; 1\frac{7}{8} \text{ is larger}$$

$$3. \quad (a) \quad \frac{7}{16} + \frac{3}{16} = \frac{10}{16} = \frac{5}{8}$$

$$(b) \quad 1\frac{3}{16} + \frac{3}{4} = \frac{19}{16} + \frac{12}{16} = \frac{31}{16} = 1\frac{15}{16}$$

$$(c) \quad \frac{3}{4} - \frac{1}{5} = \frac{15}{20} - \frac{4}{20} = \frac{11}{20}$$

$$(d) \quad 4 - 1\frac{5}{16} = \frac{64}{16} - \frac{21}{16} = \frac{43}{16} = 2\frac{11}{16}$$

Exercises 2-1 Working with Fractions

A.

$$1. \quad 2\frac{1}{3} = \frac{7}{3}$$

$$3. \quad 8\frac{3}{8} = \frac{67}{8}$$

$$5. \quad 2\frac{7}{8} = \frac{23}{8}$$

$$7. \quad 2\frac{2}{3} = \frac{8}{3}$$

$$9. \quad 4\frac{5}{6} = \frac{29}{6}$$

B.

$$1. \quad \frac{17}{2} = 8\frac{1}{2}$$

$$3. \quad \frac{11}{8} = 1\frac{3}{8}$$

$$5. \quad \frac{3}{2} = 1\frac{1}{2}$$

$$7. \quad \frac{100}{6} = 16\frac{4}{6} = 16\frac{2}{3}$$

$$9. \quad \frac{80}{32} = 2\frac{16}{32} = 2\frac{1}{2}$$

C.

$$1. \quad \frac{12}{16} = \frac{3}{4}$$

$$3. \quad \frac{6}{16} = \frac{3}{8}$$

$$5. \quad \frac{4}{10} = \frac{2}{5}$$

$$7. \quad \frac{24}{30} = \frac{4}{5}$$

9. $4\frac{3}{12} = 4\frac{1}{4}$

11. $\frac{42}{64} = \frac{21}{32}$

13. $\frac{15}{36} = \frac{5}{12}$

15. $\frac{38}{24} = \frac{19}{12}$

D.

1. $\frac{7}{8} = \frac{14}{16}$

3. $\frac{1}{8} = \frac{8}{64}$

5. $1\frac{1}{4} = \frac{5}{4} = \frac{20}{16}$

7. $3\frac{3}{5} = \frac{18}{5} = \frac{36}{10}$

9. $1\frac{40}{60} = 1\frac{2}{3} = \frac{5}{3}$

11. $2\frac{5}{8} = \frac{21}{8} = \frac{42}{16}$

E.

1. $\frac{3}{5} = \frac{21}{35}$, $\frac{4}{7} = \frac{20}{35}$; $\frac{3}{5}$ is larger

3. $1\frac{1}{2} = 1\frac{7}{14}$, $1\frac{3}{7} = 1\frac{6}{14}$; $1\frac{1}{2}$ is larger

5. $\frac{7}{8} = \frac{21}{24}$, $\frac{5}{6} = \frac{20}{24}$; $\frac{7}{8}$ is larger

7. $1\frac{2}{5} = \frac{7}{5} = \frac{28}{20}$, $\frac{6}{4} = \frac{30}{20}$; $\frac{6}{4}$ is larger

9. $\frac{13}{5} = \frac{26}{10}$, $\frac{5}{2} = \frac{25}{10}$; $\frac{13}{5}$ is larger

11. $\frac{3}{8} = \frac{9}{24}$, $\frac{5}{12} = \frac{10}{24}$; $\frac{5}{12}$ is larger

F.

1. $15\frac{6}{8} = 15\frac{3}{4}$ in.

3. $\frac{22}{7} = \frac{34,320}{10,920}$, $\frac{19}{6} = \frac{34,580}{10,920}$, $\frac{47}{15} = \frac{34,216}{10,920}$, $\frac{25}{8} = \frac{34,125}{10,920}$
 $\frac{41}{13} = \frac{34,440}{10,920}$; $\frac{19}{6}$ is largest approximation; $\frac{25}{8}$ is smallest approximation.

5. $\frac{7}{8}$ in. = $\frac{28}{32}$ in.; it is not possible to have an inner diameter of $\frac{29}{32}$ in.

8 32

32

7. $15 - 6 = 9$, $\frac{9}{15} = \frac{3}{5}$ will remain

9. $\frac{12}{60} = \frac{1}{5}$ fertilizer in final mixture

11. $\frac{3}{4} = \frac{24}{32}$ $\frac{11}{16} = \frac{22}{32}$
Try $\frac{23}{32}$ in.

Exercises 2-2 Multiplication of Fractions

A.

1. $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ 3. $\frac{\cancel{4}}{5} \times \frac{1}{\cancel{6}} = \frac{2}{15}$ 5. $\frac{8}{\cancel{9}} \times \frac{1}{\cancel{3}} = \frac{8}{3} = 2\frac{2}{3}$

7. $\frac{\cancel{8}}{3} \times \frac{5}{\cancel{12}} = \frac{10}{9} = 1\frac{1}{9}$ 9. $\frac{\cancel{12}}{8} \times \frac{15}{\cancel{9}} = \frac{5}{2} = 2\frac{1}{2}$

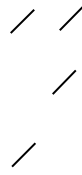
11. $4\frac{1}{2} \times \frac{2}{3} = \frac{\cancel{2}}{\cancel{2}} \times \frac{\cancel{2}}{\cancel{3}} = 3$ 13. $2\frac{1}{6} \times 1\frac{1}{2} = \frac{13}{\cancel{6}} \times \frac{\cancel{2}}{2} = \frac{13}{4} = 3\frac{1}{4}$

15. $4\frac{3}{5} \times 15 = \frac{\cancel{3}}{\cancel{5}} \times 15 = 69$ 17. $34 \times 2\frac{3}{17} = 1 \times \frac{\cancel{34}}{\cancel{17}} = 74$

19. $11\frac{6}{7} \times \frac{7}{8} = \frac{83}{\cancel{7}} \times \frac{\cancel{7}}{8} = \frac{83}{8} = 10\frac{3}{8}$ 21. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$

23. $\frac{\cancel{1}}{\cancel{4}} \times \frac{\cancel{2}}{3} \times \frac{\cancel{2}}{5} = \frac{1}{15}$ 25.

$$\begin{array}{r} 1 \\ 1 \\ \frac{2}{3} \\ \times \\ \frac{2}{2} \\ \hline \frac{3}{2} \\ 1 \\ 1 \end{array}$$



B.

1. $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

3. $\frac{\cancel{2}}{\cancel{3}} \times \frac{\cancel{2}}{\cancel{4}} = \frac{1}{2}$

5. $\frac{1}{2} \times 1\frac{1}{2} = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$

7. $\frac{5}{8} \times 2\frac{1}{10} = \frac{\cancel{5}}{8} \times \frac{21}{\cancel{10}} = \frac{21}{16} = 1\frac{5}{16}$

9. $\frac{\cancel{4}}{\cancel{3}} \times \frac{\cancel{2}}{\cancel{4}} = 1$

11. $\frac{7}{8} \times 1\frac{1}{5} = \frac{7}{\cancel{8}} \times \frac{\cancel{8}}{5} = \frac{7}{5} = 1\frac{2}{5}$

13. $\frac{7\frac{3}{8}}{\cancel{16}} \times 6 = \frac{21}{8} = 2\frac{5}{8}$

15. $\frac{3}{8} \times 2\frac{2}{3} = \frac{\cancel{3}}{8} \times \frac{\cancel{8}}{\cancel{3}} = 1$

C.

1. $38 \times 3\frac{5}{8} = 38 \times \frac{29}{\cancel{8}} = \frac{551}{4} = 137\frac{3}{4}$ in.

3. $\frac{5}{\cancel{12}} \times 28 = \frac{35}{3} = 11\frac{2}{3}$ ft

5. $28\frac{1}{4} \times 6 = \frac{113}{\cancel{4}} \times \frac{3}{\cancel{6}} = \frac{339}{2} = 169\frac{1}{2}$ in., or 14 ft $1\frac{1}{2}$ in.

7. $22\frac{3}{4} \times 14 = \frac{91}{\cancel{4}} \times \frac{\cancel{14}}{1} = \frac{637}{2} = 318\frac{1}{2}$ mi

9. $46\frac{1}{2} \times 7\frac{2}{3} = \frac{93}{2} \times \frac{23}{\cancel{3}} = \frac{713}{2} = 356\frac{1}{2}$ lb

11. $18 \times \frac{1}{20} = \frac{9}{10}$ in.

13. $\frac{3}{8} \times 26 = \frac{39}{4} = 9\frac{3}{4}$ in.

15. $45 \times 6 \frac{3}{4} = 45 \times \frac{27}{4} = \frac{1,215}{4} = 303 \frac{3}{4} + 45 = 348 \frac{3}{4}$ min

17. $\frac{1}{3} \times 64 = \frac{32}{3} = 10 \frac{2}{3}$ hr

19. $\frac{3}{4} \times \frac{4}{5} = \frac{27}{5} = 5 \frac{2}{5}$ in.

21. $6 \times 3 \frac{3}{4} = 6 \times \frac{15}{4} = \frac{45}{2} = 22 \frac{1}{2}$ picas

23. $12 \times 2 \frac{1}{4} + 11 \times \frac{3}{8} = 12 \times \frac{9}{8} + \frac{33}{8} = 27 + 4 \frac{1}{8} = 31 \frac{1}{8}$ in.

25. $26 \times \frac{1}{8} = 3 \frac{1}{4}$ in.

27. $2 \frac{1}{2} \times \frac{3}{16} = \frac{5}{2} \times \frac{3}{16} = \frac{15}{32}$ in.

29. $4 \frac{5}{8} \times 2 = \frac{37}{8} \times \frac{2}{1} = \frac{37}{4} = 9 \frac{1}{4}$ pounds

31. $15 \frac{1}{2} \times \frac{1}{4} = \frac{31}{2} \times \frac{1}{4} = \frac{31}{8} = 3 \frac{7}{8}$ in.

33. $6 \frac{1}{6} \times 12 = \frac{37}{6} \times \frac{12}{1} = 74$ pairs

Exercises 2-3 Division of Fractions

A.

1. $\frac{5}{6} \div \frac{1}{2} = \frac{5}{6} \times \frac{2}{1} = \frac{5}{3} = 1 \frac{2}{3}$

3. $\frac{5}{12} \div \frac{4}{3} = \frac{5}{12} \times \frac{3}{4} = \frac{5}{16}$

$\frac{1}{2} \div \frac{1}{3} = \frac{3}{2}$

5. $\frac{1}{2} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{4} = \frac{8}{3} = 2 \frac{2}{3}$

$$\frac{\cancel{4}}{2} \cdot 1$$

$$7. \quad \frac{3}{16} \div \frac{6}{8} = \frac{\cancel{3}}{16} \times \frac{\cancel{8}}{\cancel{6}} = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$9. \quad 1\frac{1}{2} \div \frac{1}{6} = \frac{3}{2} \div \frac{1}{6} = \frac{3}{\cancel{2}} \times \frac{\cancel{6}^3}{1} = 9$$

$$11. \quad 3\frac{1}{7} \div 2\frac{5}{14} = \frac{22}{7} \div \frac{33}{14} = \frac{\cancel{22}^2}{7} \times \frac{\cancel{14}^2}{\cancel{33}^3} = \frac{4}{3} = 1\frac{1}{3}$$

$$13. \quad 6\frac{2}{5} \div 5\frac{1}{3} = \frac{32}{5} \div \frac{16}{3} = \frac{\cancel{32}^2}{5} \times \frac{3}{\cancel{16}^1} = \frac{6}{5} = 1\frac{1}{5}$$

$$15. \quad 8 \div \frac{1}{2} = 8 \times \frac{2}{1} = 16$$

$$17. \quad 12 \div \frac{2}{3} = \cancel{12}^6 \times \frac{3}{\cancel{2}} = 18$$

$$19. \quad 5 \div \frac{2}{3} = 5 \times \frac{3}{2} = \frac{15}{2} = 7\frac{1}{2}$$

$$21. \quad \frac{5}{16} \div \frac{3}{8} = \frac{\cancel{5}^1}{\cancel{16}^2} \times \frac{\cancel{8}^1}{3} = \frac{5}{6}$$

$$23. \quad \frac{7}{23} \div 1\frac{3}{4} = \frac{7}{32} \div \frac{7}{4} = \frac{\cancel{7}^1}{\cancel{32}^8} \times \frac{\cancel{4}^1}{7} = \frac{1}{8}$$

B.

$$1. \quad 4 \div \frac{1}{2} = 4 \times \frac{2}{1} = 8 \text{ ft}$$

$$3. \quad 222 \div 4\frac{5}{8} = 222 \div \frac{37}{8} = \frac{\cancel{222}^6}{\cancel{37}^1} \times \frac{8}{1} = 48 \text{ boards}$$

$$5. \quad 4 \div \frac{1}{2} = 4 \times \frac{2}{1} = 8 \text{ pieces}$$

$$7. \quad 47\frac{1}{4} \div 2\frac{5}{8} = \frac{189}{4} \div \frac{21}{8} = \frac{\cancel{189}^9}{\cancel{4}^1} \times \frac{\cancel{8}^2}{\cancel{21}^1} = 18 \text{ courses of brick}$$

$$9. \quad 40 \div 6\frac{1}{4} = 40 \div \frac{25}{4} = \cancel{40}^8 \times \frac{4}{\cancel{25}^5} = \frac{32}{5} = 6\frac{2}{5} = 6 \times 35 = 210 \text{ pieces}$$

$$11. \quad 24\frac{3}{4} \div 3\frac{1}{2} = \frac{99}{4} \div \frac{7}{2} = \frac{\cancel{99}^9}{\cancel{4}^2} \times \frac{\cancel{2}^1}{7} = \frac{99}{14} = 7\frac{1}{14}; 7 \text{ full sheets can be cut}$$

$$13. \quad 2\frac{1}{2} \div \frac{1}{18} = \frac{5}{2} \times \frac{18}{1} = 45 \text{ threads}$$

$$15. \quad 106\frac{1}{2} \text{ sq ft} \div \frac{3}{8} = \frac{213}{2} \times \frac{8}{3} \text{ sq ft} = 284 \text{ sq ft}$$

$$17. \quad \frac{7}{16} \div 3\frac{1}{2} = \frac{7}{16} \div \frac{7}{2} = \frac{7}{16} \times \frac{2}{7} = \frac{1}{8} \text{ in. per year}$$

$$19. \quad 1\frac{1}{8} \div \frac{3}{16} = \frac{9}{8} \times \frac{16}{3} = 6 \text{ washers}$$

Exercises 2-4 Addition and Subtraction of Fractions

A.

$$1. \quad \frac{1}{16} + \frac{3}{16} = \frac{4}{16} = \frac{1}{4}$$

$$3. \quad \frac{5}{16} + \frac{7}{16} = \frac{12}{16} = \frac{3}{4}$$

$$5. \quad \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$$

$$7. \quad \frac{3}{5} - \frac{1}{5} = \frac{2}{5}$$

$$9. \quad \frac{5}{16} + \frac{3}{16} + \frac{7}{16} = \frac{15}{16}$$

$$11. \quad 1\frac{7}{8} - \frac{3}{8} = \frac{15}{8} - \frac{3}{8} = \frac{12}{8} = 1\frac{4}{8} = 1\frac{1}{2}$$

$$13. \quad \frac{1}{4} + \frac{1}{2} = \frac{1}{4} + \frac{2}{4} = \frac{3}{4}$$

$$15. \quad \frac{5}{8} + \frac{1}{12} = \frac{15}{24} + \frac{2}{24} = \frac{17}{24}$$

$$17. \quad \frac{1}{2} - \frac{3}{8} = \frac{4}{8} - \frac{3}{8} = \frac{1}{8}$$

$$19. \quad \frac{15}{16} - \frac{1}{2} = \frac{15}{16} - \frac{8}{16} = \frac{7}{16}$$

$$21. \quad \frac{3}{5} + \frac{1}{8} = \frac{24}{40} + \frac{5}{40} = \frac{29}{40}$$

$$23. \quad \frac{7}{8} - \frac{2}{5} = \frac{35}{40} - \frac{16}{40} = \frac{19}{40}$$

$$25. \quad \frac{1}{2} + \frac{1}{4} - \frac{1}{8} = \frac{4}{8} + \frac{2}{8} - \frac{1}{8} = \frac{6}{8} - \frac{1}{8} = \frac{5}{8}$$

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

$$29. \quad 2\frac{1}{2} + 1\frac{5}{8} = \frac{5}{2} + \frac{13}{8} = \frac{20}{8} + \frac{13}{8} = \frac{33}{8} = 4\frac{1}{8}$$

$$31. \quad 2\frac{1}{3} + \frac{1}{5} = \frac{7}{3} + \frac{6}{5} = \frac{35}{15} + \frac{18}{15} = \frac{53}{15} = 3\frac{8}{15}$$

$$33. \quad 4\frac{1}{8} - 1\frac{3}{4} = \frac{33}{8} - \frac{7}{4} = \frac{33}{8} - \frac{14}{8} = \frac{19}{8} = 2\frac{3}{8}$$

$$35. \quad 3\frac{1}{5} - 2\frac{1}{12} = \frac{16}{5} - \frac{25}{12} = \frac{192}{60} - \frac{125}{60} = \frac{67}{60} = 1\frac{7}{60}$$

B.

$$1. \quad \frac{8}{1} - 2\frac{7}{8} = \frac{64}{8} - \frac{23}{8} = \frac{41}{8} = 5\frac{1}{8}$$

$$3. \quad 3\frac{5}{8} - \frac{13}{16} = \frac{29}{8} - \frac{13}{16} = \frac{58}{16} - \frac{13}{16} = \frac{45}{16} = 2\frac{13}{16}$$

$$5. \quad \frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{4}{8} + \frac{2}{8} + \frac{1}{8} = \frac{7}{8}$$

$$7. \quad \frac{7}{8} + \frac{5}{2} - \frac{5}{4} = \frac{7}{8} + \frac{20}{8} - \frac{10}{8} = \frac{27}{8} - \frac{10}{8} = \frac{17}{8} = 2\frac{1}{8}$$

$$9. \quad 4\frac{7}{8} - 2\frac{3}{16} = \frac{39}{8} - \frac{35}{16} = \frac{78}{16} - \frac{35}{16} = \frac{43}{16} = 2\frac{11}{16}$$

$$11. \quad 6\frac{1}{2} - 2\frac{3}{5} = \frac{13}{2} - \frac{13}{5} = \frac{65}{10} - \frac{26}{10} = \frac{39}{10} = 3\frac{9}{10}$$

C.

$$1. \quad \frac{1}{4} + \frac{5}{8} + 5\frac{3}{4} + \frac{1}{2} + 1\frac{1}{4} + \frac{5}{8} \text{ in.} = \frac{2}{8} + \frac{5}{8} + \frac{46}{8} + \frac{4}{8} + \frac{10}{8} + \frac{5}{8} \text{ in.} = \frac{72}{8} \text{ in.} = 9 \text{ in.}$$

$$3. \quad 46\frac{3}{8} - 34\frac{3}{4} \text{ in.} = 45\frac{11}{8} - 34\frac{6}{8} \text{ in.} = 11\frac{5}{8} \text{ in.}$$

$$5. \quad 1\frac{5}{16} + \frac{2}{8} = \frac{21}{16} + \frac{4}{16} = \frac{25}{16} = 1\frac{9}{16} \text{ in.}$$

$$7. \quad 6\frac{1}{2} + 5\frac{3}{4} + 3\frac{1}{4} + 4\frac{3}{4} + 5 = 6\frac{2}{4} + 5\frac{3}{4} + 3\frac{1}{4} + 4\frac{3}{4} + 5 = 23 + \frac{9}{4} = 25 \frac{1}{4} \text{ c.i.}$$

$$9. \quad 1\frac{1}{2} - \frac{6}{16} = \frac{3}{2} - \frac{6}{16} = \frac{24}{16} - \frac{6}{16} = \frac{18}{16} = 1\frac{2}{16} = 1\frac{1}{8} \text{ in.}$$

$$11. \quad 5\frac{3}{8} + 8\frac{1}{6} + 6\frac{9}{2} + 2\frac{5}{1} + 1 = 5\frac{6}{8} + 8\frac{4}{6} + 6\frac{9}{2} + 2\frac{10}{2} + \frac{8}{2} = 21\frac{37}{2} = 21 + 2\frac{5}{2} = 23\frac{5}{2} \text{ in.}$$

$$13. \quad 18\frac{5}{8} - \left(9\frac{1}{4} + 6\frac{7}{16} + \frac{2}{16}\right) = 18\frac{10}{16} - \left(9\frac{4}{16} + 6\frac{7}{16} + \frac{2}{16}\right) = 18\frac{10}{16} - 15\frac{13}{16} = \frac{298}{16} - \frac{253}{16} = \frac{45}{16} \text{ in. remain}$$

$$15. \quad 101\frac{1}{4} - 100\frac{7}{8} \text{ in.} = \frac{405}{8} \text{ in.} - \frac{807}{8} \text{ in.} = \frac{810}{8} \text{ in.} - \frac{807}{8} \text{ in.} = \frac{3}{8} \text{ in.}$$

$$17. \quad 8\frac{1}{4} - \frac{1}{2} = \frac{33}{4} - \frac{2}{4} = \frac{31}{4} = 7\frac{3}{4} \text{ in.}; \quad 6\frac{3}{4} - \frac{1}{4} = 6\frac{2}{4} \text{ in.}$$

Finished size is $7\frac{3}{4}$ in. \times $6\frac{1}{2}$ in.

$$19. \quad 2\frac{15}{16} - 2\frac{3}{8} = 2\frac{15}{16} - 2\frac{6}{16} = \frac{9}{16} \text{ in.}$$

$$21. \quad 4\frac{5}{8} \text{ in.} - \frac{7}{64} \text{ in.} = 4\frac{40}{64} \text{ in.} - \frac{7}{64} \text{ in.} = 4\frac{33}{64} \text{ in.}$$

$$23. \quad 5\frac{1}{4} \text{ qt} - 4\frac{1}{4} \text{ qt} = \frac{21}{4} - \frac{9}{4} = \frac{21}{4} - \frac{18}{4} = \frac{3}{4} \text{ qt}$$

$$25. \quad 9 - 4\frac{1}{3} = \frac{27}{3} - \frac{13}{3} = \frac{14}{3} = 4\frac{2}{3} \text{ cu yd remaining in the truck}$$

Problem Set 2

A.

$$1. \quad 1\frac{1}{8} = \frac{9}{8}$$

$$3. \quad 1\frac{2}{3} = \frac{5}{3}$$

$$5. \quad 3\frac{3}{32} = \frac{99}{32}$$

$$7. \quad 1\frac{5}{8} = \frac{13}{8}$$

$$9. \quad \frac{10}{4} = 2\frac{2}{4} = 2\frac{1}{2}$$

$$11. \quad \frac{25}{3} = 8\frac{1}{3}$$

$$13. \quad \frac{25}{16} = 1\frac{9}{16}$$

$$15. \quad \frac{35}{4} = 8\frac{3}{4}$$

$$17. \quad \frac{\cancel{6}}{32} = \frac{3}{16}$$

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$$19. \quad \frac{\cancel{12}}{\cancel{32}} = \frac{3}{8}$$

$$21. \quad \frac{\cancel{5}}{\cancel{30}} = \frac{1}{6}$$

$$23. \quad 1\frac{16}{20} = 1\frac{4}{5}$$

$$25. \quad \frac{3}{4} = \frac{9}{12}$$

$$27. \quad 2\frac{3}{4} = \frac{11}{4} = \frac{44}{16}$$

$$29. \quad 5\frac{2}{3} = \frac{17}{3} = \frac{68}{12}$$

$$31. \quad 1\frac{1}{4} = \frac{5}{4} = \frac{15}{12}$$

$$33. \quad \frac{7}{16} = \frac{105}{240}, \frac{2}{15} = \frac{32}{240}, \frac{7}{16} \text{ is larger}$$

$$35. \quad \frac{13}{16}, \frac{7}{8} = \frac{14}{16}, \frac{7}{8} \text{ is larger}$$

$$37. \quad \frac{13}{32} = \frac{65}{160}, \frac{3}{5} = \frac{96}{160}, \frac{3}{5} \text{ is larger}$$

$$39. \quad 1\frac{7}{16}, 1\frac{3}{4} = 1\frac{12}{16}, \frac{7}{16} \text{ is larger}$$

B.

$$1. \quad \frac{1}{2} \times \frac{3}{16} = \frac{3}{32}$$

$$3. \quad \frac{7}{16} \times \frac{4}{3} = \frac{7}{12}$$

$$5. \quad 1\frac{1}{2} \times \frac{5}{6} = \frac{2}{2} \times \frac{5}{6} = \frac{5}{3} = 1\frac{1}{3}$$

$$7. \quad \frac{2}{16} \times \frac{5}{12} = \frac{5}{96}$$

$$9. \quad \frac{3}{4} \times \frac{5}{2} = \frac{15}{8} = 1\frac{7}{8}$$

$$11. \quad 18 \times 1\frac{9}{2} = 18 \times \frac{11}{2} = 99$$

$$13. \quad 2\frac{2}{3} \times 4\frac{3}{8} = \frac{8}{3} \times \frac{35}{8} = \frac{35}{3} = 11\frac{2}{3}$$

$$15. \quad \frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1} = 2$$

$$17. \quad 4 \div \frac{1}{8} = 4 \times \frac{8}{1} = 32$$

$$19. \quad \frac{2}{3} \div 4 = \frac{2}{3} \times \frac{1}{4} = \frac{1}{6}$$

$$21. \quad 3\frac{1}{2} \div 5 = \frac{7}{2} \times \frac{1}{5} = \frac{7}{10}$$

23.

$$\frac{4}{2} \times \frac{8}{3} = \frac{4 \times 8}{2 \times 3} = \frac{32}{6}$$

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$$\frac{2}{2}$$

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$$2$$

$$\frac{4}{4}$$

C.

1. $\frac{3}{8} + \frac{7}{8} = \frac{10}{8} = 1\frac{2}{8} = 1\frac{1}{4}$

3. $\frac{3}{32} + \frac{1}{8} = \frac{3}{32} + \frac{4}{32} = \frac{7}{32}$

5. $\frac{3}{5} + \frac{5}{6} = \frac{18}{30} + \frac{25}{30} = \frac{43}{30} = 1\frac{13}{30}$

7. $\frac{9}{16} - \frac{3}{16} = \frac{6}{16} = \frac{3}{8}$

9. $\frac{11}{16} - \frac{1}{4} = \frac{11}{16} - \frac{4}{16} = \frac{7}{16}$

11. $\frac{7}{8} - \frac{3}{10} = \frac{35}{40} - \frac{12}{40} = \frac{23}{40}$

13. $2\frac{1}{8} + 1\frac{1}{4} = \frac{17}{8} + \frac{5}{4} = \frac{17}{8} + \frac{10}{8} = \frac{27}{8} = 3\frac{3}{8}$

15. $6 - 1\frac{1}{2} = \frac{6}{1} - \frac{3}{2} = \frac{12}{2} - \frac{3}{2} = \frac{9}{2} = 4\frac{1}{2}$

17. $3\frac{2}{3} - 1\frac{7}{8} = \frac{11}{3} - \frac{15}{8} = \frac{88}{24} - \frac{45}{24} = \frac{43}{24} = 1\frac{19}{24}$

19. $\frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{15}{30} + \frac{10}{30} + \frac{6}{30} = \frac{31}{30} = 1\frac{1}{30}$

21. $3\frac{1}{2} - 2\frac{1}{3} = \frac{7}{2} - \frac{7}{3} = \frac{21}{6} - \frac{14}{6} = \frac{7}{6} = 1\frac{1}{6}$

23. $2 - 1\frac{3}{5} = 2 - \frac{8}{5} = \frac{10}{5} - \frac{8}{5} = \frac{2}{5}$

D.

1. $5\frac{7}{8} + 8\frac{1}{2} + 22\frac{3}{4} = \frac{47}{8} + \frac{17}{2} + \frac{91}{4} = \frac{47}{8} + \frac{68}{8} + \frac{182}{8} = \frac{297}{8} = 37\frac{1}{8}$ in.

3. Shortest: $22\frac{3}{8} - \frac{1}{16}$ in. = $22\frac{6}{16} - \frac{1}{16} = 22\frac{5}{16}$ in.

Longest: $22\frac{3}{8} + \frac{1}{16}$ in. = $22\frac{6}{16} + \frac{1}{16}$ in. = $22\frac{7}{16}$ in.

5. $1\frac{7}{8} - 1\frac{3}{32} = 1\frac{28}{32} - 1\frac{3}{32} = \frac{25}{32}$ in. difference

7. $34\frac{1}{2} \div 7\frac{1}{2} = \frac{69}{2} \div \frac{15}{2} = \frac{69}{2} \times \frac{2}{15} = \frac{69}{15} = 4\frac{9}{15} = 4\frac{3}{5}$ cu ft

$$\begin{aligned} 9. \quad 8\frac{1}{4} + 17\frac{3}{8} + 9\frac{13}{16} + 25\frac{1}{2} + 31\frac{7}{8} &= 8\frac{4}{16} + 17\frac{6}{16} + 9\frac{13}{16} + 25\frac{8}{16} + 31\frac{14}{16} \\ &= 90\frac{45}{16} = 90 + 2\frac{13}{16} = 92\frac{13}{16} \text{ in.} \end{aligned}$$

$$11. \quad \frac{3}{4} + \frac{3}{16} = \frac{12}{16} + \frac{3}{16} = \frac{15}{16} \text{ in.}$$

$$13. \quad \text{Radius \#1} = \frac{1}{2} \times 2 \frac{3}{16} = \frac{1}{2} \times \frac{35}{16} = \frac{35}{32}$$

$$\text{Radius \#2} = \frac{1}{2} \times 1 \frac{1}{8} = \frac{1}{2} \times \frac{9}{8} = \frac{9}{16} = \frac{18}{32}$$

$$\frac{23}{4} - \frac{18}{32} - \frac{35}{32} = \frac{184}{32} - \frac{53}{32} = \frac{131}{32} = 4 \frac{3}{32} \text{ in.}$$

$$15. \quad 28 \times 8 \frac{1}{4} + 27 \times \frac{1}{2} = 28 \times \frac{33}{4} + 13 \frac{1}{2} = 231 + 13 \frac{1}{2} = 244 \frac{1}{2} \text{ in.}$$

$$17. \quad 4 \frac{1}{4} - 2 \frac{1}{8} = 4 \frac{2}{8} - 2 \frac{1}{8} = 2 \frac{1}{8} \div 2 = \frac{17}{8} \times \frac{1}{2} = \frac{17}{16}$$

$= 1 \frac{1}{16} \text{ in. margin on each side width-wise}$

$$5 \frac{1}{2} - 4 \frac{1}{8} = 5 \frac{4}{8} - 4 \frac{1}{8} = 1 \frac{3}{8} \div 2 = \frac{11}{8} \times \frac{1}{2}$$

$= \frac{11}{16} \text{ in. margin on each side length-wise}$

$$19. \quad 46 - 2 \times 2 \frac{1}{4} = 46 - 4 \frac{1}{2} = 41 \frac{1}{2} \text{ in.} \div 8 = \frac{83}{2} \times \frac{1}{8} = \frac{83}{16} = 5 \frac{3}{16} \text{ in.}$$

$$21. \quad 7 \frac{1}{2} \text{ in.} \div \left(18 \text{ rev} \times \frac{1}{16} \text{ in.} \right)$$

$\quad \quad \quad \swarrow \text{/min} \quad \quad \swarrow \text{/rev}$

$$= \frac{15}{2} \text{ in.} \div \left(\frac{9 \text{ in.}}{8 \text{ min}} \right) = \frac{15}{2} \text{ in.} \times \frac{8 \text{ min}}{9 \text{ in.}} = \frac{60}{9} \text{ min} = 6 \frac{2}{3} \text{ min}$$

$$23. \quad 4 \times \frac{5}{8} \text{ in.} = \frac{5}{2} \text{ in.} = 2 \frac{1}{2} \text{ in.}$$

$$25. \quad 1 \frac{1}{2} \times \frac{3}{16} \text{ in.} = \frac{3}{2} \times \frac{3}{16} = \frac{9}{32} \text{ in.}$$

$$27. \quad 60 \times 3 \frac{3}{4} = 60 \times \frac{15}{4} = 225 \text{ tablets}$$

$$29. \quad \frac{3}{8} + \frac{3}{4} = \frac{3}{8} + \frac{6}{8} = \frac{9}{8} = 1 \frac{1}{8} \text{ in.}$$

The 1-in. screw is the longest one less than this.

$$31. \quad (a) \quad 10\frac{1}{4} + 8\frac{1}{2} + 22\frac{2}{3} + 2\left(15\frac{1}{3}\right)$$

$$= 10\frac{3}{12} + 8\frac{6}{12} + 22\frac{8}{12} + 1 \times \frac{46}{3}$$

$$= \frac{123}{12} + \frac{102}{12} + \frac{272}{12} + \frac{92}{3}$$

$$= \frac{123}{12} + \frac{102}{12} + \frac{272}{12} + \frac{368}{12}$$

$$= \frac{865}{12} = 72\frac{1}{12} \text{ ft}$$

$$(b) \quad \frac{12}{1} \times \frac{865}{12} = 865 \text{ sq ft}$$

$$(c) \quad 865 \times \$6 = \$5190$$

$$33. \quad 8\frac{3}{4} \times 12 = \frac{35}{4} \times \frac{12}{1} = 105 \text{ pairs of shorts}$$