Questions from end of chapter 2

END OF CHAPTER PROBLEMS 2–1

When working **End of Chapter Problems**, if you need to go back to the section where the material was presented at the problem set number. For example, if you are working problems in *End of Chapter Problems 2–13* and you go back to section 2–13 and review the material and examples presented there.

Convert the following numbers to powers of ten form.

1. 10
2. 100,000
3. 1000
4. 10,000,000
5. 100
6. 1,000,000

END OF CHAPTER PROBLEMS 2–2

Convert the following powers of ten numbers to decimal numbers.

1. 10^3
2. 10^5
3. 10^0
4. 10^8
5. 10^6
6. 10^4

END OF CHAPTER PROBLEMS 2–3

Convert the following powers of ten numbers to (a) decimal fractions and (b) decimal numbers.

1. 10^{-2}
2. 10^{-5}
3. 10^{-3}
4. 10^{-6}
5. 10^{-1}
6. 10^{-4}

END OF CHAPTER PROBLEMS 2–4

Convert the following decimal numbers to powers of ten form.

1. 0.0001
2. 0.01
3. 0.000001
4. 0.001

Convert the following decimal fractions to powers of ten form.

5. $\frac{1}{10,000}$
6. $\frac{1}{10,000,000}$
7. $\frac{1}{1000}$
8. $\frac{1}{1,000,000}$

END OF CHAPTER PROBLEMS 2–5

Perform the indicated operations. Express your answers in powers of ten form.

1. $10^4 \times 10^6$
2. $10^3 \times 10^2$
3. $10^2 \times 10^4$
4. $10^3 \times 10^5$
5. $10^5 \times 10^{-1}$
6. $10^6 \times 10^{-3}$
7. $10^3 \times 10^{-7}$
8. $10^2 \times 10^{-6}$
9. $10^{-1} \times 10^4$
10. $10^{-2} \times 10^6$
11. $10^{-6} \times 10^{-4}$
12. $10^{-7} \times 10^{-3}$
13. $10^{-3} \times 10^{-9}$
14. $10^{-2} \times 10^{-5}$
15. $10^{-4} \times 10^{-5}$
16. $10^{-3} \times 10^{-6}$

END OF CHAPTER PROBLEMS 2–6

Perform the indicated operations. Express your answers in powers of ten form.

1. $\frac{10^7}{10^3}$
2. $\frac{10^9}{10^4}$
3. $\frac{10^3}{10^8}$
4. $\frac{10^2}{10^5}$
5. $\frac{10^4}{10^{-4}}$
6. $\frac{10^7}{10^{-3}}$

7. $\frac{10^{3}}{10^{-9}}$
8. $\frac{10^{4}}{10^{-6}}$
9. $\frac{10^{-2}}{10^{-9}}$
10. $\frac{10^{-1}}{10^{-7}}$
11. $\frac{10^{-8}}{10^{-5}}$
12. $\frac{10^{-6}}{10^{-5}}$
13. $\frac{10^{-3}}{10^{3}}$
14. $\frac{10^{-6}}{10^{1}}$
15. $\frac{10^{-2}}{10^{5}}$
16. $\frac{10^{-4}}{10^{7}}$
17. $\frac{1}{10^{-3}}$
18. $\frac{1}{10^{-7}}$
19. $\frac{1}{10^{4}}$
20. $\frac{1}{10^{6}}$

END OF CHAPTER PROBLEMS 2–7

Perform the indicated operations. Express your answers in powers of ten form.

1. $\frac{10^{-3} \times 10^{-6}}{10^{-2}}$
2. $\frac{10^{2} \times 10^{6}}{10^{4}}$
3. $\frac{10^{-6} \times 10^{4}}{10^{5}}$
4. $\frac{10^{-4} \times 10^{9}}{10^{3}}$
5. $\frac{1}{10^{2} \times 10^{-4} \times 10^{-9}}$
6. $\frac{1}{10^{-2} \times 10^{4} \times 10^{-7}}$
7. $\frac{1}{10^{-3} \times 10^{-6} \times 10^{-1}}$
8. $\frac{1}{10^{2} \times 10^{6} \times 10^{-3}}$
9. $\frac{10^{-4}}{10^{6} \times 10^{-2} \times 10^{4}}$
10. $\frac{10^{3}}{10^{4} \times 10^{6} \times 10^{-1}}$
11. $\frac{10^{-3} \times 10^{2} \times 10^{4}}{10^{2} \times 10^{-7}}$
12. $\frac{10^{-1} \times 10^{2} \times 10^{4}}{10^{4} \times 10^{2}}$
13. $\frac{10^{4} \times 10^{6} \times 10^{3}}{10^{2} \times 10^{-7} \times 10^{5}}$
14. $\frac{10^{-1} \times 10^{-7} \times 10^{6}}{10^{1} \times 10^{0} \times 10^{-4}}$
15. $\frac{10^{3} \times 10^{-5} \times 10^{6}}{10^{4} \times 10^{-3} \times 10^{7}}$
16. $\frac{10^{-2} \times 10^{-6} \times 10^{3}}{10^{3} \times 10^{6} \times 10^{-4}}$
17. $\frac{10^{-3} \times 10^{-6} \times 10^{-9}}{10^{3} \times 10^{6} \times 10^{9}}$
18. $\frac{10^{-9} \times 10^{3} \times 10^{-3}}{10^{4} \times 10^{-1} \times 10^{5}}$

END OF CHAPTER PROBLEMS 2–8

Change the following numbers to powers of ten form with an exponent of (a) 2, (b) 4, and (c) 6.

1. 475
2. 1500
3. 65.9
4. 478
5. 93,400
6. 180,000
7. 4780
8. 4700
9. 41,800
10. 18,000

Change the following numbers to powers of ten form with an exponent of (a) −2, (b) −4, and (c) −6.

11. 0.00465
12. 0.000758
13. 0.00000555
14. 0.0000906
15. 0.000673
16. 0.00825
17. 0.0000000108
18. 0.00000745

Change the following numbers to powers of ten form with an exponent of (a) 3, and (b) -3.

19. 325
21. 722
23. 2700
25. 180
27. Change the number 0.0257 to powers of ten form with an exponent of (a) 3, (b) -3, and (c) -6.
29. Change the number 680 to powers of ten form with exponents of 3 and –3.
20. 470
22. 0.0157
24. 4.39
26. 8060
28. Change the number 0.00786 to powers of ten form w an exponent of (a) 3, (b) -3, and (c) -6.
30. Change the number 0.0642 to powers of ten form wi exponents of 3 and –3.

END OF CHAPTER PROBLEMS 2–9

Round the following numbers to three significant figures and express your answers in scientific notation.

1. 27,640
3. 47.8
5. 1,765,400
7. 273.46
9. 173,460
11. 78.88
13. 1,670,000
15. 57,945
17. 80,975
19. Round 92,151 to three significant figures and express your answer in scientific notation.
2. 43,966
4. 277.7
6. 3.716,500
8. 35.986
10. 406,600
12. 15.756
14. 12,673
16. 83,876
18. 40,713
20. Round 126,458 to three significant figures and expr your answer in scientific notation.

END OF CHAPTER PROBLEMS 2–10

Round the following numbers to three significant figures and express your answers in scientific notation.

1. 0.004783
3. 0.7474
5. 0.01637
7. 0.0045446
9. 0.000050085
11. 0.25465
13. 0.040045
15. 0.0008964
17. 0.0170983
19. Round 0.00020507 to three significant figures and express your answer in scientific notation.
2. 0.017600
4. 0.002087
6. 0.001037
8. 0.0078449
10. 0.000030067
12. 0.056374
14. 0.0740347
16. 0.0006794
18. 0.07096
20. Round 0.005648 to three significant figures and ex your answer in scientific notation.

END OF CHAPTER PROBLEMS 2–11

Perform the indicated operations. Express your answers in scientific notation rounded to three places.

1. $10^3 + 10^4$
3. $10^{-1} + 10^{-1}$
5. $33 \times 10^2 + 56 \times 10$
7. $470 \times 10^3 + 1.2 \times 10^4$
9. $27 \times 10^{-2} + 180 \times 10^{-4}$
11. $45 \times 10^{-3} - 63 \times 10^{-4}$
13. $8.2 \times 10^3 + 8.2 \times 10^4 + 9100$
15. Add 470×10^3 and 33×10^4.
2. $10^2 + 10$
4. $10^{-1} + 10^{-2}$
6. $56 \times 10^3 + 33 \times 10^4$
8. $750 \times 10^3 + 1.5 \times 10^4$
10. $56 \times 10^{-2} + 470 \times 10^{-4}$
12. $75 \times 10^{-3} - 47 \times 10^{-4}$
14. $2.7 \times 10^2 + 6.8 \times 10^3 + 1200$
16. Add 2500×10^{-4} and 3530×10^{-5}.

END OF CHAPTER PROBLEMS 2–12

In the following problems, first estimate the answer by rounding each term to one-place accuracy and using scientific notation. Then calculate the answer using a calculator set to scientific notation with three-place accuracy.

1. 737×53.9
2. 3.15×0.324
3. 0.0059×0.005892
4. 0.0932×0.00337
5. 5957.32×0.01317
6. 384.7×0.846
7. $620 \times 270 \times 190$
8. $434 \times 597 \times 850$
9. $32572 \div 0.329$
10. $5227.8 \div 0.0322$
11. $0.0987 \div 0.00475$
12. $0.0529 \div 0.00289$
13. $392.73 \div 8388.2$
14. $213.71 \div 7569.3$
15. $283 \times 489 \div 511$
16. $849 \times 334 \div 731$

END OF CHAPTER PROBLEMS 2–13

Perform the indicated operations. Express your answers in scientific notation rounded to three places.

1. $\dfrac{12 \times 47 \times 10^3}{4.7 \times 10^3 + 4.7 \times 10^4}$
2. $\dfrac{12 \times 56 \times 10^3}{3.3 \times 10^3 + 5.6 \times 10^4}$
3. $\dfrac{5 \times 4700}{470 + 4700}$
4. $\dfrac{5 \times 5600}{680 + 5600}$
5. $\dfrac{15 \times 82 \times 10^4}{10 \times 10^3 + 82 \times 10^4}$
6. $\dfrac{15 \times 33 \times 10^4}{10 \times 10^3 + 33 \times 10^4}$
7. $\dfrac{25 \times 750 \times 10^3}{91 \times 10^3 + 750 \times 10^3}$
8. $\dfrac{25 \times 680}{82 \times 10 + 680}$
9. $\dfrac{18 \times 12 \times 10^6}{12 \times 10^6 + 8.2 \times 10^6}$
10. $\dfrac{18 \times 18 \times 10^6}{18 \times 10^6 + 4.7 \times 10^6}$
11. $\dfrac{25 \times 3300}{3300 + 56{,}000}$
12. $\dfrac{20 \times 4700}{39{,}000 + 4700}$
13. $\dfrac{12 \times 5600}{5600 + 33{,}000}$
14. $\dfrac{5 \times 680}{680 + 1500}$
15. $\dfrac{12 \times 4.7 \times 10^3}{4.7 \times 10^4 + 4.7 \times 10^3}$
16. $\dfrac{15 \times 1.8 \times 10^3}{4.7 \times 10^4 + 1.8 \times 10^3}$
17. $\dfrac{20 \times 6.8 \times 10^3}{6.8 \times 10^3 + 4.7 \times 10^4}$
18. $\dfrac{5 \times 1.2 \times 10^3}{1.2 \times 10^3 + 1.8 \times 10^4}$
19. A luxury car dealer pays a sound system installer $27.50 per hour. How much is the sound system installer paid for 47 hours of work? Estimate by rounding to the nearest 10 before multiplying. Then find the exact answer accurate to the nearest cent.
20. A luxury car dealer pays a sound system installer $ per hour. How much is the sound system installer p for 33 hours of work? Estimate by rounding to the nearest 10 before multiplying. Then find the exact answer accurate to the nearest cent.
21. A parcel of land measures 1786 ft by 814.4 ft. Estimate the area by rounding to the nearest hundred, then find the exact area. Express both answers in scientific notation rounded to three places. Express the area in square feet. Area = length × width.
22. A parcel of land measures 1289.3 ft by 1865.4 ft. Estimate the area by rounding to the nearest hund then find the exact area. Express both answers in scientific notation rounded to three places. Expre area in square feet. Area = length × width.
23. Ohm's law states that in a series circuit, $I = \frac{E}{R}$, where I is the circuit current, E is the applied voltage, and R is the total resistance. If $E = 9$ V and $R = 33 \times 10^4\ \Omega$, what is the circuit current? Estimate the answer by rounding to the nearest ten, then find the actual current in scientific notation rounded to three places.
24. Ohm's law states that in a series circuit, $I = \frac{E}{R}$, v the circuit current, E is the applied voltage, and total resistance. If $E = 15$ V and $R = 8.2 \times 10$ what is the circuit current? Estimate the answer rounding to the nearest ten, then find the actual scientific notation rounded to three places.

END OF CHAPTER PROBLEMS 2–14

Perform the indicated operations. Express your answers in scientific notation rounded to three places.

1. $\dfrac{1}{6.28 \times 50 \times 10^{3} \times 30 \times 10^{-9}}$
2. $\dfrac{1}{6.28 \times 600 \times 10 \times 10^{-6}}$
3. $\dfrac{1}{6.28 \times 25 \times 10^{3} \times 50 \times 10^{-3}}$
4. $\dfrac{1}{6.28 \times 2 \times 10^{3} \times 7 \times 10^{-6}}$
5. $\dfrac{1}{680} + \dfrac{1}{560}$
6. $\dfrac{1}{470} + \dfrac{1}{560}$
7. $\dfrac{1}{3300} + \dfrac{1}{2700} + \dfrac{1}{1000}$
8. $\dfrac{1}{6800} + \dfrac{1}{5600} + \dfrac{1}{9100}$
9. $\dfrac{1}{56 \times 10^{3}} + \dfrac{1}{47 \times 10^{3}}$
10. $\dfrac{1}{27 \times 10^{5}} + \dfrac{1}{10 \times 10^{5}}$
11. $\dfrac{1}{470 \times 10^{3}} + \dfrac{1}{330 \times 10^{3}}$
12. $\dfrac{1}{68 \times 10^{3}} + \dfrac{1}{75 \times 10^{3}}$
13. $\dfrac{1}{27 \times 10^{3}} + \dfrac{1}{56 \times 10^{3}} + \dfrac{1}{18 \times 10^{3}}$
14. $\dfrac{1}{820 \times 10^{3}} + \dfrac{1}{390 \times 10^{3}} + \dfrac{1}{270 \times 10^{3}}$
15. $\dfrac{1}{\dfrac{1}{4700} + \dfrac{1}{5600}}$
16. $\dfrac{1}{\dfrac{1}{270} + \dfrac{1}{560}}$
17. $\dfrac{1}{\dfrac{1}{270} + \dfrac{1}{180} + \dfrac{1}{390}}$
18. $\dfrac{1}{\dfrac{1}{7500} + \dfrac{1}{5600} + \dfrac{1}{3300}}$
19. $\dfrac{1}{\dfrac{1}{56 \times 10^{3}} + \dfrac{1}{68 \times 10^{3}}}$
20. $\dfrac{1}{\dfrac{1}{2.2 \times 10^{3}} + \dfrac{1}{810}}$
21. $\dfrac{1}{\dfrac{1}{9.1 \times 10^{3}} + \dfrac{1}{8.2 \times 10^{3}} + \dfrac{1}{5.6 \times 10^{3}}}$
22. $\dfrac{1}{\dfrac{1}{18 \times 10^{3}} + \dfrac{1}{39 \times 10^{3}} + \dfrac{1}{56 \times 10^{3}}}$
23. The total conductance, G_T, of a circuit consisting of two resistors in parallel is given by the equation $G_T = \frac{1}{R_1} + \frac{1}{R_2}$. Find G_T when $R_1 = 330\ \Omega$ and $R_2 = 750\ \Omega$. Express your answer in scientific notation rounded to three places.
24. The total conductance, G_T, of a circuit consisting of two resistors in parallel is given by the equation $G_T = \frac{1}{R_1} + \frac{1}{R_2}$. Find G_T when $R_1 = 2.2 \times 10^{4}\ \Omega$ and $R_2 = 3.9 \times 10^{4}\ \Omega$. Express your answer in sci notation rounded to three places.

END OF CHAPTER PROBLEMS 2–15

Perform the indicated operations.

1. $(10^{2})^{3}$
2. $(10^{2})^{5}$
3. $(10^{5})^{2}$
4. $(10^{-2})^{-3}$
5. $(10^{3})^{-4}$
6. $(10^{2})^{-7}$
7. $(10^{-4})^{-3}$
8. $\left(\dfrac{1}{10^{3}}\right)^{3}$
9. $\left(\dfrac{1}{10^{-4}}\right)^{-2}$
10. $\left(\dfrac{1}{10^{-4}}\right)^{-2}$

END OF CHAPTER PROBLEMS 2–16

Perform the indicated operations.

1. $(10^{6})^{1/2}$
2. $(10^{8})^{1/2}$
3. $(10^{-4})^{1/2}$
4. $(10^{-2})^{1/2}$
5. $\left(\dfrac{1}{10^{4}}\right)^{1/2}$
6. $\left(\dfrac{1}{10^{8}}\right)^{1/2}$

7. $\left(\frac{1}{10^{-10}}\right)^{1/2}$
8. $\left(\frac{1}{10^{-6}}\right)^{1/2}$
9. $\left(\frac{10^2}{10^{-4}}\right)^{1/2}$
10. $\left(\frac{10^5}{10^{-1}}\right)^{1/2}$

END OF CHAPTER PROBLEMS 2–17

Perform the indicated operations. Express your answers in scientific notation rounded to three places.

1. 79.3^2
2. 446^2
3. 1780^2
4. 5600^2
5. 0.04758^2
6. 0.0652^2
7. 0.00873^2
8. 0.00165^2
9. $(45 \times 10^3)^2$
10. $(264 \times 10^2)^2$
11. $(300 \times 10^3)^2$
12. $(400 \times 10^3)^2$
13. $(0.296 \times 10^{-3})^2$
14. $(525 \times 10^{-4})^2$
15. $(0.00903 \times 10^{-2})^2$
16. $(0.033 \times 10^{-2})^2$
17. $(50 \times 10^{-3})^2 \times 2700$
18. $(375 \times 10^{-9})^2 \times 120$
19. $(0.0765 \times 10^2)^2 \times 0.037$
20. $(0.000821 \times 10^3)^2 \times 0.976$
21. A playground is laid out in the shape of a square. Therefore the area equals any side squared. $A = S^2$. What is the area of a playground whose sides equal 53.7 yards? Express your answer in scientific notation rounded to three places.
22. A playground is laid out in the shape of a square. Therefore the area equals any side squared. $A = S^2$. What is the area of a playground whose sides equal 127.4 yards? Express your answer in scientific notation rounded to three places.
23. A 48 in. × 48 in. ceramic tile shower stall is being installed. How many 4 in. × 4 in. tiles are needed to cover the floor? Disregard the drain opening and grout spaces.
24. A 42 in. × 42 in. ceramic tile shower stall is being installed. How many 6 in. × 6 in. tiles are needed to cover the floor? Disregard the drain opening and grout spaces.
25. In an electrical circuit, $P = I^2R$. Find the power in watts if the current, I, equals 734×10^{-3} amps and the resistance, R, equals 47 ohms. Express your answer in scientific notation rounded to three places.
26. In an electrical circuit, $P = I^2R$. Find the power in watts if the current, I, equals 17.9×10^{-5} amps and the resistance, R, equals 27×10^4 ohms. Express your answer in scientific notation rounded to three places.

END OF CHAPTER PROBLEMS 2–18

Perform the indicated operations. Express your answers in scientific notation rounded to three places.

1. $93^{1/2}$
2. $783^{1/2}$
3. $237^{1/2}$
4. $5756^{1/2}$
5. $0.00705^{1/2}$
6. $0.0085^{1/2}$
7. $0.000105^{1/2}$
8. $0.000187^{1/2}$
9. $(270 \times 10^5)^{1/2}$
10. $(432 \times 10^4)^{1/2}$
11. $(4500 \times 10^4)^{1/2}$
12. $(74.5 \times 10^3)^{1/2}$
13. $(0.00923 \times 10^{-3})^{1/2}$
14. $(0.00176 \times 10^4)^{1/2}$
15. $(0.000346 \times 10^5)^{1/2}$
16. $(0.000906 \times 10^{-6})^{1/2}$
17. $\left(\frac{0.289 \times 10^{-1}}{254}\right)^{1/2}$
18. $\left(\frac{0.00573 \times 10^{-4}}{330}\right)^{1/2}$
19. $\frac{1}{6.28(20 \times 10^{-3} \times 20 \times 10^{-9})^{1/2}}$
20. $\frac{1}{6.28(0.0047 \times 560 \times 10^{-12})^{1/2}}$
21. $\frac{1}{6.28(0.150 \times 680 \times 10^{-12})^{1/2}}$
22. $\frac{1}{6.28(100 \times 10^{-3} \times 20 \times 10^{-9})^{1/2}}$
23. The current, I, in a series circuit is found using the equation $I = (\frac{P}{R})^{1/2}$. Find the circuit current when the power dissipated, P, equals 83.2×10^{-2} watts, and the resistance, R, equals 75×10^2 ohms. Express your answer in scientific notation rounded to three places.
24. The current, I, in a series circuit is found using the equation $I = (\frac{P}{R})^{1/2}$. Find the circuit current when the power dissipated, P, equals 278×10^{-3} watts, and the resistance, R, equals 180×10^2 ohms. Express your answer in scientific notation rounded to three places.

Solutions for end of chapter 2 questions

CHAPTER 2

PRACTICE PROBLEMS 2–1

1. 10^2
2. 10^5
3. 10^1
4. 10^7
5. 10^3
6. 10^4
7. 10^6
8. 10^8

The answer to problem 3 could be written simply as 10 since $10^1 = 10$. In the future, when the number is raised to the fir
power, we will not write the exponent.

END OF CHAPTER PROBLEMS 2–1

1. 10^1 3. 10^3 5. 10^2

PRACTICE PROBLEMS 2–2

1. 100 2. 10 3. 1,000,000 4. 10,000,000 5. 1,000,000,000

END OF CHAPTER PROBLEMS 2–2

1. 1000 3. 1 5. 1,000,000

PRACTICE PROBLEMS 2–3

1. (a) 0.0001 (b) $\frac{1}{10{,}000}$
2. (a) 0.01 (b) $\frac{1}{100}$
3. (a) 0.1 (b) $\frac{1}{10}$
4. (a) 0.00000001 (b) $\frac{1}{100{,}000{,}000}$
5. (a) 0.001 (b) $\frac{1}{1000}$
6. (a) 0.0000001 (b) $\frac{1}{10{,}000{,}000}$
7. (a) 0.000001 (b) $\frac{1}{1{,}000{,}000}$
8. (a) 0.00001 (b) $\frac{1}{100{,}000}$

END OF CHAPTER PROBLEMS 2–3

1. $\frac{1}{100} = 0.01$
3. $\frac{1}{1000} = 0.001$
5. $\frac{1}{10} = 0.1$

PRACTICE PROBLEMS 2–4

1. 10^{-3}
2. 10^{-1}
3. 10^{-6}
4. 10^{-2}
5. 10^{-5}
6. 10^{-7}
7. 10^{-4}
8. 10^{-8}
9. 10^{-3}
10. 10^{-5}
11. 10^{-1}
12. 10^{-6}
13. 10^{-2}
14. 10^{-4}

END OF CHAPTER PROBLEMS 2–4

1. 10^{-4}
3. 10^{-6}
5. 10^{-4}
7. 10^{-3}

PRACTICE PROBLEMS 2–5

1. 10^{5}
2. 10^{10}
3. 10^{-4}
4. 10^{-8}
5. 10^{3}
6. 10^{2}
7. 10^{-1}
8. 10^{0}
9. 10^{3}
10. 10^{4}

END OF CHAPTER PROBLEMS 2–5

1. 10^{10}
3. 10^{6}
5. 10^{4}
7. 10^{-4}
9. 10^{3}
11. 10^{-10}
13. 10^{-12}
15. 10^{-9}

PRACTICE PROBLEMS 2–6

1. 10^{2}
2. 10^{3}
3. 10^{-3}
4. 10^{-5}
5. 10^{4}
6. 10^{8}
7. 10^{2}
8. 10^{-4}
9. 10^{2}
10. 10^{3}
11. 10^{-2}
12. 10^{-3}
13. 10^{-2}
14. 10^{4}
15. 10^{-6}

END OF CHAPTER PROBLEMS 2–6

1. 10^{4}
3. 10^{-5}
5. 10^{8}
7. 10^{12}
9. 10^{7}
11. 10^{-3}
13. 10^{-6}
15. 10^{-7}
17. 10^{3}
19. 10^{-4}

PRACTICE PROBLEMS 2–7

1. 10^{-5}
2. 10^{-10}
3. 10^{10}
4. 10^{-2}
5. 10^{-3}
6. 10^{6}
7. 10^{-7}
8. 10^{4}
9. 10^{6}
10. $10^{0} = 1$

END OF CHAPTER PROBLEMS 2–7

1. 10^{-7}
3. 10^{-7}
5. 10^{11}
7. 10^{10}
9. 10^{-12}
11. 10^{8}
13. 10^{13}
15. 10^{-4}
17. 10^{-36}

SELF-TEST 2–1 THROUGH 2–7

1. 10^{3}
2. 10^{6}
3. 10^{-3}
4. 10^{-7}
5. 10^{-4}
6. 10^{-5}
7. 1000
8. 100,000
9. 100

10. 1
11. 0.0001
12. 0.1
13. 0.00001
14. 0.00000001
15. $\frac{1}{100} = 0.01$
16. $\frac{1}{1000} = 0.001$
17. $\frac{1}{100{,}000} = 0.00001$
18. $\frac{1}{10} = 0.1$
19. 10^7
20. 10^{-1}
21. 10^4
22. 10^{-9}
23. 10^{-3}
24. 10^{10}
25. 10^{-9}
26. 10^3
27. 10^5
28. 10
29. 10^{-3}
30. 10^{-5}
31. 10^8
32. 10^{-3}
33. 10^{-3}

PRACTICE PROBLEMS 2–8

1. (a) 0.386×10^2, (b) 0.0386×10^3, (c) 0.00386×10^4
2. (a) 56.0×10^2, (b) 5.60×10^3, (c) 0.560×10^4
3. (a) 0.00905×10^{-2}, (b) 90.5×10^{-6}, (c) 9050×10^{-8}
4. (a) 0.0277×10^{-5}, (b) 2.77×10^{-7}, (c) 277×10^{-9}
5. (a) 0.180×10, (b) 0.00180×10^3, (c) 18.0×10^{-1}, (d) 1800×10^{-3}
6. (a) 0.000000833×10^6, (b) 0.000833×10^3, (c) 833×10^{-3}, (d) $833{,}000 \times 10^{-6}$

END OF CHAPTER PROBLEMS 2–8

1. (a) 4.75×10^2 (b) 0.0475×10^4 (c) 0.000475×10^6
3. (a) 0.659×10^2 (b) 0.00659×10^4 (c) 0.0000659×10^6
5. (a) 934×10^2 (b) 9.34×10^4 (c) 0.0934×10^6
7. (a) 47.8×10^2 (b) 0.478×10^4 (c) 0.00478×10^6
9. (a) 418×10^2 (b) 4.18×10^4 (c) 0.0418×10^6
11. (a) 0.465×10^{-2} (b) 46.5×10^{-4} (c) 4650×10^{-6}
13. (a) 0.000555×10^{-2} (b) 0.0555×10^{-4} (c) 5.55×10^{-6}
15. (a) 0.0673×10^{-2} (b) 6.73×10^{-4} (c) 673×10^{-6}
17. (a) $0.00000108 \times 10^{-2}$ (b) 0.000108×10^{-4} (c) 0.0108×10^{-6}
19. (a) 0.325×10^3 (b) $325{,}000 \times 10^{-3}$
21. (a) 0.722×10^3 (b) $722{,}000 \times 10^{-3}$
23. (a) 2.70×10^3 (b) $2{,}700{,}000 \times 10^{-3}$
25. (a) 0.180×10^3 (b) $180{,}000 \times 10^{-3}$
27. (a) 0.0000257×10^3 (b) 25.7×10^3 (c) 25700×10^{-6}
29. 0.680×10^3; 680×10^{-3}

PRACTICE PROBLEMS 2–9

1. 1.73×10^3
2. 2.67×10^4
3. 1.65×10^6
4. 4.27×10^1
5. 1.73×10^5
6. 4.74×10^4
7. 7.91×10^1
8. 6.78×10^5
9. 1.90×10^2
10. 6.75×10^3

END OF CHAPTER PROBLEMS 2–9

1. 2.76×10^4
3. 4.78×10
5. 1.77×10^6
7. 2.73×10^2
9. 1.73×10^5
11. 7.89×10
13. 1.67×10^6
15. 5.79×10^4
17. 8.10×10^4
19. 9.22×10^4

PRACTICE PROBLEMS 2–10

1. 1.67×10^{-2}
2. 6.41×10^{-1}
3. 3.99×10^{-4}
4. 6.07×10^{-3}
5. 1.09×10^{-1}
6. 7.06×10^{-6}
7. 1.76×10^{-5}
8. 9.10×10^{-3}
9. 7.65×10^{-2}
10. 5.67×10^{-4}

END OF CHAPTER PROBLEMS 2–10

1. 4.78×10^{-3}
3. 7.47×10^{-1}
5. 1.64×10^{-2}
7. 4.54×10^{-3}
9. 5.01×10^{-5}
11. 2.55×10^{-1}
13. 4.00×10^{-2}
15. 8.96×10^{-4}
17. 1.71×10^{-2}
19. 2.05×10^{-4}

PRACTICE PROBLEMS 2–11

1. 1.10×10^{3}
2. 1.01×10
3. 9.00×10^{2}
4. 3.20×10^{3}
5. 1.03
6. 1.00×10^{4}
7. 2.55×10^{-2}
8. 4.90×10^{2}
9. 1.31×10^{5}
10. 7.69×10^{-4}
11. $5830 + 0.245 = 5.83 \times 10^{3}$
12. $0.000054 \times 10^{2} - 37.8 \times 10^{-3} = -3.24 \times 10^{-2}$
13. $45.8 \times 10^{2}\ \text{ft} + 7.96 \times 10^{2}\ \text{ft} + 2738\ \text{ft} + 357.5 \times 10\ \text{ft} = 1.17 \times 10^{4}\ \text{ft}$
14. $27{,}000\ \Omega + 7.5 \times 10^{3}\ \Omega + 3.3 \times 10^{4} + 10 \times 10^{3}\ \Omega = 7.75 \times 10^{4}\ \Omega$

END OF CHAPTER PROBLEMS 2–11

1. 1.10×10^{4}
3. 2.00×10^{-1}
5. 3.86×10^{3}
7. 4.82×10^{5}
9. 2.88×10^{-1}
11. 3.87×10^{-2}
13. 9.93×10^{4}
15. 8.00×10^{5}

PRACTICE PROBLEMS 2–12

1. $587 \approx 6 \times 10^{2}$ $43.8 \approx 4 \times 10$ $6 \times 10^{2} \times 4 \times 10 = 24 \times 10^{3} = 2.4 \times 10^{4}$
   $587 \times 43.8 = 2.57 \times 10^{4}$
2. $713 \approx 7 \times 10^{2}$ $8.53 \approx 9$ $7 \times 10^{2} \times 9 = 63 \times 10^{2} = 6.3 \times 10^{3}$ $713 \times 8.53 = 6.08 \times 10^{3}$
3. $832.51 \approx 8 \times 10^{2}$ $47.956 \approx 5 \times 10$ $8 \times 10^{2} \times 5 \times 10 = 40 \times 10^{3} = 4.0 \times 10^{4}$
   $832.51 \times 47.956 = 3.99 \times 10^{4}$
4. $397.93 \approx 4 \times 10^{2}$ $0.00052439 \approx 5 \times 10^{-4}$ $4 \times 10^{2} \times 5 \times 10^{-4} = 20 \times 10^{-2} =$
   2.0×10^{-1} $397.63 \times 0.00052439 = 2.09 \times 10^{-1}$
5. $694 \approx 7 \times 10^{2}$ $137.9 \approx 1 \times 10^{2}$ $7 \times 10^{2} \div 1 \times 10^{2} = 7.0$ $694 \div 137.9 = 5.03$
6. $3870 \approx 4 \times 10^{3}$ $88.72 \approx 9 \times 10$ $4 \times 10^{3} \div 9 \times 10 \approx 0.5 \times 10^{2} = 5.0 \times 10$
   $3870 \times 88.72 \approx 4.36 \times 10$
7. $55.374 \approx 6 \times 10$ $0.0356 \approx 4 \times 10^{-2}$ $6 \times 10 \div 4 \times 10^{-2} = 1.5 \times 10^{3}$
   $55.374 \div 0.0356 = 1.56 \times 10^{3}$
8. $0.9327 \approx 9 \times 10^{-1}$ $9832.7 \approx 1 \times 10^{4}$ $9 \times 10^{-1} \div 1 \times 10^{4} = 9.0 \times 10^{-5}$ $0.9327 \div 9832.7 = 9.49$
9. To the nearest ten: $\$30 \times 40$ hours $= \$1200$
   To the nearest cent: $\$33.25 \times 37 = \$1230.25$
10. To the nearest hundred: $1900\ \text{ft} \times 600\ \text{ft} = 1{,}140{,}000 = 1.14 \times 10^{6}$ sq ft
    Actual area: $1940.7\ \text{ft} \times 620.4\ \text{ft} = 1.20 \times 10^{6}$ sq ft
11. $I = \dfrac{E}{R} = \dfrac{22\ \text{V}}{47} \times 10^{3}\ \Omega \approx \dfrac{20\ \text{V}}{50} \times 10^{3} = 0.4 \times 10^{-3} = 4 \times 10^{-4}\ \text{A}$
    Actual: $I = \dfrac{22\ \text{V}}{47} \times 10^{3}\ \Omega = 4.68 \times 10^{-4}\ \text{A}$

END OF CHAPTER PROBLEMS 2–12

Estimated answers are given, then answers rounded to three places are given.

1. $3.5 \times 10^{4}, 3.97 \times 10^{4}$
3. $3.6 \times 10^{-5}, 3.48 \times 10^{-5}$
5. $6.0 \times 10, 7.85 \times 1$
7. $3.3 \times 10^{7}, 3.18 \times 10^{7}$
9. $1.0 \times 10^{5}, 9.90 \times 10^{4}$
11. $2.0 \times 10, 2.08 \times 1$
13. $5.0 \times 10^{-2}, 4.68 \times 10^{-2}$
15. $3.0 \times 10^{2}, 2.71 \times 10^{2}$

PRACTICE PROBLEMS 2–13

1. 4.55
2. 8.42
3. 1.49×10
4. 9.14
5. 7.85
6. 1.42
7. 2.27
8. 1.82

END OF CHAPTER PROBLEMS 2–13

1. 1.09×10
3. 4.55
5. 1.48×10
7. 2.23×10
9. 1.07×10
11. 1.39
13. 1.74
15. 1.09
17. 2.53
19. \$1316; \$1292.50
21. 1.44×10^6; 1.45×10^6
23. 3.00×10^{-5}; 2.73×10^{-5}

PRACTICE PROBLEMS 2–14

1. 2.13×10^{-3}
2. 3.03×10^{-6}
3. 1.47×10^{7}
4. 2.70×10^{2}
5. 3.62×10^{-4}
6. 1.79×10^{-4}
7. 2.00×10^{-5}
8. 2.70×10^{3}
9. 2.50×10^{2}
10. 1.00×10^{-4}
11. 9.26×10^{-4}
12. 3.60×10^{-5}
13. 2.17×10^{-4}
14. 6.00×10^{-5}
15. 1.08×10^{4}
16. 3.07×10^{3}
17. 1.50×10^{-5}
18. 1.31×10^{2}
19. $G_T = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{470}\,\Omega + \frac{1}{560}\,\Omega = 2.13 \times 10^{-3} + 1.79 \times 10^{-3} = 3.91 \times 10^{-3}$ S. The siemen (S) is the unit conductance.

END OF CHAPTER PROBLEMS 2–14

1. 1.06×10^{2}
3. 1.27×10^{-4}
5. 3.26×10^{-3}
7. 1.67×10^{-3}
9. 3.91×10^{-5}
11. 5.16×10^{-6}
13. 1.10×10^{-4}
15. 2.56×10^{3}
17. 8.46 × 10
19. 3.07×10^{4}
21. 2.44×10^{3}
23. 4.36×10^{-3}

SELF-TEST 2–8 THROUGH 2–14

1. 1.76×10^{3}
2. $6.75 \times 10^{0} = 6.75$
3. $1.99 \times 10^{0} = 1.99$
4. 4.35×10^{7}
5. 8.91×10^{9}
6. 5.26×10^{4}
7. 4.43×10^{-5}
8. 7.85×10^{-3}
9. 5.59×10^{5}
10. 5.18×10^{-2}
11. 2.08×10
12. 1.78×10^{-1}
13. 7.81×10^{-1}
14. 6.27×10^{-3}
15. $2.27 \times 10^{0} = 2.27$
16. 3.27×10^{-4}
17. 2.82×10^{4}
18. $1.89 \times 10^{0} = 1.89$
19. 2.56×10^{4}
20. 1.13×10^{3}

PRACTICE PROBLEMS 2–15

1. 10^{6}
2. 10^{8}
3. 10^{9}
4. 10^{-2}
5. 10^{-20}
6. 10^{-12}
7. 10^{6}
8. 10^{3}
9. 10^{4}
10. 10^{-15}
11. 10^{-2}
12. 10^{-12}
13. 10^{-8}
14. 10^{6}
15. 10^{9}

END OF CHAPTER PROBLEMS 2–15

1. 10^{6}
3. 10^{10}
5. 10^{-12}
7. 10^{12}
9. 10^{-8}

PRACTICE PROBLEMS 2–16

1. 10^{3}
2. 10^{3}
3. 10^{-3}
4. 10^{-4}
5. 10
6. 10^{-2}
7. 10
8. 10^{-2}
9. 10^{-5}
10. 10^{5}

END OF CHAPTER PROBLEMS 2–16

1. 10^{3}
3. 10^{-2}
5. 10^{-2}
7. 10^{5}
9. 10^{3}

PRACTICE PROBLEMS 2–17

1. 3.97×10
2. 1.85×10^{3}
3. 1.38×10^{-3}
4. 2.21×10^{-7}
5. 4.53×10^{5}
6. 1.08×10^{-6}
7. 6.34×10
8. 7.68×10^{7}
9. 9.47×10^{-1}
10. 3.21×10^{-13}
11. 7.62×10^{-1}
12. 1.59
13. 2.50×10^{-1}
14. 4.96×10^{-5}
15. 1.21×10^{-1}
16. 3.00×10^{-1}
17. Area $= S^2 = (78.4 \text{ yd})^2 = 6.15 \times 10^{3}$ square yards
18. The area of the shower stall $= (36 \text{ in.})^2 = 1296 \text{ in}^2$. The area of one tile $= (4 \text{ in.})^2 = 16 \text{ in}^2$. $1296 \div 16 = 81$. 81 tiles will be needed.
19. $P = I^2R = (48.7 \times 10^{-4} \text{ A})^2 \times 5.6 \times 10^{3} \ \Omega = 1.33 \times 10^{-1} \text{ W}$

END OF CHAPTER PROBLEMS 2–17

1. 6.29×10^{3}
3. 3.17×10^{6}
5. 2.26×10^{-3}
7. 7.62×10^{-5}
9. 2.03×10^{9}
11. 9.00×10^{10}
13. 8.76×10^{-8}
15. 8.15×10^{-9}
17. 6.75
19. 2.17
21. 2.88×10^{3}
23. 144
25. $2.53 \times 10 \text{ W}$

PRACTICE PROBLEMS 2–18

1. 6.04
2. 9.62×10^{-1}
3. 2.52
4. 1.37×10^{3}
5. 2.60×10^{-1}
6. 5.22×10
7. 2.34×10^{-2}
8. 1.32×10
9. 3.07×10^{-1}
10. 6.50×10^{3}
11. $I = \left(\frac{P}{R}\right)^{1/2} = \left(38.1 \times \frac{10^{-2} \text{ W}}{91} \times 10^{2} \ \Omega\right)^{1/2} = 6.47 \times 10^{-3} \text{ A}$

END OF CHAPTER PROBLEMS 2–18

1. 9.64
3. 1.54×10
5. 8.40×10^{-2}
7. 1.02×10^{-2}
9. 5.20×10^{3}
11. 6.71×10^{3}
13. 3.04×10^{-3}
15. 5.88
17. 1.07×10^{-2}
19. 7.96×10^{3}
21. 1.58×10^{4}
23. $1.05 \times 10^{-2} \text{ A}$

SELF-TEST 2–15 THROUGH 2–18

1. 10^{15}
2. 10^{-8}
3. 10^{6}
4. 10^{-3}
5. 10^{2}
6. 10^{-1}
7. 6.13×10^{3}
8. 8.58×10^{-8}
9. 7.74×10^{13}
10. 5.39×10^{-1}
11. 1.83×10^{-3}
12. 1.50×10^{-1}
13. 1.65×10^{1}
14. 1.63×10^{-2}
15. 2.72×10^{-2}
16. 6.79×10
17. 9.21×10^{-3}
18. 8.12
19. 4.77×10^{4}
20. 5.04×10^{2}