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Instructor's Solutions Manual
to accompany

MATHEMATICS FOR THE TRADES A Guided Approach

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Contents

Odd-Numbered Solutions 1

1	Arithmetic of Whole Numbers	3
2	Fractions	15
3	Decimal Numbers	27
4	Ratio, Proportion, and Percent	44
5	Measurement	59
6	Pre-Algebra	74
7	Basic Algebra	82
8	Practical Plane Geometry	105
9	Solid Figures and Geometric Constructions	121
10	Triangle Trigonometry	138
11	Advanced Algebra	154
12	Statistics	168

Even-Numbered Solutions 173

1	Arithmetic of Whole Numbers	175
2	Fractions	184
3	Decimal Numbers	196
4	Ratio, Proportion, and Percent	211
5	Measurement	229
6	Pre-Algebra	243
7	Basic Algebra	252
8	Practical Plane Geometry	274
9	Solid Figures and Geometric Constructions	288
10	Triangle Trigonometry	305
11	Advanced Algebra	320
12	Statistics	335

Odd-Numbered Solutions

CHAPTER 1

ARITHMETIC OF WHOLE NUMBERS

Preview 1

1. (a) Two hundred fifty thousand, three hundred seventy-four
 (b) 1,065,008
 (c) (1) 210,000 (2) 214,700

3. (a)
$$\begin{array}{r} 64 \\ \times 37 \\ \hline 448 \\ 192 \\ \hline 2,368 \end{array}$$

(b)
$$\begin{array}{r} 305 \\ \times 243 \\ \hline 915 \\ 1220 \\ 610 \\ \hline 74,115 \end{array}$$

(c)
$$\begin{array}{r} 908 \\ \times 705 \\ \hline 4540 \\ 63560 \\ \hline 640,140 \end{array}$$

(d)
$$\begin{array}{r} 334R2 \\ 6 \overline{)2006} \\ \underline{18} \\ 20 \\ \underline{18} \\ 26 \\ \underline{24} \\ 2 \end{array}$$

(e)
$$\begin{array}{r} 203 \\ 37 \overline{)7511} \\ \underline{74} \\ 111 \\ \underline{111} \\ 0 \end{array}$$

5. (a) 1, 2, 3, 4, 6 and 12

(b) $12 = 2 \times 2 \times 3$

$$\begin{array}{c} 12 \\ \wedge \\ 2 \quad 6 \\ \quad \wedge \\ \quad 2 \quad 3 \end{array}$$

Exercises 1-1 Working with Whole Numbers

A.

1. 70 3. 80 5. 123 7. 132 9. 393
11. 1,390 13. 1,009 15. 861 17. 9,461 19. 11,428
21. 25,717 23. 11,071 25. 175,728

B.

1. 1,042 3. 2,442 5. 7,083 7. 6,352
9. 6,514 11. 64 13. 55 15. 357

C.

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

D.

- | | | |
|---|---|--|
| <p>1. 387 ft
 913
 76
 2,640
 + 845
 ——
 4,861 ft</p> | <p>3. 346
 275
 84
 128
 325
 98
 260
 + 120
 ——
 1,636 screws</p> | <p>5. 78
 428
 143
 96
 + 384
 ——
 1,129 minutes</p> |
| <p>7. (a) 420
 260
 875
 340
 558
 564
 280
 + 310
 ——
 3,607 watts</p> | <p>(b) 875
 564
 + 558
 ——
 1,997 watts</p> | <p>(c) 260
 280
 + 310
 ——
 850 watts</p> |
| <p>9. 1,205
 865
 742
 + 257
 ——
 3,114 bricks</p> | <p>11. \$ 597
 279
 299
 + 139
 ——
 \$1,314</p> | <p>13. 520
 1,160
 49
 + 1,200
 ——
 2,929 ohms</p> |
| <p>15. 485
 74
 251
 + 146
 ——
 756 grams</p> | | |

E.

1. 35,244
 + 61,775
 ——
 97,001 kHz
3. (a) \$307,225 (b) \$732,813 (c) \$2,298,502 (d) \$7,156

<p>5. (a) Total feet of each kind</p> <p>11,453 ft of #12 BHD</p> <p>258 ft of #TX</p> <p>12,715 ft of 410 AAC</p> <p>8,792 ft of 110 ACSR</p> <p>7,425 ft of 6B</p>	<p>(b) Total feet installed at each location</p> <p>3,530 ft at A3</p> <p>8,412 ft at A4</p> <p>4,294 ft at B1</p> <p>5,482 ft at B5</p> <p>5,073 ft at B6</p> <p>6,073 ft at C4</p> <p>7,779 ft at C5</p>
--	--

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. 2,809 | 25. 12,518 | 27. 4,741 | 29. 47,593 |

C.

- | | | |
|---|--|---|
| <p>1. \$ 486</p> <p><u> - 27</u></p> <p>\$ 459</p> | <p>3. 3,540 ft</p> <p><u> - 1,782</u></p> <p>1,758 ft</p> | <p>5. \$ 1,206,512</p> <p><u> - 875,977</u></p> <p>\$ 330,535</p> |
|---|--|---|
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.
- | | |
|---|---|
| <p>9. 238</p> <p><u> - 64</u></p> <p>174 gal</p> | <p>11. 22,000</p> <p><u> - 14,250</u></p> <p>7,750 impressions</p> |
|---|---|
- | | |
|--|--|
| <p>13. 20,000</p> <p><u> - 6,500</u></p> <p>13,500 ohms</p> | <p>15. 1,350,000</p> <p><u> - 850,000</u></p> <p>500,000 Hertz</p> |
|--|--|

D.**1.** Total mileage of each

- # 1 $60,027 - 58,352 = 1,675$
 # 2 $43,302 - 42,135 = 1,167$
 # 3 $78,007 - 76,270 = 1,737$
 # 4 $41,322 - 40,006 = 1,316$
 # 5 $10,002 - 08,642 = 1,360$
 # 6 $35,700 - 35,401 = 299$
 # 7 $80,101 - 79,002 = 1,099$
 # 8 $40,122 - 39,987 = 135$
 # 9 $11,671 - 10,210 = 1,461$
 #10 $73,121 - 71,040 = 2,081$
 Total mileage of all = 12,330

3. $\$28,245$
 $\underline{- 3,814}$
 $\$24,431$

5. (a) Balance A = $\$2,065$

(b) $\$ 6,375$
 $6375 - 379 = 5,996$
 $5996 + 1683 = 7,679$
 $7679 + 474 = 8,153$
 $8153 + 487 = 8,640$
 $8640 - 2373 = 6,267$
 $6267 - 1990 = 4,277$
 $4277 - 308 = 3,969$
 $3969 - 1090 = 2,879$
 $2879 - 814 = 2,065$

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.** 1,404
25. 282 **27.** 720 **29.** 5,040 **31.** 1,938 **33.** 4,484 **35.** 3,822

B.

- 1.** $\begin{array}{r} 305 \\ \times 123 \\ \hline 915 \\ 610 \\ 305 \\ \hline 37,515 \end{array}$ **3.** $\begin{array}{r} 8,043 \\ \times 37 \\ \hline 56301 \\ 24129 \\ \hline 297,591 \end{array}$ **5.** $\begin{array}{r} 3,706 \\ \times 102 \\ \hline 7412 \\ 37060 \\ \hline 378,012 \end{array}$ **7.** $\begin{array}{r} 684 \\ \times 45 \\ \hline 3420 \\ 2736 \\ \hline 30,780 \end{array}$ **9.** $\begin{array}{r} 2,008 \\ \times 198 \\ \hline 16064 \\ 18072 \\ 2008 \\ \hline 397,584 \end{array}$

11. 809 × 9 <u> </u> 7,281	13. 500 × 50 <u> </u> 25,000	15. 7,009 × 504 <u> </u> 28 036 <u> </u> 3 504 50 <u> </u> 3,532,536	17. 316 × 32 <u> </u> 632 <u> </u> 9 48 <u> </u> 10,112	19. 807 × 111 <u> </u> 807 <u> </u> 8 07 <u> </u> 80 7 <u> </u> 89,577
---	---	---	--	--

C.

1. \$ 65
 × 40

 \$ 2,600

3. 65
 × 20

 1,300 ft

5. 50
 × 18

 400

 50

 900

 100
 × 16

 1600

 500
 × 11

 500

 5 00

 5,500

 900
 1,600
 + 5,500

 8,000 = total envelopes

7. 27
 × 2

 54
 × 45

 270

 2 16

 2,430 parts

9. 60
 × 4

 240
 × 5

 1,200 bolts

11. 850
 × 9

 7,650 cards

13. 60
 × 24

 240

 120

 1,440 min

 1,440
 × 16

 8640

 1440

 23,040 screws

15. 23
 × 5

 115 in.

17. 850
 × 25

 4250

 1700

 21,250 ohms, No

15. 170
 × 220

 000
 340

 340

 37,400 bu

D.

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

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

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

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

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

5. 8 hours/day \times 5 days/week = 40 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.

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

3. Not defined

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

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

$$9. \quad \begin{array}{r} 6 \\ 9 \overline{)54} \\ \underline{54} \end{array}$$

$$11. \quad \begin{array}{r} 23 \text{ r}6 \\ 7 \overline{)167} \\ \underline{14} \\ 27 \\ \underline{21} \\ 6 \end{array}$$

$$13. \quad \begin{array}{r} 51 \text{ r}4 \\ 6 \overline{)310} \\ \underline{30} \\ 10 \\ \underline{6} \\ 4 \end{array}$$

$$15. \quad \begin{array}{r} 21 \\ 7 \overline{)147} \\ \underline{14} \\ 07 \\ \underline{7} \end{array}$$

$$17. \quad \begin{array}{r} 37 \\ 6 \overline{)222} \\ \underline{18} \\ 42 \\ \underline{42} \end{array}$$

$$19. \quad \begin{array}{r} 23 \\ 14 \overline{)322} \\ \underline{28} \\ 42 \\ \underline{42} \end{array}$$

$$21. \quad \begin{array}{r} 39 \\ 24 \overline{)936} \\ \underline{72} \\ 216 \\ \underline{216} \end{array}$$

$$23. \quad \begin{array}{r} 9 \text{ r}1 \\ 81 \overline{)730} \\ \underline{729} \\ 1 \end{array}$$

$$25. \quad \begin{array}{r} 22 \\ 31 \overline{)682} \\ \underline{62} \\ 62 \\ \underline{62} \end{array}$$

$$27. \quad \begin{array}{r} 8 \text{ r}35 \\ 42 \overline{)371} \\ \underline{336} \\ 35 \end{array}$$

B.

$$1. \quad 61 \overline{)7320}$$

$$\begin{array}{r} 120 \\ 61 \\ \hline 122 \\ 122 \\ \hline \end{array}$$

$$3. \quad 16 \overline{)904} \text{ r}8$$

$$\begin{array}{r} 56 \\ 16 \\ \hline 80 \\ 104 \\ \hline 96 \\ \hline 8 \end{array}$$

$$5. \quad 21 \overline{)2016}$$

$$\begin{array}{r} 96 \\ 21 \\ \hline 189 \\ 126 \\ \hline 126 \\ \hline \end{array}$$

$$7. \quad 9 \overline{)2000}$$

$$\begin{array}{r} 222 \\ 9 \\ \hline 18 \\ 20 \\ \hline 18 \\ 20 \\ \hline 18 \\ 2 \\ \hline \end{array}$$

$$9. \quad 14 \overline{)4275} \text{ r}5$$

$$\begin{array}{r} 305 \\ 14 \\ \hline 42 \\ 075 \\ \hline 70 \\ \hline 5 \end{array}$$

$$11. \quad 53 \overline{)6307}$$

$$\begin{array}{r} 119 \\ 53 \\ \hline 53 \\ 100 \\ \hline 53 \\ 477 \\ \hline 477 \\ \hline \end{array}$$

$$13. \quad 7 \overline{)3507}$$

$$\begin{array}{r} 501 \\ 7 \\ \hline 35 \\ 007 \\ \hline 7 \\ \hline \end{array}$$

$$15. \quad 6 \overline{)3624}$$

$$\begin{array}{r} 604 \\ 6 \\ \hline 36 \\ 024 \\ \hline 24 \\ \hline \end{array}$$

$$17. \quad 15 \overline{)3000}$$

$$\begin{array}{r} 200 \\ 15 \\ \hline 30 \\ 000 \\ \hline \end{array}$$

$$19. \quad 24 \overline{)2596} \text{ r}4$$

$$\begin{array}{r} 108 \\ 24 \\ \hline 24 \\ 196 \\ \hline 192 \\ \hline 4 \end{array}$$

$$21. \quad 38 \overline{)22800}$$

$$\begin{array}{r} 600 \\ 38 \\ \hline 228 \\ 000 \\ \hline \end{array}$$

$$23. \quad 411 \overline{)42020} \text{ r}98$$

$$\begin{array}{r} 102 \\ 411 \\ \hline 411 \\ 920 \\ \hline 822 \\ 98 \\ \hline \end{array}$$

$$25. \quad 111 \overline{)11111} \text{ r}11$$

$$\begin{array}{r} 100 \\ 111 \\ \hline 011 \\ 0 \\ \hline 11 \end{array}$$

$$27. \quad 405 \overline{)7008} \text{ r}123$$

$$\begin{array}{r} 17 \\ 405 \\ \hline 2958 \\ 2835 \\ \hline 123 \end{array}$$

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.

$$1. \quad 9 \overline{)243} \text{ 27 in.}$$

$$\begin{array}{r} 27 \\ 9 \\ \hline 18 \\ 63 \\ \hline 63 \\ \hline \end{array}$$

$$3. \quad 85 \overline{)1105} \text{ 13 hr}$$

$$\begin{array}{r} 13 \\ 85 \\ \hline 85 \\ 255 \\ \hline 255 \\ \hline \end{array}$$

$$5. \quad 16 \overline{)432} \text{ 27 + 1 = 28 joists}$$

$$\begin{array}{r} 27 \\ 16 \\ \hline 32 \\ 112 \\ \hline 112 \\ \hline \end{array}$$

$$7. \quad \begin{array}{r} 7 \text{ in.} \\ 18 \overline{)126} \\ \underline{126} \end{array}$$

$$9. \quad \begin{array}{r} \$ 1,400 \\ - \quad 176 \\ \hline \$ 1,224 \end{array}$$

$$\begin{array}{r} \$68 \text{ per hour} \\ 18 \overline{)1224} \\ \underline{108} \\ 144 \\ \underline{144} \end{array}$$

$$11. \quad \begin{array}{r} 48 \text{ boxes} \\ 10 \overline{)480} \\ \underline{40} \\ 80 \\ \underline{80} \end{array}$$

$$13. \quad \begin{array}{r} 27 \text{ reams} \\ 500 \overline{)13500} \\ \underline{1000} \\ 3500 \\ \underline{3500} \end{array}$$

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

$$7. \quad \begin{array}{r} 42 \text{ hours} \\ 115 \overline{)4830} \\ \underline{460} \\ 230 \\ \underline{230} \end{array}$$

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

B.

1. $3 \times \$18 + 5 \times \$20 = \$54 + \$100 = \$154$

3. $12 \times \$11 - 5 \times \$9 = \$132 - \$45 = \$87$

5. Cost = $2 \times \$10 \times 40 + 3 \times \$10 \times 40 + \$2140 + \500
= $\$800 + \$2160 + \$2140 + \500
= $\$5600$

C.

1. $462 + 83 \times 95 = 462 + 7,885 = 8,347$

3. $7,482 - 1,152 \div 12 = 7,482 - 96 = 7,386$

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

7. $612 + 86 \times 9 - 1,026 \div 38 = 612 + 774 - 27 = 1,359$

9. $3,579 - 16 \times (72 + 46) = 3,579 - 16 \times 118 = 3,579 - 1,888 = 1,691$

11. $864 \div 16 \times 27 = 54 \times 27 = 1,458$

13. $(296 + 18 \times 48) \times 12 = (296 + 864) \times 12 = 1,160 \times 12 = 13,920$

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

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.
$$\begin{array}{r} 43 \\ - 28 \\ \hline 15 \end{array}$$
9.
$$\begin{array}{r} 734 \\ - 85 \\ \hline 649 \end{array}$$
11.
$$\begin{array}{r} 543 \\ - 348 \\ \hline 195 \end{array}$$
13.
$$\begin{array}{r} 376 \\ \times 4 \\ \hline 1,504 \end{array}$$
15.
$$\begin{array}{r} 67 \\ \times 21 \\ \hline 134 \\ 1,407 \end{array}$$
17.
$$\begin{array}{r} 207 \\ \times 63 \\ \hline 1242 \\ 13,041 \end{array}$$
19.
$$\begin{array}{r} 5,236 \\ \times 44 \\ \hline 20944 \\ 230,384 \end{array}$$
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.
$$\frac{36 \times 91}{13 \times 42} \times \frac{3,276}{546}$$

$$= 546 \overline{)3276}$$

36	42
$\times 91$	$\times 13$
$\hline 36$	$\hline 126$
3 24	42
$\hline 3,276$	$\hline 546$
31. $120 - 40 \div 8 = 120 - 5 = 115$
33. $3 \times 4 - 15 \div 3 = 12 - 5 = 7$
35.
$$\begin{array}{r} 308 \\ 793 \\ \hline 144 \\ \hline 1,245 \end{array}$$

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. $346 + 210 + 4 \times 164 + 2 \times 96 + 208 + 280 = 1,892 \text{ sq ft}$

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

7.
$$\begin{array}{r} 210 \\ 215 \\ 245 \\ 217 \\ 220 \\ 227 \\ \underline{115} \\ 1,449 \end{array} \quad \begin{array}{r} 207 \text{ lb average} \\ 7 \overline{)1449} \\ \underline{14} \\ 049 \\ \underline{49} \end{array}$$

9. $\$350 + 12 \times \$116 = \$350 + \$1,392 = \$1,742$

$$\begin{array}{r} \$ 116 \\ \times 12 \\ \hline 232 \\ \underline{116} \\ \$1392 \end{array}$$

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. $167 \times 17 = 2,839 \text{ lbs}$

17. $\frac{3}{4} \times 32 = 24 \text{ hours}$
 Note: $45 \text{ min} = \frac{3}{4} \text{ hr}$

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

21.
$$\begin{array}{r} 506,409 \\ - 460,089 \\ \hline 46,320 \text{ in 4 hrs} \end{array}$$

$$\begin{array}{r} 11580 \text{ rph} \\ 4 \overline{)46320} \end{array}$$

$$\begin{array}{r} 193 \text{ rpm} \\ 60 \overline{)11580} \\ \underline{60} \\ 558 \\ \underline{540} \\ 180 \\ \underline{180} \end{array}$$

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

25.
$$\begin{aligned} \$60 \times 36 + \$350 &= \$2160 + \$350 = \$2510 \\ \$2510 - \$2400 &= \$110 \end{aligned}$$