Solutions Manual

Algebra $\sqrt{\frac{1}{2}}$

An Incremental Development

THIRD EDITION

SAXON

Solutions Manual for

Algebra $\frac{1}{2}$

An Incremental Development

Third Edition

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Preface

This manual contains solutions to every problem set in the *Algebra $\frac{1}{2}$*, Third Edition, textbook. Early solutions of problems of a particular type contain every step. Later solutions omit obvious steps. We have attempted to stay as close as possible to the methods and procedures outlined in the textbook. These solutions are representative of a student's work, but many problems have alternate solutions. For ease of grading, the final answer of each problem is set in boldface type.

The following individuals were instrumental in the development of this solutions manual, and we gratefully acknowledge their contributions: Clint Keele and Matt Maloney for writing and revising the solutions; Karen Bottoms for working the problems and checking the answers; Eric Atkins and Jane Claunch for typesetting the manual; Sariah Adams, Jeremy Eiken, and Chad Morris for proofreading the manual; Wendy Chitwood, David LeBlanc, Tonea Morrow, Dan O'Connor, Jason Purswell, and Nancy Rimassa for creating the graphics; Chris Davey for copyediting the manual; and Carrie Brown and Brian Rice for supervising the project.

PROBLEM SET 1

1. (a) This 6 is in the ten-thousands' place, so it has a value of $6 \times 10,000$, or **60,000.**

   (b) This 9 is in the hundreds' place, so it has a value of 9×100, or **900.**

   (c) This 3 is in the units' place, so it has a value of 3×1, or **3.**

2. **334,333**

3. **3,666,766**

4. **39,959,992**

5. **41,000,200,520**

6. **507,640,090,042**

7. **407,000,090,742,072**

8. **980,000,470**

9. 517,236,428 is **five hundred seventeen million, two hundred thirty-six thousand, four hundred twenty-eight**

10. 90,807,060 is **ninety million, eight hundred seven thousand, sixty**

11. 32,000,000,652 is **thirty-two billion, six hundred fifty-two**

12. 3,250,009,111 is **three billion, two hundred fifty million, nine thousand, one hundred eleven**

13. 6,040,000 is **six million, forty thousand**

14. 99,019,900 is **ninety-nine million, nineteen thousand, nine hundred**

15. $(3 \times 100,000) + (4 \times 1000) + (2 \times 10)$
    $= 300,000 + 4000 + 20 = \mathbf{304,020}$

16. $(7 \times 10,000) + (8 \times 100) + (6 \times 10)$
    $= 70,000 + 800 + 60 = \mathbf{70,860}$

17. $(9 \times 1000) + (4 \times 100) + (5 \times 1)$
    $= 9000 + 400 + 5 = \mathbf{9405}$

18. $(7 \times 1,000,000) + (2 \times 10,000) + (6 \times 1000)$
    $= 7,000,000 + 20,000 + 6000 = \mathbf{7,026,000}$

19. $5280 = 5000 + 200 + 80$
    $= (5 \times 1000) + (2 \times 100) + (8 \times 10)$

20. $408 = 400 + 8 = (4 \times 100) + (8 \times 1)$

21. $70,600 = 70,000 + 600$
    $= (7 \times 10,000) + (6 \times 100)$

22. $21,000 = 20,000 + 1000$
    $= (2 \times 10,000) + (1 \times 1000)$

23. $4005 = 4000 + 5 = (4 \times 1000) + (5 \times 1)$

24. $9080 = 9000 + 80 = (9 \times 1000) + (8 \times 10)$

25.
```
     43
     76
     84
   + 91
    294
```

26.
```
    4628
    5734
  + 8416
   18,778
```

27.
```
   $53.58
 + $52.78
  $106.36
```

28.
```
    9056
    4708
  + 9076
   22,840
```

29.
```
    432
    846
    943
  + 721
   2942
```

30.
```
   $3.64
   $0.52
 + $9.00
  $13.16
```

PROBLEM SET 2

1.
```
        -11  -5    2  6          19
  +--+--|--+--•+--•-•--+--+--•-+
  -20 -15 -10 -5  0  5  10 15 20
```
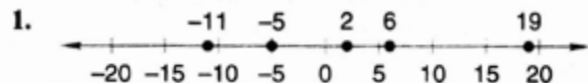
2. **−415, 145, 154, 451, 514**

3. **249, 294, 429, 924, 942**

4.
$$\downarrow$$
4,185,②70

The rounded number is **4,185,300.**

5.

$\downarrow$

83,72①,525

The rounded number is **83,722,000.**

6.

$\downarrow$

415,②37,842

The rounded number is **415,200,000.**

7. **777,727,757**

8. **3,634,733**

9. **107,047,020**

10. **93,462,000,047**

11. 731,284,006 is **seven hundred thirty-one million, two hundred eighty-four thousand, six**

12. 903,721,625 is **nine hundred three million, seven hundred twenty-one thousand, six hundred twenty-five**

13. 9,003,001,256 is **nine billion, three million, one thousand, two hundred fifty-six**

14. 7,234,000,052 is **seven billion, two hundred thirty-four million, fifty-two**

15. $(7 \times 10,000) + (6 \times 100) + (5 \times 10)$
    $+ (4 \times 1)$
    $= 70,000 + 600 + 50 + 4 = $ **70,654**

16. $(3 \times 100,000) + (9 \times 1000) + (7 \times 100)$
    $+ (6 \times 10) + (3 \times 1)$
    $= 300,000 + 9000 + 700 + 60 + 3$
    $= $ **309,763**

17. $(9 \times 1000) + (6 \times 100) + (9 \times 1)$
    $= 9000 + 600 + 9 = $ **9609**

18. $109,326 = 100,000 + 9000 + 300 + 20 + 6$
    $= (1 \times 100,000) + (9 \times 1000) + (3 \times 100)$
    $+ (2 \times 10) + (6 \times 1)$

19. $68,312 = 60,000 + 8000 + 300 + 10 + 2$
    $= (6 \times 10,000) + (8 \times 1000) + (3 \times 100)$
    $+ (1 \times 10) + (2 \times 1)$

20. $903,162 = 900,000 + 3000 + 100 + 60 + 2$
    $= (9 \times 100,000) + (3 \times 1000) + (1 \times 100)$
    $+ (6 \times 10) + (2 \times 1)$

21.
$$\begin{array}{r} \$93.17 \\ \$45.26 \\ + \ \$90.15 \\ \hline \$228.58 \end{array}$$

22.
$$\begin{array}{r} 7316 \\ 4582 \\ + \ 9143 \\ \hline 21,041 \end{array}$$

23.
$$\begin{array}{r} 88,871 \\ 40,012 \\ + \ 90,375 \\ \hline 219,258 \end{array}$$

24.
$$\begin{array}{r} 78,524 \\ 91,325 \\ 70,026 \\ + \ 91,358 \\ \hline 331,233 \end{array}$$

25.
$$\begin{array}{r} 42,715 \\ 90,826 \\ 41,222 \\ + \ 39,057 \\ \hline 213,820 \end{array}$$

26. $37,251 + 81,432 + 90,256 + 21,312$
    $= $ **230,251**

27. $14 + 32 + 16 + 21 + 932 + 21 = $ **1036**

28. $1 + 2 + 21 + 12 + 122 + 1222 = $ **1380**

29. $33¢ + \$3 + \$13.99 = $ **\$17.32**

30. $4 + 314 + 134 + 13,245 = $ **13,697**

PROBLEM SET 3

1. **225,223**

2. **70,777**

3. **4,144,444**

4. **14,705,052**

5. **500,000,465,182**

6. $64,030 = 60,000 + 4000 + 30$
    $= (6 \times 10,000) + (4 \times 1000) + (3 \times 10)$

7. $79,003 = 70,000 + 9000 + 3$
    $= (7 \times 10,000) + (9 \times 1000) + (3 \times 1)$

8. $123,419 = 100,000 + 20,000 + 3000 + 400$
$+ 10 + 9$
$= (1 \times 100,000) + (2 \times 10,000) + (3 \times 1000)$
$+ (4 \times 100) + (1 \times 10) + (9 \times 1)$

9. $\begin{array}{r} 551 \\ - \ 174 \\ \hline \mathbf{377} \end{array}$

10. $\begin{array}{r} 853 \\ - \ 284 \\ \hline \mathbf{569} \end{array}$

11. $\begin{array}{r} 936 \\ + \ 474 \\ \hline \mathbf{1410} \end{array}$

12. $\begin{array}{r} 839 \\ + \ 472 \\ \hline \mathbf{1311} \end{array}$

13. $\begin{array}{r} \$60.00 \\ - \ \$49.49 \\ \hline \mathbf{\$10.51} \end{array}$

14. $\begin{array}{r} 4017 \\ - \ 3952 \\ \hline \mathbf{65} \end{array}$

15. $\begin{array}{r} X \\ - \ 245 \\ \hline 276 \end{array}$ $\begin{array}{r} 276 \\ + \ 245 \\ \hline \mathbf{521} \end{array}$ Check: $\begin{array}{r} 521 \\ - \ 245 \\ \hline 276 \end{array}$

16. $\begin{array}{r} 800 \\ - \ M \\ \hline 436 \end{array}$ $\begin{array}{r} 800 \\ - \ 436 \\ \hline \mathbf{364} \end{array}$ Check: $\begin{array}{r} 800 \\ - \ 364 \\ \hline 436 \end{array}$

17. $\begin{array}{r} 735 \\ + \ A \\ \hline 1211 \end{array}$ $\begin{array}{r} 1211 \\ - \ 735 \\ \hline \mathbf{476} \end{array}$ Check: $\begin{array}{r} 735 \\ + \ 476 \\ \hline 1211 \end{array}$

18. $\begin{array}{r} 925 \\ + \ F \\ \hline 1111 \end{array}$ $\begin{array}{r} 1111 \\ - \ 925 \\ \hline \mathbf{186} \end{array}$ Check: $\begin{array}{r} 925 \\ + \ 186 \\ \hline 1111 \end{array}$

19. $(8 \times 10,000) + (5 \times 1000) + (3 \times 100)$
$+ (2 \times 10) + (5 \times 1)$
$= 80,000 + 5000 + 300 + 20 + 5 = \mathbf{85,325}$

20. $(6 \times 1000) + (6 \times 100) + (6 \times 1)$
$= 6000 + 600 + 6 = \mathbf{6606}$

21. $(3 \times 100,000) + (2 \times 10,000) + (9 \times 100)$
$+ (7 \times 1)$
$= 300,000 + 20,000 + 900 + 7 = \mathbf{320,907}$

22. 5,803,125,702 is **five billion, eight hundred three million, one hundred twenty-five thousand, seven hundred two**

23. $295 + 486 + 588 + 714 = \mathbf{2083}$

24. $\$2 + \$9.37 + 86¢ = \mathbf{\$12.23}$

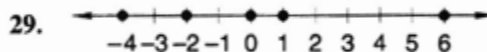25. $\begin{array}{r} 90,125 \\ 40,061 \\ 30,627 \\ + \ 95,132 \\ \hline \mathbf{255,945} \end{array}$

26. $\begin{array}{r} 1125 \\ 986 \\ 139 \\ + \ 2364 \\ \hline \mathbf{4614} \end{array}$

27. $7\textcircled{1}6,487,250$
The rounded number is **720,000,000.**

28. $716,4\textcircled{8}7,250$
The rounded number is **716,490,000.**

29.

30. **−213, 123, 132, 231, 321**

PROBLEM SET 4

1. **7333**

2. **3,339,933**

3. **47,000,014**

4. **14,000,042,755**

5. $71\textcircled{6},487,250$
The rounded number is **716,000,000.**

6. **−176, −76, 167, 617, 671**

7. $7650 = (7 \times \mathbf{1000}) + (6 \times \mathbf{100}) + (5 \times \mathbf{10})$

8. $(5 \times 1000) + (6 \times 10) + (7 \times 1) = \mathbf{5067}$

9. $\dfrac{\$25.11}{9}$

$$
\begin{array}{r}
\mathbf{\$2.79} \\
9\overline{)\$25.11} \\
\underline{18} \\
7\,1 \\
\underline{6\,3} \\
81 \\
\underline{81} \\
0
\end{array}
$$

10. $2800 \div 50$

$$
\begin{array}{r}
\mathbf{56} \\
50\overline{)2800} \\
\underline{250} \\
300 \\
\underline{300} \\
0
\end{array}
$$

11.

$$
\begin{array}{r}
\mathbf{1115\ r\ 42} \\
45\overline{)50{,}217} \\
\underline{45} \\
5\,2 \\
\underline{4\,5} \\
71 \\
\underline{45} \\
267 \\
\underline{225} \\
42
\end{array}
$$

12. $\dfrac{9114}{7}$

$$
\begin{array}{r}
\mathbf{1302} \\
7\overline{)9114} \\
\underline{7} \\
21 \\
\underline{21} \\
01 \\
\underline{0} \\
14 \\
\underline{14} \\
0
\end{array}
$$

13. $4165 \div 40$

$$
\begin{array}{r}
\mathbf{104\ r\ 5} \\
40\overline{)4165} \\
\underline{40} \\
16 \\
\underline{0} \\
165 \\
\underline{160} \\
5
\end{array}
$$

14.

$$
\begin{array}{r}
\mathbf{1438\ r\ 17} \\
21\overline{)30{,}215} \\
\underline{21} \\
9\,2 \\
\underline{8\,4} \\
81 \\
\underline{63} \\
185 \\
\underline{168} \\
17
\end{array}
$$

15.

$$
\begin{array}{r}
285 \\
\times\ 321 \\
\hline
285 \\
570 \\
855 \\
\hline
\mathbf{91{,}485}
\end{array}
$$

16.

$$
\begin{array}{r}
\$5.06 \\
\times\ \ \ 75 \\
\hline
2530 \\
3542 \\
\hline
\mathbf{\$379.50}
\end{array}
$$

17.

$$
\begin{array}{r}
512 \\
\times\ 320 \\
\hline
10240 \\
1536 \\
\hline
\mathbf{163{,}840}
\end{array}
$$

18. $25 \times 40 \times 100$

$$
\begin{array}{rr}
25 & 1000 \\
\times\ 40 & \times\ \ 100 \\
\hline
1000 & \mathbf{100{,}000}
\end{array}
$$

19. 500×420

$$
\begin{array}{r}
500 \\
\times\ 420 \\
\hline
10000 \\
2000 \\
\hline
\mathbf{210{,}000}
\end{array}
$$

20. $6 \times 12 \times 24$

$$
\begin{array}{rr}
12 & 72 \\
\times\ \ 6 & \times\ 24 \\
\hline
72 & 288 \\
 & 144 \\
\hline
 & \mathbf{1728}
\end{array}
$$

21.

$$
\begin{array}{rrl}
943 & 943 & \text{Check:}\quad 943 \\
-\ \ X & -\ 274 & -\ 669 \\
\hline
274 & \mathbf{669} & 274
\end{array}
$$

22.
$$
\begin{array}{r} 605 \\ +\ M \\ \hline 927 \end{array}
\qquad
\begin{array}{r} 927 \\ -\ 605 \\ \hline \mathbf{322} \end{array}
\qquad
\text{Check:}
\begin{array}{r} 605 \\ +\ 322 \\ \hline 927 \end{array}
$$

23.
$$
\begin{array}{r} K \\ -\ 2257 \\ \hline 925 \end{array}
\qquad
\begin{array}{r} 2257 \\ +\ 925 \\ \hline \mathbf{3182} \end{array}
\qquad
\text{Check:}
\begin{array}{r} 3182 \\ -\ 2257 \\ \hline 925 \end{array}
$$

24. $25 \times N = 400$

$$
\begin{array}{r} 16 \\ 25\overline{)400} \\ \underline{25} \\ 150 \\ \underline{150} \\ 0 \end{array}
\qquad
\text{Check:}
\begin{array}{r} 25 \\ \times\ 16 \\ \hline 150 \\ \underline{25} \\ 400 \end{array}
$$

25. $625 \div W = 25$

$$
\begin{array}{r} 25 \\ 25\overline{)625} \\ \underline{50} \\ 125 \\ \underline{125} \\ 0 \end{array}
\qquad
\text{Check: Our solution provides its own check.}
$$

26. $\dfrac{X}{54} = 7$

$$
\begin{array}{r} 54 \\ \times\ 7 \\ \hline \mathbf{378} \end{array}
\qquad
\text{Check: }
\begin{array}{r} 7 \\ 54\overline{)378} \\ \underline{378} \\ 0 \end{array}
$$

27.
$$
\begin{array}{r} 408{,}627 \\ 915{,}634 \\ 589{,}062 \\ +\ 113{,}093 \\ \hline \mathbf{2{,}026{,}416} \end{array}
$$

28.
$$
\begin{array}{r} 957{,}125 \\ 826{,}015 \\ 902{,}121 \\ +\ 313{,}947 \\ \hline \mathbf{2{,}999{,}208} \end{array}
$$

29. $73 + 816 + 92 + 47 + 321 + 5432 = \mathbf{6781}$

30. $92¢ + \$31.82 + \$21 = \mathbf{\$53.74}$

PROBLEM SET 5

1.
$$
\begin{array}{r} 6190 \\ -\ 5320 \\ \hline \mathbf{870}\ \textbf{people} \end{array}
$$

2.
$$
\begin{array}{r} 530 \\ +\ N \\ \hline 778 \end{array}
\qquad
\begin{array}{r} 778 \\ -\ 530 \\ \hline \mathbf{248}\ \textbf{dancers} \end{array}
\qquad
\text{Check:}
\begin{array}{r} 530 \\ +\ 248 \\ \hline 778 \end{array}
$$

3.
$$
\begin{array}{r} 725{,}000{,}000 \\ -\ 550{,}000{,}000 \\ \hline \mathbf{175{,}000{,}000}\ \textbf{people} \end{array}
$$

4.
$$
\begin{array}{r} \$25.17 \\ -\ \$\ 8.56 \\ \hline \mathbf{\$16.61} \end{array}
$$

5. **86,838,887**

6. **1,555,155**

7. $\dfrac{9300}{7}$

$$
\begin{array}{r} 1328\ \text{r}\ 4 \\ 7\overline{)9300} \\ \underline{7} \\ 23 \\ \underline{21} \\ 20 \\ \underline{14} \\ 60 \\ \underline{56} \\ 4 \end{array}
$$

8. $\$41.63 \div 23$

$$
\begin{array}{r} \$1.81 \\ 23\overline{)\$41.63} \\ \underline{23} \\ 18\ 6 \\ \underline{18\ 4} \\ 23 \\ \underline{23} \\ 0 \end{array}
$$

9.
$$
\begin{array}{r} 2607\ \text{r}\ 13 \\ 16\overline{)41{,}725} \\ \underline{32} \\ 9\ 7 \\ \underline{9\ 6} \\ 12 \\ \underline{0} \\ 125 \\ \underline{112} \\ 13 \end{array}
$$

10.
$$
\begin{array}{r} \$7.89 \\ \times\ 9 \\ \hline \mathbf{\$71.01} \end{array}
$$

11.
$$
\begin{array}{r} 506 \\ \times\ 27 \\ \hline 3542 \\ 1012 \\ \hline \mathbf{13{,}662} \end{array}
$$

12.
$$\begin{array}{r} 512 \\ \times\ 632 \\ \hline 1024 \\ 1536\ \\ 3072\ \ \\ \hline 323{,}584 \end{array}$$

13.
$$\begin{array}{r} A \\ -\ 526 \\ \hline 437 \end{array} \qquad \begin{array}{r} 526 \\ +\ 437 \\ \hline \mathbf{963} \end{array} \qquad \text{Check:} \begin{array}{r} 963 \\ -\ 526 \\ \hline 437 \end{array}$$

14.
$$\begin{array}{r} 743 \\ -\ N \\ \hline 188 \end{array} \qquad \begin{array}{r} 743 \\ -\ 188 \\ \hline \mathbf{555} \end{array} \qquad \text{Check:} \begin{array}{r} 743 \\ -\ 555 \\ \hline 188 \end{array}$$

15.
$$\begin{array}{r} F \\ -\ 123 \\ \hline 289 \end{array} \qquad \begin{array}{r} 123 \\ +\ 289 \\ \hline \mathbf{412} \end{array} \qquad \text{Check:} \begin{array}{r} 412 \\ -\ 123 \\ \hline 289 \end{array}$$

16.
$$\begin{array}{r} K \\ +\ 325 \\ \hline 1001 \end{array} \qquad \begin{array}{r} 1001 \\ -\ 325 \\ \hline \mathbf{676} \end{array} \qquad \text{Check:} \begin{array}{r} 676 \\ +\ 325 \\ \hline 1001 \end{array}$$

17.
$$\begin{array}{r} 643 \\ +\ X \\ \hline 1112 \end{array} \qquad \begin{array}{r} 1112 \\ -\ 643 \\ \hline \mathbf{469} \end{array} \qquad \text{Check:} \begin{array}{r} 643 \\ +\ 469 \\ \hline 1112 \end{array}$$

18.
$$\begin{array}{r} S \\ +\ 727 \\ \hline 915 \end{array} \qquad \begin{array}{r} 915 \\ -\ 727 \\ \hline \mathbf{188} \end{array} \qquad \text{Check:} \begin{array}{r} 188 \\ +\ 727 \\ \hline 915 \end{array}$$

19.
$$\begin{array}{r} 32 \\ \times\ W \\ \hline 224 \end{array} \qquad 32\overline{)224} \quad \begin{array}{r} \mathbf{7} \\ \underline{224} \\ 0 \end{array} \qquad \text{Check:} \begin{array}{r} 32 \\ \times\ 7 \\ \hline 224 \end{array}$$

20. $D \div 26 = 7$
$$\begin{array}{r} 26 \\ \times\ 7 \\ \hline \mathbf{182} \end{array} \qquad \text{Check: } 26\overline{)182} \begin{array}{r} 7 \\ \underline{182} \\ 0 \end{array}$$

21. $\dfrac{990}{P} = 45$

$$45\overline{)990} \begin{array}{r} \mathbf{22} \\ \underline{90} \\ 90 \\ \underline{90} \\ 0 \end{array} \qquad \text{Check: } 22\overline{)990} \begin{array}{r} 45 \\ \underline{88} \\ 110 \\ \underline{110} \\ 0 \end{array}$$

22. $(7 \times 10{,}000) + (4 \times 100) + (3 \times 10)$
$= \mathbf{70{,}430}$

23. $2109 = (2 \times 1000) + (1 \times 100) + (9 \times 1)$

24. **47,000,014**

25. **14,000,042,755**

26. **−691, −619, 169, 196, 916, 961**

27. 5021 is **five thousand, twenty-one**

28.
716,48⑦,250
The rounded number is **716,487,000.**

29.
$$\begin{array}{r} 408{,}627 \\ +\ 915{,}634 \\ \hline \mathbf{1{,}324{,}261} \end{array}$$

30. $\$9.99 + 33¢ + \$1.07 = \mathbf{\$11.39}$

PROBLEM SET 6

1.
$$\begin{array}{r} 37{,}918{,}500 \\ -\ 19{,}099{,}009 \\ \hline \mathbf{18{,}819{,}491} \end{array}$$

2.
$$\begin{array}{r} 725{,}000{,}000 \\ +\ 475{,}000{,}000 \\ \hline \mathbf{1{,}200{,}000{,}000}\ \textbf{people} \end{array}$$

3.
$$\begin{array}{r} 10{,}000 \\ -\ 5{,}420 \\ \hline \mathbf{4{,}580}\ \textbf{runners} \end{array}$$

4. **6,264,666**

5. **372,333**

6.
$$\begin{array}{r} 14.0300 \\ -\ 0.0132 \\ \hline \mathbf{14.0168} \end{array} \qquad \text{Check:} \begin{array}{r} 14.0168 \\ +\ 0.0132 \\ \hline 14.0300 \end{array}$$

7.
$$\begin{array}{r} 941.20 \\ -\ 14.23 \\ \hline \mathbf{926.97} \end{array} \qquad \text{Check:} \begin{array}{r} 926.97 \\ +\ 14.23 \\ \hline 941.20 \end{array}$$

8. $\dfrac{3624}{23}$

$$23\overline{)3624} \begin{array}{r} \mathbf{157\ r\ 13} \\ \underline{23} \\ 132 \\ \underline{115} \\ 174 \\ \underline{161} \\ 13 \end{array}$$

9. $\$12.75 \div 17$

$$
\begin{array}{r}
\mathbf{\$0.75} \\
17\overline{)\$12.75} \\
\underline{11\ 9} \\
85 \\
\underline{85} \\
0
\end{array}
$$

10.
$$
\begin{array}{r}
\mathbf{811\ r\ 1} \\
51\overline{)41,362} \\
\underline{40\ 8} \\
56 \\
\underline{51} \\
52 \\
\underline{51} \\
1
\end{array}
$$

11.
$$
\begin{array}{r}
\mathbf{81\ r\ 2} \\
27\overline{)2189} \\
\underline{216} \\
29 \\
\underline{27} \\
2
\end{array}
$$

12. $2546 \div 41$

$$
\begin{array}{r}
\mathbf{62\ r\ 4} \\
41\overline{)2546} \\
\underline{246} \\
86 \\
\underline{82} \\
4
\end{array}
$$

13. $\dfrac{92,438}{51}$

$$
\begin{array}{r}
\mathbf{1812\ r\ 26} \\
51\overline{)92,438} \\
\underline{51} \\
41\ 4 \\
\underline{40\ 8} \\
63 \\
\underline{51} \\
128 \\
\underline{102} \\
26
\end{array}
$$

14.
$$\downarrow$$
$0.02①532$

The rounded number is **0.021.**

15.
$$\downarrow$$
$14.1193①627$

The rounded number is **14.11932.**

16. 3178.0285 is **three thousand, one hundred seventy-eight and two hundred eighty-five ten-thousandths**

17. 504,327.001510512 is **five hundred four thousand, three hundred twenty-seven and one million, five hundred ten thousand, five hundred twelve billionths**

18. **63,000.0214**

19. **0.000029**

20.
$$
\begin{array}{r}
625 \\
+\ \ Z \\
\hline
913
\end{array}
\qquad
\begin{array}{r}
913 \\
-\ 625 \\
\hline
\mathbf{288}
\end{array}
\qquad
\text{Check:}
\begin{array}{r}
625 \\
+\ 288 \\
\hline
913
\end{array}
$$

21.
$$
\begin{array}{r}
921 \\
-\ \ Y \\
\hline
199
\end{array}
\qquad
\begin{array}{r}
921 \\
-\ 199 \\
\hline
\mathbf{722}
\end{array}
\qquad
\text{Check:}
\begin{array}{r}
921 \\
-\ 722 \\
\hline
199
\end{array}
$$

22.
$$
\begin{array}{r}
X \\
-\ 763 \\
\hline
189
\end{array}
\qquad
\begin{array}{r}
763 \\
+\ 189 \\
\hline
\mathbf{952}
\end{array}
\qquad
\text{Check:}
\begin{array}{r}
952 \\
-\ 763 \\
\hline
189
\end{array}
$$

23.
$$
\begin{array}{r}
W \\
\times\ 8 \\
\hline
\$50.00
\end{array}
$$

$$
\begin{array}{r}
\mathbf{\$6.25} \\
8\overline{)\$50.00} \\
\underline{48} \\
2\ 0 \\
\underline{1\ 6} \\
40 \\
\underline{40} \\
0
\end{array}
\qquad
\text{Check:}
\begin{array}{r}
\$6.25 \\
\times\ \ \ 8 \\
\hline
\$50.00
\end{array}
$$

24. $N \div 18 = 15$

$$
\begin{array}{r}
18 \\
\times\ 15 \\
\hline
90 \\
\underline{18} \\
\mathbf{270}
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
15 \\
18\overline{)270} \\
\underline{18} \\
90 \\
\underline{90} \\
0
\end{array}
$$

25. $\dfrac{945}{V} = 45$

$$
\begin{array}{r}
\mathbf{21} \\
45\overline{)945} \\
\underline{90} \\
45 \\
\underline{45} \\
0
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
45 \\
21\overline{)945} \\
\underline{84} \\
105 \\
\underline{105} \\
0
\end{array}
$$

26.
```
      0.005
     21.620
      9.035
  +  5165.200
    5195.860
```

27.
```
    70.0200
     0.0013
     9.0620
  +  0.1420
    79.2253
```

28. $3917 = (3 \times 1000) + (9 \times 100) + (1 \times 10) + (7 \times 1)$

29. $(9 \times 10{,}000) + (4 \times 1000) + (5 \times 100) + (7 \times 10) + (9 \times 1) = $ **94,579**

30.
```
       703
    ×  579
      6327
      4921
      3515
    407,037
```

PROBLEM SET 7

1.
```
    1569
  + 1237
    2806 heroic acts
```

2.
```
    35,264
  - 17,927
    17,337 fans
```

3.
```
    72,000
  - 39,400
    32,600 delegates
```

4. **747,777,677,277**

5.
```
    1.4160      Check:   1.3992
  - 0.0168             + 0.0168
    1.3992               1.4160
```

6.
```
    23.410      Check:   20.744
  -  2.666             +  2.666
    20.744               23.410
```

7.
```
    38.04       Check:   36.44
  -  1.60              +  1.60
    36.44                38.04
```

8.
```
  Estimate:    10      Evaluate:    14.13
            ×  20                 ×  21.6
              200                   8478
                                    1413
                                    2826
                                  305.208
```

9.
```
  Estimate:   900      Evaluate:   914.23
            × 0.01                × 0.0132
             9.00                  182846
                                   274269
                                    91423
                                12.067836
```

10.
```
  Estimate:  0.004     Evaluate:   0.00413
            ×   0.3               ×   0.312
             0.0012                   826
                                      413
                                     1239
                               0.00128856
```

11. $\$90.16 \div 23$
```
            $3.92
    23)$90.16
         69
         21 1
         20 7
           46
           46
            0
```

12.
```
             1812.585
    41)74,316.000
       41
       33 3
       32 8
          51
          41
         106
          82
         24 0
         20 5
          3 50
          3 28
           220
           205
            15
```

The rounded number is **1812.59.**

13. $\dfrac{90.327}{0.08}$

```
            1129.087
008.)9032.700
         8
         10
          8
          23
          16
          72
          72
           07
            0
            70
            64
            60
            56
             4
```

The rounded number is **1129.09**.

14. $42 \div 0.009$

```
              4666.666
0009.)42000.000
        36
        60
         54
         60
          54
          60
           54
            60
             5 4
              60
               54
               60
                54
                 6
```

The rounded number is **4666.67**.

15.
$$\downarrow$$
91.648⑤73
The rounded number is **91.6486**.

16.
$$\downarrow$$
0.84165⑧39
The rounded number is **0.841658**.

17. $-13, -10, -2, 0, 6, 12$

18. **4007.09742**

19. **702.00942**

20. 14,372.015264 is **fourteen thousand, three hundred seventy-two and fifteen thousand, two hundred sixty-four millionths**

21. 9001.321 is **nine thousand one and three hundred twenty-one thousandths**

22.
```
    X        493     Check:   902
  − 493    + 409            − 493
    409      902              409
```

23.
```
    S       1151     Check:   678
  + 473    − 473            + 473
   1151      678             1151
```

24.
```
   126      1152     Check:    126
  +  A     − 126            + 1026
   1152     1026             1152
```

25. $276 \div X = 12$
```
      23                    12
  12)276      Check: 23)276
     24                    23
     36                    46
     36                    46
      0                     0
```

26. $\dfrac{N}{7} = 27$
```
     27                    27
   × 7      Check: 7)189
    189                   14
                          49
                          49
                           0
```

27. $13 \times P = 117$
```
       9     Check:    13
  13)117             × 9
     117              117
       0
```

28. $\$15 + 54¢ + \$31.62 = \mathbf{\$47.16}$

29.
```
      3.164
     75.236
  + 4328.914
    4407.314
```

30.
```
      3.0624
  + 9053.2160
    9056.2784
```

PROBLEM SET 8

1.   32,015,032
   − 14,000,642
   18,014,390 light-years

2.   1743
   + 1234
   2977 orations

3. $\dfrac{41,362.68}{100}$ = **413.6268**

4.   305.2165 × 100 = **30,521.65**

5.   9315.21 ÷ 1000 = **9.31521**

6.   32.1652 × 10,000 = **321,652**

7.   0.00526
   ×   3.14
   2104
   526
   1578
   0.0165164

8.   2.315
   ×   413
   6945
   2315
   9260
   956.095

9.   0.00312
   ×   0.642
   624
   1248
   1872
   0.00200304

10.   313.65
   ×   0.9
   282.285

11.   392.163   Check: 388.086
   −   4.077   +   4.077
   388.086   392.163

12.   3.2421   Check: 1.8791
   − 1.3630   + 1.3630
   1.8791   3.2421

13.   A   28.9   Check: 15.5
   + 13.4   − 13.4   + 13.4
   28.9   **15.5**   28.9

14.   116.04   116.04   Check: 116.04
   −   X   − 107.06   −   8.98
   107.06   **8.98**   107.06

15. $\dfrac{Q}{12.2}$ = 6

   12.2
   ×   6   Check: $122\overline{)732.}$ 6
   73.2   732
                        0

16.   9 × R = 587.7

   65.3   Check: 65.3
   $9\overline{)587.7}$ ×   9
   54   587.7
   47
   45
   2 7
   2 7
   0

17.   58.8 ÷ M = 4.9

   12   4.9
   $49\overline{)588.}$ Check: $12\overline{)58.8}$
   49   48
   98   10 8
   98   10 8
   0   0

18. $\dfrac{59.329}{0.4}$

   148.322
   $04\overline{)593.290}$
   4
   19
   16
   33
   32
   1 2
   1 2
   09
   8
   10
   8
   2

The rounded number is **148.32.**

Algebra $\frac{1}{2}$, Third Edition

19. $52 \div 7$

$$
\begin{array}{r}
7.428 \\
7\overline{)52.000} \\
\underline{49} \\
3\,0 \\
\underline{2\,8} \\
20 \\
\underline{14} \\
60 \\
\underline{56} \\
4
\end{array}
$$

The rounded number is **7.43**.

20. $\dfrac{321.4}{0.071}$

$$
\begin{array}{r}
4526.760 \\
0071.\overline{)321400.000} \\
\underline{284} \\
374 \\
\underline{355} \\
190 \\
\underline{142} \\
480 \\
\underline{426} \\
54\,0 \\
\underline{49\,7} \\
4\,30 \\
\underline{4\,26} \\
40 \\
\underline{0} \\
40
\end{array}
$$

The rounded number is **4526.76**.

21. $3.22 \div 0.0022$

$$
\begin{array}{r}
1463.636 \\
00022.\overline{)32200.000} \\
\underline{22} \\
102 \\
\underline{88} \\
140 \\
\underline{132} \\
80 \\
\underline{66} \\
14\,0 \\
\underline{13\,2} \\
80 \\
\underline{66} \\
140 \\
\underline{132} \\
8
\end{array}
$$

The rounded number is **1463.64**.

22.

42.12345⑥78

The rounded number is **42.123457**.

23.

31.6③72052

The rounded number is **31.64**.

24. **47,000,067,000.00417**

25. **1003.04742**

26. 0.00006184 is **six thousand, one hundred eighty-four hundred-millionths**

27. 4,000,062.013 is **four million, sixty-two and thirteen thousandths**

28. **0.0164, 0.0426, 0.0461, 0.0614**

29.
$$
\begin{array}{r}
7186.132 \\
+\quad 185.620 \\
\hline
\mathbf{7371.752}
\end{array}
$$

30.
$$
\begin{array}{r}
42.1600 \\
0.0032 \\
+\quad 3.1650 \\
\hline
\mathbf{45.3282}
\end{array}
$$

PROBLEM SET 9

1.
$$
\begin{array}{r}
35,000 \\
-\ 19,763 \\
\hline
\mathbf{15,237}\text{ musicians}
\end{array}
$$

2.
$$
\begin{array}{r}
23,215 \\
-\ 16,219 \\
\hline
\mathbf{6,996}\text{ canvases}
\end{array}
$$

3. $\dfrac{3164.215}{100} = \mathbf{31.64215}$

4. $3164.215 \times 100 = \mathbf{316,421.5}$

5. $\dfrac{417,365.20}{1000} = \mathbf{417.36520}$

6. $2.15 \times 10,000 = \mathbf{21,500}$

7.
$$
\begin{array}{r}
0.0316 \\
\times\quad 2.4 \\
\hline
1264 \\
632\quad \\
\hline
\mathbf{0.07584}
\end{array}
$$

8.
$$\begin{array}{r} 2.862 \\ \times \quad 61 \\ \hline 2862 \\ 17172 \\ \hline 174.582 \end{array}$$

9.
$$\begin{array}{r} 8.123 \\ \times \quad 0.9 \\ \hline 7.3107 \end{array}$$

10.
$$\begin{array}{r} 43.240000 \\ - \quad 0.000613 \\ \hline 43.239387 \end{array}$$
Check:
$$\begin{array}{r} 43.239387 \\ + \quad 0.000613 \\ \hline 43.240000 \end{array}$$

11.
$$\begin{array}{r} 3.065 \\ - \ 0.210 \\ \hline 2.855 \end{array}$$
Check:
$$\begin{array}{r} 2.855 \\ + \ 0.210 \\ \hline 3.065 \end{array}$$

12. $PR = PQ + QR$

$3.065 = PQ + 1.423$

$$\begin{array}{r} 3.065 \\ - \ 1.423 \\ \hline 1.642 \ \text{units} \end{array}$$
Check:
$$\begin{array}{r} 1.642 \\ + \ 1.423 \\ \hline 3.065 \end{array}$$

13. $(6 + 10 + 20 + 10 + 26 + 20)$ in. $= \textbf{92 in.}$

14. $(40 + 7 + 34 + 15 + 34 + 10 + 40 + 32)$ in.
$= \textbf{212 in.}$

15. $0.002215 \div 0.042$

$$\begin{array}{r} 0.052 \\ 0042.\overline{)0002.215} \\ 2\ 10 \\ \hline 115 \\ 84 \\ \hline 31 \end{array}$$

The rounded number is **0.05.**

16. $\dfrac{16.032}{0.024}$

$$\begin{array}{r} 668 \\ 0024.\overline{)16032.} \\ 144 \\ \hline 163 \\ 144 \\ \hline 192 \\ 192 \\ \hline 0 \end{array}$$

17. $\dfrac{416.5}{0.07}$

$$\begin{array}{r} 5950. \\ 007.\overline{)41650.} \\ 35 \\ \hline 66 \\ 63 \\ \hline 35 \\ 35 \\ \hline 0 \end{array}$$

18.
$$\downarrow$$
$61.373737\ⓈΘ42$

61.373737⑧42

The rounded number is **61.3737378.**

19.
$$\downarrow$$
$433.6851④72$

The rounded number is **433.68515.**

20. **742,000,537.010948**

21. **0.0001748**

22. 0.00128647 is **one hundred twenty-eight thousand, six hundred forty-seven hundred-millionths**

23. 27,000,316.081 is **twenty-seven million, three hundred sixteen and eighty-one thousandths**

24. **2.00321, 2.01465, 2.0155, 2.04285**

25.
$$\begin{array}{r} 904.682 \\ 513.976 \\ + \ 214.685 \\ \hline 1633.343 \end{array}$$

26.
$$\begin{array}{r} 2172.062 \\ + \ 5091.799 \\ \hline 7263.861 \end{array}$$

27.
$$\begin{array}{r} 204.63 \\ - \quad A \\ \hline 39.67 \end{array}$$
$$\begin{array}{r} 204.63 \\ - \ 39.67 \\ \hline \textbf{164.96} \end{array}$$
Check:
$$\begin{array}{r} 204.63 \\ - \ 164.96 \\ \hline 39.67 \end{array}$$

28.
$$\begin{array}{r} 88.762 \\ + \quad L \\ \hline 89.800 \end{array}$$
$$\begin{array}{r} 89.800 \\ - \ 88.762 \\ \hline \textbf{1.038} \end{array}$$
Check:
$$\begin{array}{r} 88.762 \\ + \ 1.038 \\ \hline 89.800 \end{array}$$

29. $\frac{Z}{9} = 0.52$

$$
\begin{array}{r}
0.52 \\
\times \quad 9 \\
\hline
\mathbf{4.68}
\end{array}
\qquad
\text{Check: } 9\overline{)4.68} \\
$$

$$
\begin{array}{r}
0.52 \\
9\overline{)4.68} \\
\underline{4\,5} \\
18 \\
\underline{18} \\
0
\end{array}
$$

30. $0.8 \times R = 1.44$

$$
\begin{array}{r}
\mathbf{1.8} \\
08_{.})\overline{14_{.}4} \\
\underline{8} \\
6\,4 \\
\underline{6\,4} \\
0
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
1.8 \\
\times \, 0.8 \\
\hline
1.44
\end{array}
$$

PROBLEM SET 10

1.
$$
\begin{array}{r}
2{,}300{,}619 \\
- \; 1{,}219{,}312 \\
\hline
\mathbf{1{,}081{,}307 \text{ people}}
\end{array}
$$

2.
$$
\begin{array}{r}
2941 \text{ m} \\
- \; 1627 \text{ m} \\
\hline
\mathbf{1314 \text{ m}}
\end{array}
$$

3. **762,000,442.12792**

4. **0.014702**

5. $(34 + 16 + 29 + 9 + 5 + 25)\,\text{m} = \mathbf{118\ m}$

6. $(12 + 23 + 13 + 8 + 25 + 31)\,\text{m} = \mathbf{112\ m}$

7.
$$
\begin{array}{r}
0.0352 \\
\times \quad 2.24 \\
\hline
1408 \\
704 \\
704 \\
\hline
\mathbf{0.078848}
\end{array}
$$

8.
$$
\begin{array}{r}
305 \\
\times \; 2.42 \\
\hline
610 \\
1220 \\
610 \\
\hline
\mathbf{738.10}
\end{array}
$$

9.
$$
\begin{array}{r}
3.062 \\
\times \quad 410 \\
\hline
30620 \\
12248 \\
\hline
\mathbf{1255.420}
\end{array}
$$

10.
$$
\begin{array}{r}
70 \\
\times \; 0.9 \\
\hline
\mathbf{63.0}
\end{array}
$$

11.
$$
\begin{array}{r}
4.016 \\
- \; 3.217 \\
\hline
\mathbf{0.799}
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
0.799 \\
+ \; 3.217 \\
\hline
4.016
\end{array}
$$

12.
$$
\begin{array}{r}
23.2100 \\
- \; \; 0.0034 \\
\hline
\mathbf{23.2066}
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
23.2066 \\
+ \; \; 0.0034 \\
\hline
23.2100
\end{array}
$$

13.
$$
\begin{array}{r}
2.049 \\
- \quad N \\
\hline
0.684
\end{array}
\qquad
\begin{array}{r}
2.049 \\
- \; 0.684 \\
\hline
\mathbf{1.365}
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
2.049 \\
- \; 1.365 \\
\hline
0.684
\end{array}
$$

14.
$$
\begin{array}{r}
F \\
+ \; 963.09 \\
\hline
1750.24
\end{array}
\qquad
\begin{array}{r}
1750.24 \\
- \; 963.09 \\
\hline
\mathbf{787.15}
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
787.15 \\
+ \; 963.09 \\
\hline
1750.24
\end{array}
$$

15. $\dfrac{14.28}{X} = 0.51$

$$
\begin{array}{r}
\mathbf{28.} \\
051_{.})\overline{1428_{.}} \\
\underline{102} \\
408 \\
\underline{408} \\
0
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
0.51 \\
28\overline{)14.28} \\
\underline{14\,0} \\
28 \\
\underline{28} \\
0
\end{array}
$$

16. $M \cdot 5 = 8.5$

$$
\begin{array}{r}
\mathbf{1.7} \\
5\overline{)8.5} \\
\underline{5} \\
3\,5 \\
\underline{3\,5} \\
0
\end{array}
\qquad
\text{Check: }
\begin{array}{r}
1.7 \\
\times \quad 5 \\
\hline
8.5
\end{array}
$$

17. $0.0030 \div 0.031$

$$
\begin{array}{r}
0.096 \\
0031_{.})\overline{0003_{.}000} \\
\underline{2\,79} \\
210 \\
\underline{186} \\
24
\end{array}
$$

The rounded number is **0.10.**

18. $\dfrac{18.034}{0.04}$

$$
\begin{array}{r}
450.85 \\
004.\overline{)1803.40} \\
16 \\
\hline
20 \\
20 \\
\hline
03 \\
0 \\
\hline
3\ 4 \\
3\ 2 \\
\hline
20 \\
20 \\
\hline
0
\end{array}
$$

19. $2.77 \div 0.0055$

$$
\begin{array}{r}
503.636 \\
00055.\overline{)27700.000} \\
275 \\
\hline
200 \\
165 \\
\hline
35\ 0 \\
33\ 0 \\
\hline
2\ 00 \\
1\ 65 \\
\hline
350 \\
330 \\
\hline
20
\end{array}
$$

The rounded number is **503.64.**

20. $\dfrac{50.93}{9}$

$$
\begin{array}{r}
5.658 \\
9\overline{)50.930} \\
45 \\
\hline
5\ 9 \\
5\ 4 \\
\hline
53 \\
45 \\
\hline
80 \\
72 \\
\hline
8
\end{array}
$$

The rounded number is **5.66.**

21. (a) The following numbers are divisible by 2, since the last digit of each is even: **300, 4888, 9132, and 72,654.**

(b) The following numbers are divisible by 3, since the sum of the digits of each is divisible by 3: **300, 9132, and 72,654.**

(c) The following numbers are divisible by 5, since the last digit of each is either 5 or 0: **235 and 300.**

(d) The following number is divisible by 10, since its last digit is 0: **300.**

22.

4②83.52162

The rounded number is **4300.**

23.

478.64③85

The rounded number is **478.644.**

24. $47{,}123 \div 1000 = \textbf{47.123}$

25. $40.265 \times 1000 = \textbf{40,265}$

26. $\dfrac{0.00143}{100} = \textbf{0.0000143}$

27. 472.058 is **four hundred seventy-two and fifty-eight thousandths**

28. **0.341, 0.417, 0.471, 0.704, 0.714**

29. $MR = MN + NR$

$11 = 7.43 + NR$

$$
\begin{array}{rr}
11.00 & \text{Check:} \quad 7.43 \\
-\ 7.43 & +\ 3.57 \\
\hline
\textbf{3.57 cm} & 11.00\ \text{cm}
\end{array}
$$

30.
$$
\begin{array}{r}
416.520 \\
3.006 \\
+\ 215.006 \\
\hline
\textbf{634.532}
\end{array}
$$

PROBLEM SET 11

1.
$$
\begin{array}{r}
50 \\
\times\ 15 \\
\hline
250 \\
50 \\
\hline
\textbf{750 players}
\end{array}
$$

2. $15 \times N = 660$

$$
\begin{array}{r}
\textbf{44 students} \\
15\overline{)660} \\
60 \\
\hline
60 \\
60 \\
\hline
0
\end{array}
$$

3.   19.0863 in.
      + 24.4506 in.
      43.5369 in.

4.   43,219
      − 26,314
      16,905 delegates

5. (31 + 14 + 25 + 11 + 6 + 25) in. = **112 in.**

6. (31 + 17 + 12 + 8 + 19 + 25) in. = **112 in.**

7. 132,116 ÷ 10,000 = **13.2116**

8. 136.13 × 1000 = **136,130**

9. $\dfrac{123.6}{1000}$ = **0.1236**

10.   162
      × 2.25
      810
      324
      324
      364.50

11.   1.811
      × 20.1
      1811
      3622
      36.4011

12.   19
      × 0.91
      19
      171
      17.29

13.   61.8100   Check: 61.8088
      − 0.0012   + 0.0012
      61.8088   61.8100

14.   129.631   Check: 127.151
      − 2.480   + 2.480
      127.151   129.631

15.   2.110   Check: 1.079
      − 1.031   + 1.031
      1.079   2.110

16. (a) The following numbers are divisible by 2, since the last digit of each is even: **6132, 9130,** and **6130.**

(b) The following numbers are divisible by 3, since the sum of the digits of each is divisible by 3: **6132** and **6111.**

(c) The following numbers are divisible by 5, since the last digit of each is either 5 or 0: **6325, 9130,** and **6130.**

(d) The following numbers are divisible by 10, since the last digit of each is 0: **9130** and **6130.**

17. $\dfrac{411.23}{61}$

```
       6.741
  61)411.230
     366
      45 2
      42 7
       2 53
       2 44
         90
         61
         29
```

The rounded number is **6.74.**

18. 0.0016 ÷ 0.011

```
          0.145
  0011.)0001.600
          1 1
           50
           44
           60
           55
            5
```

The rounded number is **0.15.**

19. $\dfrac{11.031}{3.1}$

```
        3.558
  31.)110.310
      93
      17 3
      15 5
       1 81
       1 55
         260
         248
          12
```

The rounded number is **3.56.**

20.

223.0⑨2870

The rounded number is **223.09.**

21.

$1\underline{6}21.32161$

The rounded number is **1600**.

22. **1,625,000,250,025.123**

23. 123.9621 is **one hundred twenty-three and nine thousand, six hundred twenty-one ten-thousandths**

24. 223,092,870 is **two hundred twenty-three million, ninety-two thousand, eight hundred seventy**

25.
```
  1135.62
+   32.61
  1168.23
```

26. An acute angle is an angle less than a right angle (90° angle).

27. $DF = DE + EF$

$6.32 = 3.12 + EF$

```
  6.32        Check:   3.20
- 3.12               + 3.12
  3.20 cm             6.32 cm
```

28.
```
     A       68.73     Check:   91.22
- 22.49    + 22.49            - 22.49
  68.73      91.22              68.73
```

29. $X \cdot 0.3 = 116.91$

```
          389.7     Check:   389.7
03.)1169.1                 ×   0.3
     9                       116.91
    26
    24
    29
    27
     2 1
     2 1
       0
```

30. $\dfrac{0.0768}{D} = 0.48$

```
         0.16                    0.48
048.)007.68     Check: 016.)007.68
     4 8                      6 4
     2 88                     1 28
     2 88                     1 28
       0                        0
```

1.
```
  12,000.04100 in.
-  1,021.00002 in.
  10,979.04098 in.
```

2.
```
  14,000,762.0075
+    842,015.0070
  14,842,777.0145 units
```

3. $5 \times N = 740$

```
    148 containers
5)740
  5
  24
  20
  40
  40
   0
```

4. $25 \times N = 602$

```
      24
25)602
   50
   102
   100
     2
```

2 buses will have 25 fanatic fans; 23 buses will have 24 fanatic fans.

5. (a) The following numbers are divisible by 2, since the last digit of each is even: **302, 9172, 3132,** and **62,120.**

(b) The following number is divisible by 3, since the sum of its digits is divisible by 3: **3132.**

(c) The following numbers are divisible by 5, since the last digit of each is either 5 or 0: **625** and **62,120.**

(d) The following number is divisible by 10, since its last digit is 0: **62,120.**

6. $(52 + 23 + 42 + 7 + 10 + 30)$ ft = **164 ft**

7. $(31 + 10 + 16 + 15 + 15 + 25)$ ft = **112 ft**

8. $91,865 \div 100 =$ **918.65**

9. $36.8211 \times 1000 =$ **36,821.1**

10. $5 + 7 + 11 + 13 + 17 + 19 + 23 =$ **95**

11. $2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 =$ **77**

12.
$$
\begin{array}{r}
913 \\
\times\ 0.19 \\
\hline
8217 \\
913 \\
\hline
\mathbf{173.47}
\end{array}
$$

13.
$$
\begin{array}{r}
0.0316 \\
\times\ \ \ \ 8.9 \\
\hline
2844 \\
2528 \\
\hline
\mathbf{0.28124}
\end{array}
$$

14. (a) $\dfrac{95}{5} = 19$

$95 = 5 \cdot 19$

(b) $\dfrac{720}{5} = 144$; $\dfrac{144}{3} = 48$; $\dfrac{48}{3} = 16$;

$\dfrac{16}{2} = 8$; $\dfrac{8}{2} = 4$; $\dfrac{4}{2} = 2$

$720 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$

(c) $\dfrac{2862}{2} = 1431$; $\dfrac{1431}{3} = 477$; $\dfrac{477}{3} = 159$;

$\dfrac{159}{3} = 53$

$2862 = 2 \cdot 3 \cdot 3 \cdot 3 \cdot 53$

15.
$$
\begin{array}{r}
162.1330 \\
-\ \ \ 0.0123 \\
\hline
\mathbf{162.1207}
\end{array}
\qquad
\text{Check:}
\begin{array}{r}
162.1207 \\
+\ \ \ 0.0123 \\
\hline
162.1330
\end{array}
$$

16.
$$
\begin{array}{r}
1.329 \\
-\ 0.999 \\
\hline
\mathbf{0.330}
\end{array}
\qquad
\text{Check:}
\begin{array}{r}
0.330 \\
+\ 0.999 \\
\hline
1.329
\end{array}
$$

17.
$$
\begin{array}{r}
A \\
-\ \$41.29 \\
\hline
\$9.93
\end{array}
\quad
\begin{array}{r}
\$\ 9.93 \\
+\ \$41.29 \\
\hline
\mathbf{\$51.22}
\end{array}
\quad
\text{Check:}
\begin{array}{r}
\$51.22 \\
-\ \$41.29 \\
\hline
\$9.93
\end{array}
$$

18. $25 \times D = 1953$

$$
\begin{array}{r}
\mathbf{78.12} \\
25\overline{)1953.00} \\
175 \\
\hline
203 \\
200 \\
\hline
3\,0 \\
2\,5 \\
\hline
50 \\
50 \\
\hline
0
\end{array}
\qquad
\text{Check:}
\begin{array}{r}
78.12 \\
\times\ \ \ \ 25 \\
\hline
39060 \\
15624 \\
\hline
1953.00
\end{array}
$$

19. $\dfrac{N}{3.1} = 200.32$

$$
\begin{array}{r}
200.32 \\
\times\ \ \ \ 3.1 \\
\hline
20032 \\
60096 \\
\hline
\mathbf{620.992}
\end{array}
\qquad
\text{Check:}\ 31\overline{)6209.92}
$$
$$
\begin{array}{r}
62 \\
\hline
09 \\
0 \\
\hline
9\,9 \\
9\,3 \\
\hline
62 \\
62 \\
\hline
0
\end{array}
$$

20. $\dfrac{3012.3}{12}$

$$
\begin{array}{r}
251.025 \\
12\overline{)3012.300} \\
24 \\
\hline
61 \\
60 \\
\hline
12 \\
12 \\
\hline
0\,30 \\
24 \\
\hline
60 \\
60 \\
\hline
0
\end{array}
$$

The rounded number is **251.03.**

21. $\dfrac{32.631}{0.03}$

$$
\begin{array}{r}
\mathbf{1087.7} \\
3\overline{)3263.1} \\
3 \\
\hline
026 \\
24 \\
\hline
23 \\
21 \\
\hline
2\,1 \\
2\,1 \\
\hline
0
\end{array}
$$

22. $18.621 \div 6.1$

$$
\begin{array}{r}
3.052 \\
61\overline{)186.210} \\
183 \\
\hline
3\,21 \\
3\,05 \\
\hline
160 \\
122 \\
\hline
38
\end{array}
$$

The rounded number is **3.05.**

23.

↓

4⑥92.83215

The rounded number is **4700.**

24.

↓

4113.6②185

The rounded number is **4113.62.**

25. **961,313,000,025**

26. 0.001621 is **one thousand, six hundred twenty-one millionths**

27. 16.0562 is **sixteen and five hundred sixty-two ten-thousandths**

28. **An obtuse angle is an angle greater than a right angle (90°) but less than a straight angle (180°).**

29.   931.62
       621.73
   + 631.81
   ‾‾‾‾‾‾‾‾‾
     2185.16

30.   0.7210
   + 4.3906
   ‾‾‾‾‾‾‾‾‾
     5.1116

PROBLEM SET 13

1.   79,864
   ×   26
   ‾‾‾‾‾‾‾‾‾
     479184
     159728
   ‾‾‾‾‾‾‾‾‾
   2,076,464 points

2.   2.53
   ×   38
   ‾‾‾‾‾‾‾
     2024
      759
   ‾‾‾‾‾‾‾
   96.14 percent

3. $100 \times N = 26,000$

$26,000 \div 100 =$ **260 bags**

4.   14,742,000.000170
   −   800,000.000042
   ‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾
   13,942,000.000128 hectares

5. $13 + 17 + 19 + 23 + 29 + 31 + 37 + 41$
   = 210

6. (a) The following numbers are divisible by 2, since the last digit of each is even: **1020, 130, 1332,** and **132.**

(b) The following numbers are divisible by 3, since the sum of the digits of each is divisible by 3: **1020, 1332,** and **132.**

(c) The following numbers are divisible by 5, since the last digit of each is either 5 or 0: **1020, 125, 130,** and **185.**

(d) The following numbers are divisible by 10, since the last digit of each is 0: **1020** and **130.**

7. $(31 + 20 + 25 + 5 + 6 + 25)$ cm = **112 cm**

8. $(31 + 25 + 31 + 25)$ cm = **112 cm**

9. $31,621 \div 1000 =$ **31.621**

10. $311.836152 \times 10,000 =$ **3,118,361.52**

11.   621
   × 8.11
   ‾‾‾‾‾‾‾
      621
      621
     4968
   ‾‾‾‾‾‾‾
   5036.31

12.   2.28
   × 22.4
   ‾‾‾‾‾‾‾
      912
      456
      456
   ‾‾‾‾‾‾‾
   51.072

13. (a) $\dfrac{360}{5} = 72$; $\dfrac{72}{3} = 24$; $\dfrac{24}{3} = 8$; $\dfrac{8}{2} = 4$;

$\dfrac{4}{2} = 2$

$360 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$

(b) $\dfrac{720}{5} = 144$; $\dfrac{144}{3} = 48$; $\dfrac{48}{3} = 16$;

$\dfrac{16}{2} = 8$; $\dfrac{8}{2} = 4$; $\dfrac{4}{2} = 2$

$720 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$

(c) $\dfrac{1440}{5} = 288$; $\dfrac{288}{3} = 96$; $\dfrac{96}{3} = 32$;

$\dfrac{32}{2} = 16$; $\dfrac{16}{2} = 8$; $\dfrac{8}{2} = 4$; $\dfrac{4}{2} = 2$

$1440 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$

14. Factors of 15: 1, 3, 5, 15

Factors of 18: 1, 2, 3, 6, 9, 18

Common factors: **1, 3**

15. Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36

    Factors of 45: 1, 3, 5, 9, 15, 45

    Common factors: **1, 3, 9**

16. Factors of 9: 1, 3, 9

    Factors of 10: 1, 2, 5, 10

    The only common factor is **1.**

17.
$643.28	$643.28	Check:	$643.28
− N	− $257.29		− $385.99
$257.29	**$385.99**		$257.29

18.
1019.05	2364.41	Check:	1019.05
+ S	− 1019.05		+ 1345.36
2364.41	**1345.36**		2364.41

19. $245 \div V = 9.8$

$$
\begin{array}{r} 25 \\ 98\overline{)2450} \\ 196 \\ \hline 490 \\ 490 \\ \hline 0 \end{array}
\qquad
\text{Check: }
\begin{array}{r} 9.8 \\ 25\overline{)245.0} \\ 225 \\ \hline 20\ 0 \\ 20\ 0 \\ \hline 0 \end{array}
$$

20. $8 = ②\cdot②\cdot 2$

    $36 = ②\cdot②\cdot 3 \cdot 3$

    $GCF\ (8, 36) = 2 \cdot 2 = \textbf{4}$

21. $50 = 2 \cdot⑤\cdot⑤$

    $75 = 3 \cdot⑤\cdot⑤$

    $GCF\ (50, 75) = 5 \cdot 5 = \textbf{25}$

22. $\dfrac{311.12}{1.2}$

$$
\begin{array}{r} 259.266 \\ 12\overline{)3111.200} \\ 24 \\ \hline 71 \\ 60 \\ \hline 111 \\ 108 \\ \hline 3\ 2 \\ 2\ 4 \\ \hline 80 \\ 72 \\ \hline 80 \\ 72 \\ \hline 8 \end{array}
$$

The rounded number is **259.27.**

23. $\dfrac{621}{0.31}$

$$
\begin{array}{r} 2003.225 \\ 31\overline{)62100.000} \\ 62 \\ \hline 0100 \\ 93 \\ \hline 7\ 0 \\ 6\ 2 \\ \hline 80 \\ 62 \\ \hline 180 \\ 155 \\ \hline 25 \end{array}
$$

The rounded number is **2003.23.**

24.
$$
1231.62⑤67
$$
The rounded number is **1231.626.**

25. **321,617,212.231**

26. **straight angle (180° angle)**

27. 161.016 is **one hundred sixty-one and sixteen thousandths**

28. 613.162 is **six hundred thirteen and one hundred sixty-two thousandths**

29.
621.81
+ 31.62
653.43

30. **0.901, 1.091, 1.119, 1.191, 1.911**

PROBLEM SET 14

1. $12 \times N = 5282$

$$
\begin{array}{r} 440 \\ 12\overline{)5282} \\ 48 \\ \hline 48 \\ 48 \\ \hline 02 \end{array}
$$

440 family meals can be sold.

2. $14 \times N = 780$

$$
\begin{array}{r} 55 \\ 14\overline{)780} \\ 70 \\ \hline 80 \\ 70 \\ \hline 10 \end{array}
$$

56 toadstools would be needed.

3.   0.00001620
  − 0.00000423
  0.00001197 m

4.   32,015,032 units
  − 14,000,642 units
  18,014,390 units

5.   3000.000787
  ×   14
  12000003148
  3000000787
  42,000.011018

  42,000.011018 second wind
  + 3,000.000787 first wind
  45,000.011805 ft

6. (a) The following numbers are divisible by 10, since the last digit of each is 0: **120** and **1620**.

   (b) The following numbers are divisible by 5, since the last digit of each is either 5 or 0: **120, 135,** and **1620**.

   (c) The following numbers are divisible by 2, since the last digit of each is even: **120, 122, 1332,** and **1620**.

   (d) The following numbers are divisible by 3, since the sum of the digits of each is divisible by 3: **120, 135, 1332,** and **1620**.

7. $(10 + 18 + 11 + 18 + 10 + 26 + 31 + 26)$ km
  = 150 km

8. $(16 + 18 + 9 + 18 + 6 + 26 + 31 + 26)$ km
  = 150 km

9. (a) $\dfrac{45}{60} = \dfrac{45 \div 15}{60 \div 15} = \dfrac{3}{4}$

   (b) $\dfrac{30}{75} = \dfrac{30 \div 15}{75 \div 15} = \dfrac{2}{5}$

   (c) $\dfrac{80}{220} = \dfrac{80 \div 20}{220 \div 20} = \dfrac{4}{11}$

   (d) $\dfrac{16}{80} = \dfrac{16 \div 16}{80 \div 16} = \dfrac{1}{5}$

10. (a) $\dfrac{1}{2} = \dfrac{1 \cdot 10}{2 \cdot 10} = \dfrac{10}{20}$

   (b) $7 = \dfrac{7 \cdot 20}{1 \cdot 20} = \dfrac{140}{20}$

11. $12.361 \div 1000 = \mathbf{0.012361}$

12. $11.3 \times 1000 = \mathbf{11{,}300}$

13.   113
  × 0.009
  1.017

14.   2.14
  × 11.6
  1284
  214
  214
  24.824

15. (a) $\dfrac{1800}{5} = 360;\ \dfrac{360}{5} = 72;\ \dfrac{72}{3} = 24;$

   $\dfrac{24}{3} = 8;\ \dfrac{8}{2} = 4;\ \dfrac{4}{2} = 2$

   $1800 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 5$

   (b) $\dfrac{900}{5} = 180;\ \dfrac{180}{5} = 36;\ \dfrac{36}{3} = 12;$

   $\dfrac{12}{3} = 4;\ \dfrac{4}{2} = 2$

   $900 = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 5$

   (c) $\dfrac{450}{5} = 90;\ \dfrac{90}{5} = 18;\ \dfrac{18}{3} = 6;\ \dfrac{6}{3} = 2$

   $450 = 2 \cdot 3 \cdot 3 \cdot 5 \cdot 5$

16.   131.61   Check: 119.74
  − 11.87   + 11.87
  119.74   131.61

17.   181.811   Check: 175.482
  −   6.329   +   6.329
  175.482   181.811

18. M $657.06   Check: $193.94
  + $463.12   − $463.12   + $463.12
  $657.06   **$193.94** $657.06

19. $653.28 $653.28   Check: $653.28
  − S − $468.29   − $184.99
  $468.29   **$184.99** $468.29

20. $\dfrac{24.455}{N} = 6.7$

```
      3.65                        6.7
  67)244.55      Check: 365)2445.5
     201                      2190
     43 5                     255 5
     40 2                     255 5
      3 35                        0
      3 35
         0
```

21. $40 = ②\cdot②\cdot 2\cdot⑤$
$60 = ②\cdot②\cdot 3\cdot⑤$
GCF $(40, 60) = 2\cdot 2\cdot 5 = $ **20**

22. $7 = ①\cdot⑦$
$42 = ①\cdot 2\cdot 3\cdot⑦$
GCF $(7, 42) = 1\cdot 7 = $ **7**

23. $6111.12 \div 7.5$

$$
\begin{array}{r}
814.816 \\
75\overline{)61111.200} \\
\underline{600} \\
111 \\
\underline{75} \\
361 \\
\underline{300} \\
61\,2 \\
\underline{60\,0} \\
1\,20 \\
\underline{75} \\
450 \\
\underline{450} \\
0
\end{array}
$$

The rounded number is **814.82.**

24. $\dfrac{611.21}{0.2}$

$$
\begin{array}{r}
3056.05 \\
2\overline{)6112.10} \\
\underline{6} \\
011 \\
\underline{10} \\
12 \\
\underline{12} \\
0\,10 \\
\underline{10} \\
0
\end{array}
$$

25.

$1612.316②89$

The rounded number is **1612.3163.**

26. 1231.161 is **one thousand, two hundred thirty-one and one hundred sixty-one thousandths**

27. 3.121 is **three and one hundred twenty-one thousandths**

28. Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
Factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72
Common factors: **1, 2, 3, 4, 6, 8, 12, 24**

29.
$$
\begin{array}{r}
1093.0600 \\
113.1016 \\
+\ 915.0900 \\
\hline
2121.2516
\end{array}
$$

30.
$$
\begin{array}{r}
647.1120 \\
+\ 9158.0109 \\
\hline
9805.1229
\end{array}
$$

PROBLEM SET 15

1.
$$
\begin{array}{r}
14,007,920 \\
+\ \ 900,067 \\
\hline
14,907,987 \text{ hungry locusts}
\end{array}
$$

2.
$$
\begin{array}{r}
9043 \\
\times\ \ \ \ 8 \\
\hline
72,344
\end{array}
\qquad
\begin{array}{r}
9043 \\
\times\ \ \ 12 \\
\hline
18086 \\
9043 \\
\hline
108,516
\end{array}
\qquad
\begin{array}{r}
108,516 \\
72,344 \\
+\ \ 9,043 \\
\hline
189,903 \text{ votes}
\end{array}
$$

3. $20 \times N = 9042$

$$
\begin{array}{r}
452 \\
20\overline{)9042} \\
\underline{80} \\
104 \\
\underline{100} \\
42 \\
\underline{40} \\
2
\end{array}
$$

They formed **452 bunches with 2 not in a bunch.**

4. (a) The following numbers are divisible by 3, since the sum of the digits of each is divisible by 3: **2133, 312,** and **630.**

(b) The following numbers are divisible by 2, since the last digit of each is even: **212, 312, 610,** and **630.**

5. $31 + 37 + 41 = $ **109**

6. $(32 + 31 + 32 + 13 + 21 + 18 + 21)$ ft
$= $ **168 ft**

7. $\dfrac{5}{9}$

$$
\begin{array}{r}
0.555 \\
9\overline{)5.000} \\
\underline{4\,5} \\
50 \\
\underline{45} \\
50 \\
\underline{45} \\
5
\end{array}
$$

The repeating decimal is written $0.\overline{5}$.

8. $\dfrac{1}{20}$

$$\begin{array}{r} 0.05 \\ 20\overline{)1.00} \\ \underline{1\,00} \\ 0 \end{array}$$

9. $\dfrac{3}{14} = \dfrac{3 \cdot 3}{14 \cdot 3} = \dfrac{9}{42}$

10. (a) $\dfrac{70}{60} = \dfrac{70 \div 10}{60 \div 10} = \dfrac{7}{6}$

   (b) $\dfrac{16}{24} = \dfrac{16 \div 8}{24 \div 8} = \dfrac{2}{3}$

   (c) $\dfrac{24}{36} = \dfrac{24 \div 12}{36 \div 12} = \dfrac{2}{3}$

11. $169{,}211 \div 10{,}000 = \mathbf{16.9211}$

12. $123.61311 \times 100 = \mathbf{12{,}361.311}$

13.
$$\begin{array}{r} 89.21 \\ \times\ 62.1 \\ \hline 8921 \\ 17842 \\ 53526 \\ \hline \mathbf{5539.941} \end{array}$$

14.
$$\begin{array}{r} 2.16 \\ \times\ 32.8 \\ \hline 1728 \\ 432 \\ 648 \\ \hline \mathbf{70.848} \end{array}$$

15. (a) $\dfrac{3600}{5} = 720;\ \dfrac{720}{5} = 144;\ \dfrac{144}{3} = 48;$

$\dfrac{48}{3} = 16;\ \dfrac{16}{2} = 8;\ \dfrac{8}{2} = 4;\ \dfrac{4}{2} = 2$

$3600 = \mathbf{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 5}$

   (b) $\dfrac{450}{5} = 90;\ \dfrac{90}{5} = 18;\ \dfrac{18}{3} = 6;\ \dfrac{6}{3} = 2$

$450 = \mathbf{2 \cdot 3 \cdot 3 \cdot 5 \cdot 5}$

   (c) $\dfrac{4500}{5} = 900;\ \dfrac{900}{5} = 180;\ \dfrac{180}{5} = 36;$

$\dfrac{36}{3} = 12;\ \dfrac{12}{3} = 4;\ \dfrac{4}{2} = 2$

$4500 = \mathbf{2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 5 \cdot 5}$

16.
$$\begin{array}{r} 1131.13 \\ -\ 131.98 \\ \hline \mathbf{999.15} \end{array} \qquad \text{Check:} \begin{array}{r} 999.15 \\ +\ 131.98 \\ \hline 1131.13 \end{array}$$

17.
$$\begin{array}{r} 192.680 \\ -\ 6.321 \\ \hline \mathbf{186.359} \end{array} \qquad \text{Check:} \begin{array}{r} 186.359 \\ +\ 6.321 \\ \hline 192.680 \end{array}$$

18.
$$\begin{array}{r} N \\ -\ 364.82 \\ \hline 59.69 \end{array} \quad \begin{array}{r} 364.82 \\ +\ 59.69 \\ \hline \mathbf{424.51} \end{array} \quad \text{Check:} \begin{array}{r} 424.51 \\ -\ 364.82 \\ \hline 59.69 \end{array}$$

19.
$$\begin{array}{r} 16.0375 \\ +\ A \\ \hline 17.0094 \end{array} \quad \begin{array}{r} 17.0094 \\ -\ 16.0375 \\ \hline \mathbf{0.9719} \end{array} \quad \text{Check:} \begin{array}{r} 16.0375 \\ +\ 0.9719 \\ \hline 17.0094 \end{array}$$

20. $\dfrac{2.76}{F} = 12$

$$\begin{array}{r} 0.23 \\ 12\overline{)2.76} \\ \underline{2\,4} \\ 36 \\ \underline{36} \\ 0 \end{array} \qquad \text{Check: } \begin{array}{r} 12 \\ 23\overline{)276} \\ \underline{23} \\ 46 \\ \underline{46} \\ 0 \end{array}$$

21. $34 = 2 \cdot \boxed{17}$

$51 = 3 \cdot \boxed{17}$

$\text{GCF}\,(34, 51) = \mathbf{17}$

22. $26 = 2 \cdot \boxed{13}$

$117 = 3 \cdot 3 \cdot \boxed{13}$

$\text{GCF}\,(26, 117) = \mathbf{13}$

23. $7.81 \div 3.1$

$$\begin{array}{r} 2.519 \\ 31\overline{)78.100} \\ \underline{62} \\ 16\,1 \\ \underline{15\,5} \\ 60 \\ \underline{31} \\ 290 \\ \underline{279} \\ 11 \end{array}$$

The rounded number is **2.52.**

24. $\dfrac{2310}{13}$

$$
\begin{array}{r}
177.692 \\
13\overline{)2310.000} \\
\underline{13} \\
101 \\
\underline{91} \\
100 \\
\underline{91} \\
9\,0 \\
\underline{7\,8} \\
1\,20 \\
\underline{1\,17} \\
30 \\
\underline{26} \\
4
\end{array}
$$

The rounded number is **177.69.**

25.

$\downarrow$

4017.33633⑥3

The rounded number is **4017.336336.**

26.

$\downarrow$

946.0545454⑤4

The rounded number is **946.05454545.**

27. $0.85 = \dfrac{85}{100} = \dfrac{85 \div 5}{100 \div 5} = \dfrac{17}{20}$

28. $0.76 = \dfrac{76}{100} = \dfrac{76 \div 4}{100 \div 4} = \dfrac{19}{25}$

29.
$$
\begin{array}{r}
613.1 \\
7214.6 \\
11.2 \\
+3.1 \\
\hline
7842.0
\end{array}
$$

30. **0.0119, 0.0191, 0.091, 0.9**

PROBLEM SET 16

1. $14 \times N = 3808$

$$
\begin{array}{r}
272 \text{ spaces} \\
14\overline{)3808} \\
\underline{28} \\
100 \\
\underline{98} \\
28 \\
\underline{28} \\
0
\end{array}
$$

2.
$$
\begin{array}{r}
14.0742 \\
\times7 \\
\hline
98.5194
\end{array}
\qquad
\begin{array}{r}
14.0742 \\
+\,98.5194 \\
\hline
112.5936 \text{ units}
\end{array}
$$

3.
$$
\begin{array}{r}
91,042 \\
-\,12,015 \\
\hline
79,027 \text{ genes}
\end{array}
$$

4.
$$
\begin{array}{r}
142 \\
\times\,432 \\
\hline
284 \\
426 \\
568 \\
\hline
61,344
\end{array}
\qquad
\begin{array}{r}
61,344 \\
+5 \\
\hline
61,349 \text{ apples}
\end{array}
$$

5. (a) The following numbers are divisible by 5, since the last digit of each is either 5 or 0: **650, 625, 15, 20,** and **30.**

(b) The following numbers are divisible by 10, since the last digit of each is 0: **650, 20,** and **30.**

6. **41, 43, 47, 53, 59, 61**

7. $(25 + 42 + 25 + 14 + 14 + 42)$ yd $=$ **162 yd**

8. $\dfrac{19}{25}$

$$
\begin{array}{r}
0.76 \\
25\overline{)19.00} \\
\underline{17\,5} \\
1\,50 \\
\underline{1\,50} \\
0
\end{array}
$$

9. $\dfrac{4}{7}$

$$
\begin{array}{r}
0.571 \\
7\overline{)4.000} \\
\underline{3\,5} \\
50 \\
\underline{49} \\
10 \\
\underline{7} \\
3
\end{array}
$$

The rounded number is **0.57.**

10. $\dfrac{36}{42} = \dfrac{36 \div 6}{42 \div 6} = \dfrac{6}{7}$

11. $\dfrac{72}{120} = \dfrac{72 \div 24}{120 \div 24} = \dfrac{3}{5}$

12. $\dfrac{9}{27} = \dfrac{9 \cdot 9}{27 \cdot 9} = \dfrac{81}{243}$

13. $(0.5)^2 = 0.5 \cdot 0.5 = \mathbf{0.25}$

14. $9^3 = 9 \cdot 9 \cdot 9 = 81 \cdot 9 = \mathbf{729}$

15.

$$
\begin{array}{r}
13.61 \\
\times\ \ 71.3 \\
\hline
4083 \\
1361\ \ \ \\
9527\ \ \ \ \\
\hline
970.393
\end{array}
$$

16. $12,389.32 \div 100 = \mathbf{123.8932}$

17.

$$
\begin{array}{r}
181,131.6200 \\
-\ \ \ \ \ \ 1.9876 \\
\hline
\mathbf{181,129.6324}
\end{array}
\qquad
\begin{array}{r}
\text{Check:}\quad 181,129.6324 \\
+\ \ \ \ \ \ \ 1.9876 \\
\hline
181,131.6200
\end{array}
$$

18. $\dfrac{613.15}{3.1}$

$$
\begin{array}{r}
197.790 \\
31\overline{)6131.500} \\
31\ \ \ \ \ \ \ \ \ \ \\
\hline
303\ \ \ \ \ \ \ \ \\
279\ \ \ \ \ \ \ \ \\
\hline
241\ \ \ \ \ \\
217\ \ \ \ \ \\
\hline
24\ 5\ \ \ \\
21\ 7\ \ \ \\
\hline
2\ 80\ \ \\
2\ 79\ \ \\
\hline
10\ \\
0\ \\
\hline
10
\end{array}
$$

The rounded number is **197.79.**

19. Factors of 20 = 1, 2, 4, 5, 10, 20

Factors of 30 = 1, 2, 3, 5, 6, 10, 15, 30

Common factors = **1, 2, 5, 10**

20. $20 = \circled{2} \cdot 2 \cdot \circled{5}$

$30 = \circled{2} \cdot 3 \cdot \circled{5}$

GCF (20, 30) = $2 \cdot 5 = \mathbf{10}$

21. $\dfrac{288}{3} = 96;\ \dfrac{96}{3} = 32;\ \dfrac{32}{2} = 16;$

$\dfrac{16}{2} = 8;\ \dfrac{8}{2} = 4;\ \dfrac{4}{2} = 2$

$288 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 = \mathbf{2^5 \cdot 3^2}$

22. $\dfrac{1080}{5} = 216;\ \dfrac{216}{3} = 72;\ \dfrac{72}{3} = 24;\ \dfrac{24}{3} = 8;$

$\dfrac{8}{2} = 4;\ \dfrac{4}{2} = 2$

$1080 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5$

$\quad\quad = \mathbf{2^3 \cdot 3^3 \cdot 5}$

23. $\dfrac{10,800}{5} = 2160;\ \dfrac{2160}{5} = 432;\ \dfrac{432}{3} = 144;$

$\dfrac{144}{3} = 48;\ \dfrac{48}{3} = 16;\ \dfrac{16}{2} = 8;\ \dfrac{8}{2} = 4;$

$\dfrac{4}{2} = 2$

$10,800 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5 \cdot 5$

$\quad\quad\ = \mathbf{2^4 \cdot 3^3 \cdot 5^2}$

24.

$$87,621.32178\circled{9}39$$

The rounded number is **87,621.321789.**

25.

$$437.0062162\circled{1}6$$

The rounded number is **437.00621622.**

26. 172.312 is **one hundred seventy-two and three hundred twelve thousandths**

27.

$$
\begin{array}{r}
1361.31 \\
21.14 \\
112.17 \\
+\ \ \ \ 1.18 \\
\hline
\mathbf{1495.80}
\end{array}
$$

28. $0.65 = \dfrac{65}{100} = \dfrac{65 \div 5}{100 \div 5} = \mathbf{\dfrac{13}{20}}$

29.

$$
\begin{array}{r}
14,392.091 \\
+\ \ \ \ \ \ \ \ \ \ A \\
\hline
107,072.060
\end{array}
\qquad
\begin{array}{r}
107,072.060 \\
-\ 14,392.091 \\
\hline
\mathbf{92,679.969}
\end{array}
$$

Check:

$$
\begin{array}{r}
14,392.091 \\
+\ 92,679.969 \\
\hline
107,072.060
\end{array}
$$

30. $\dfrac{321}{B} = 0.04$

$$
\begin{array}{r}
8025 \\
4\overline{)32100} \\
32\ \ \ \ \ \\
\hline
01\ \ \ \\
0\ \ \ \\
\hline
10\ \\
8\ \\
\hline
20 \\
20 \\
\hline
0
\end{array}
\qquad
\begin{array}{r}
0.04 \\
\text{Check: } 8025\overline{)321.00} \\
321.00 \\
\hline
0
\end{array}
$$

PROBLEM SET 17

1. $11 \times N = 10{,}802$

$$
\begin{array}{r}
\mathbf{982\ mi} \\
11\overline{)10{,}802} \\
\underline{9\,9} \\
90 \\
\underline{88} \\
22 \\
\underline{22} \\
0
\end{array}
$$

2.
$$
\begin{array}{r}
4842 \\
\times\ \ \ 330 \\
\hline
145260 \\
14526 \\
\hline
\mathbf{1{,}597{,}860\ ants}
\end{array}
$$

3.
$$
\begin{array}{r}
108{,}015 \\
-\ \ \ \ 4{,}842 \\
\hline
\mathbf{103{,}173\ ants}
\end{array}
$$

4. (a) The following numbers are divisible by 3, since the sum of the digits of each is divisible by 3: **135** and **1050**.

(b) The following numbers are divisible by 5, since the last digit of each is either 5 or 0: **135, 1050, 335, 4145,** and **1010**.

5. $2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29 + 31 + 37 + 41 = \mathbf{238}$

6. $(29 + 46 + 19 + 46 + 11 + 21)\,\text{m} = \mathbf{172\ m}$

7. $(6\,\text{cm} \times 6\,\text{cm}) + (3\,\text{cm} \times 14\,\text{cm})$
$= 36\,\text{cm}^2 + 42\,\text{cm}^2 = \mathbf{78\ cm^2}$

8. $(2\,\text{in.} \times 2\,\text{in.}) + (2\,\text{in.} \times 2\,\text{in.}) + (2\,\text{in.} \times 8\,\text{in.})$
$= 4\,\text{in.}^2 + 4\,\text{in.}^2 + 16\,\text{in.}^2 = 24\,\text{in.}^2$

So, **24 tiles**, each one-inch-square, are needed.

9. $\dfrac{3}{17}$

$$
\begin{array}{r}
0.176 \\
17\overline{)3.000} \\
\underline{1\,7} \\
1\,30 \\
\underline{1\,19} \\
110 \\
\underline{102} \\
8
\end{array}
$$

The rounded number is **0.18**.
(An ambitious student may find that this one does repeat after 16 digits: $0.\overline{1764705882352941}$)

10. $\dfrac{7}{11}$

$$
\begin{array}{r}
0.636 \\
11\overline{)7.000} \\
\underline{6\,6} \\
40 \\
\underline{33} \\
70 \\
\underline{66} \\
4
\end{array}
$$

The repeating decimal is **$0.\overline{63}$**.

11. $\dfrac{7}{500}$

$$
\begin{array}{r}
0.014 \\
500\overline{)7.000} \\
\underline{5\,00} \\
2\,000 \\
\underline{2\,000} \\
0
\end{array}
$$

The rounded number is **0.01**.

12. $\dfrac{540}{5} = 108$; $\dfrac{108}{3} = 36$; $\dfrac{36}{3} = 12$; $\dfrac{12}{3} = 4$;

$\dfrac{4}{2} = 2$

$540 = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5 = \mathbf{2^2 \cdot 3^3 \cdot 5}$

13. $\dfrac{30}{5} = 6$; $\dfrac{6}{3} = 2$

$30 = \mathbf{2 \cdot 3 \cdot 5}$

14. $\dfrac{210}{5} = 42$; $\dfrac{42}{3} = 14$; $\dfrac{14}{2} = 7$

$210 = \mathbf{2 \cdot 3 \cdot 5 \cdot 7}$

15. $36 = ②\cdot②\cdot③\cdot③$
$216 = ②\cdot②\cdot 2 \cdot③\cdot③\cdot 3$
GCF $(36, 216) = 2 \cdot 2 \cdot 3 \cdot 3 = \mathbf{36}$

16. $\dfrac{21}{49} = \dfrac{21 \div 7}{49 \div 7} = \dfrac{\mathbf{3}}{\mathbf{7}}$

17. $\dfrac{36}{48} = \dfrac{36 \div 12}{48 \div 12} = \dfrac{\mathbf{3}}{\mathbf{4}}$

18. $\dfrac{3}{7} = \dfrac{3 \cdot 30}{7 \cdot 30} = \dfrac{\mathbf{90}}{\mathbf{210}}$

19.
$$
\begin{array}{r}
62.13 \\
\times\ \ \ 7.8 \\
\hline
49704 \\
43491 \\
\hline
\mathbf{484.614}
\end{array}
$$

20. $625.3 \times 100 = \textbf{62,530}$

21.
$$\begin{array}{r} 185.3617 \\ -\ \ 17.3169 \\ \hline \textbf{168.0448} \end{array} \qquad \text{Check:} \begin{array}{r} 168.0448 \\ +\ \ 17.3169 \\ \hline 185.3617 \end{array}$$

22.
$$\begin{array}{r} 179.3622 \\ -\qquad Z \\ \hline 57.4643 \end{array} \qquad \begin{array}{r} 179.3622 \\ -\ \ 57.4643 \\ \hline \textbf{121.8979} \end{array}$$

Check:
$$\begin{array}{r} 179.3622 \\ -\ 121.8979 \\ \hline 57.4643 \end{array}$$

23. $\dfrac{V}{0.6} = 44.4$

$$\begin{array}{r} 44.4 \\ \times\ \ 0.6 \\ \hline \textbf{26.64} \end{array} \qquad \text{Check: } 6\overline{)266.4}$$

$$\begin{array}{r} 44.4 \\ 6\,\overline{)266.4} \\ 24 \\ \hline 26 \\ 24 \\ \hline 2\ 4 \\ 2\ 4 \\ \hline 0 \end{array}$$

24. $\dfrac{231.2}{0.048}$

$$\begin{array}{r} 4816.666 \\ 48\,\overline{)231200.000} \\ 192 \\ \hline 392 \\ 384 \\ \hline 80 \\ 48 \\ \hline 320 \\ 288 \\ \hline 32\ 0 \\ 28\ 8 \\ \hline 3\ 20 \\ 2\ 88 \\ \hline 320 \\ 288 \\ \hline 32 \end{array}$$

The rounded number is **4816.67**.

25.
$\downarrow$

3.141592⑥54

The rounded number is **3.1415927**.

26.
$\downarrow$

2.070707⓪7

The rounded number is **2.0707071**.

27. $0.134 = \dfrac{134}{1000} = \dfrac{134 \div 2}{1000 \div 2} = \dfrac{67}{500}$

28. $0.025 = \dfrac{25}{1000} = \dfrac{25 \div 25}{1000 \div 25} = \dfrac{1}{40}$

29. $(0.8)^3 = 0.8 \cdot 0.8 \cdot 0.8 = 0.64 \cdot 0.8 = \textbf{0.512}$

30. $1^{24} = \textbf{1}$ (since 1 raised to any power is 1)

PROBLEM SET 18

1.
$$\begin{array}{r} 5482 \\ \times\ \ \ \ \ 4 \\ \hline 21,928 \end{array} \quad \begin{array}{r} 21,928 \\ \times\ \ \ \ \ \ 2 \\ \hline 43,856 \end{array} \quad \begin{array}{r} 43,856 \\ 21,928 \\ +\ \ 5,482 \\ \hline \textbf{71,266 peaches} \end{array}$$

2.
$$\begin{array}{r} 19,000,000.00047 \\ +\qquad 17,005.02370 \\ \hline \textbf{19,017,005.02417 cm} \end{array}$$

3.
$$\begin{array}{r} 700,033 \\ \times\qquad 63 \\ \hline 2100099 \\ 4200198 \\ \hline \textbf{44,102,079 rocks} \end{array}$$

4.
$$\begin{array}{r} 416,943 \\ \times\qquad 63 \\ \hline 1250829 \\ 2501658 \\ \hline \textbf{26,267,409 rocks} \end{array}$$

5. **29, 31, 37, 41, 43, 47**

6. $(28 + 40 + 20 + 40 + 11 + 19)$ cm
$= \textbf{158 cm}$

7. $(5 \text{ cm} \times 30 \text{ cm}) + (14 \text{ cm} \times 30 \text{ cm})$
$= 150 \text{ cm}^2 + 420 \text{ cm}^2 = \textbf{570 cm}^2$

8. $(7 \text{ cm} \times 26 \text{ cm}) + (18 \text{ cm} \times 11 \text{ cm})$
$= 182 \text{ cm}^2 + 198 \text{ cm}^2 = \textbf{380 cm}^2$

9. $\dfrac{480}{1000} = \dfrac{480 \div 10}{1000 \div 10} = \dfrac{48 \div 4}{100 \div 4} = \dfrac{12}{25}$

10. $\dfrac{66}{104} = \dfrac{66 \div 2}{104 \div 2} = \dfrac{33}{52}$

11. $\dfrac{210}{294} = \dfrac{210 \div 2}{294 \div 2} = \dfrac{105 \div 3}{147 \div 3} = \dfrac{35 \div 7}{49 \div 7} = \dfrac{5}{7}$

12. $\dfrac{738}{882} = \dfrac{738 \div 2}{882 \div 2} = \dfrac{369 \div 3}{441 \div 3} = \dfrac{123 \div 3}{147 \div 3}$

$= \dfrac{\mathbf{41}}{\mathbf{49}}$

13. $\dfrac{16}{17}$

```
      0.9411
17)16.0000
   15 3
      70
      68
      20
      17
      30
      17
      13
```

The rounded number is **0.941**.

14. $\dfrac{7}{250}$

```
       0.028
250)7.000
    5 00
    2 000
    2 000
        0
```

15. $\dfrac{11}{13}$

```
      0.8461
13)11.0000
   10 4
      60
      52
      80
      78
      20
      13
       7
```

The rounded number is **0.846**.

16. $\dfrac{3}{10} = \dfrac{3 \cdot 9}{10 \cdot 9} = \dfrac{\mathbf{27}}{\mathbf{90}}$

17. $\dfrac{14}{15} = \dfrac{14 \cdot 6}{15 \cdot 6} = \dfrac{\mathbf{84}}{\mathbf{90}}$

18.
```
      62.13
    × 11.31
      6213
    18639
     6213
    6213
  702.6903
```

19. $621.1378 \div 10,000 = \mathbf{0.06211378}$

20. $4^3 = 4 \cdot 4 \cdot 4 = 16 \cdot 4 = \mathbf{64}$

21. $13^2 = 13 \cdot 13 = \mathbf{169}$

22.
```
    183.1782     Check:     181.2783
  −   1.8999              +   1.8999
    181.2783               183.1782
```

23. $\dfrac{2}{3} \cdot \dfrac{15}{1} = \dfrac{30}{3} = \mathbf{10}$

24. $\dfrac{5}{9} \cdot \dfrac{10}{1} = \dfrac{\mathbf{50}}{\mathbf{9}}$

25. $\dfrac{3}{5} \cdot \dfrac{100}{1} = \dfrac{300}{5} = \mathbf{60}$

26. $\dfrac{4}{7} \cdot \dfrac{12}{1} = \dfrac{\mathbf{48}}{\mathbf{7}}$

27.
```
    0.11111       0.11111    Check:    0.11111
  −       K     − 0.01121            − 0.09990
    0.01121       0.09990            0.01121
```

28. $P \times 78 = 43.68$

```
      0.56       Check:     0.56
  78)43.68                ×   78
     39 0                    448
      4 68                   392
      4 68                  43.68
         0
```

29. $0.095 = \dfrac{95}{1000} = \dfrac{95 \div 5}{1000 \div 5} = \dfrac{\mathbf{19}}{\mathbf{200}}$

30. $121 = 11 \cdot 11$

$132 = 2 \cdot 2 \cdot 3 \cdot 11$

GCF $(121, 132) = \mathbf{11}$

PROBLEM SET 19

1. Charles: 14,016.2163 kg
          − 13,041.0006 kg
             975.2157 kg

   Mary: 14,991.2300 kg
         − 14,016.2163 kg
            975.0137 kg

   Mary's guess was closer.

2.
```
   51,416          205,664
 ×      4        +  51,416
  205,664          257,080 mice
```