Test 1 Homework Exercises for eBook

We will be covering Chapters 1, 2, and 3 as the content for Test 1 in this MATH103 class. Homework exercises are located at the end of each section of the eBook and answers to odd numbered problems are provided in the eBook appendix beginning on page 375.

It is very important to do all assigned exercises in an organized manner in your homework notebook. Use enough paper to show the complete step-by-step process for each exercise. It is best to solve the exercises using pencil on notebook paper and avoid using a calculator for exercises. I will be collecting your notebooks at the beginning of each hour test to verify you attempted the excercises.

eBook Chapter 1 Assignment

- □ Section 1.1 all odd exercises (1 through 75)
- □ Section 1.2 all odd exercises (1 through 21)
- □ Section 1.3 exercises: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 61, 65, 69, 73, 77, 81, 85, 89, 93, 97, 101, 103, 105, 107, 109
- □ Section 1.4 all odd exercises (1 through 45)
- □ Section 1.5 all odd exercises (1 through 75)

eBook Chapter 2 Assignment

- □ Section 2.1: 1, 5, 9, 13, 17, 21, 25, 27, 29
- □ Section 2.2: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57
- □ Section 2.3: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37
- □ Section 2.4: 1, 3, 5, 7, 9, 11, 13, 15

eBook Chapter 3 Assignment

- □ Section 3.1: 1, 3, 5, 7, 13, 15
- □ Section 3.2: 1, 3, 7, 11, 13, 15
- □ Section 3.3: all odd exercises (1 through 21)
- □ Section 3.4: all odd exercises (1 through 45)
- □ Section 3.5: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 25, 27, 29, 33

eBook Chapter 1 Homework Exercise Solutions

Chapter 1 is very important to build a firm foundation to be successful in the rest of the course. It is best to solve the exercises using pencil on notebook paper. Only use a calulator for checking your answers in process. I will be collecting your notebooks at the beginning of each hour test to verify you attempted the excercises in a step-by-step procedure. Chapter 1 Homework Exercise Solutions that follow provide more detail then the answers in the appendix and should be used with that in mind to keep you on track with your problem solving skills.

Please refer to eBook Appendix for answers to all odd exercises for Chapters 2 and 3.

Section 1.1 Signed Numbers and Order of Operations

1. $<$ 3. $>$ 5. $<$ 7. $<$ 9. $>$

Order from smallest to largest:

11. $-1,\ |0|, |-2|, 3, 7, |-11|$ 13. $-5, -2, 0, 1, |-6|, |-7|, |11|$

Simplify without using a calculator:

15. -2 17. -21 19. 4 21. -42 23. -7

25. -9 27. -12 29. -5 31. -45 33. -40

35. -63 37. -9 39. -9 41. -7 43. -20

45. 125 47. 16 49. 64 51. -16

53. $2+15=17$ 55. $3+(-6)=-3$ 57. $4-7=-3$

59. $-3-5\cdot 5=-3-25=-28$ 61. $-10-4\cdot(-4)=-10-(-16)=-10+16=6$

63. $(3-16)-(8-10)=(-13)-(-2)=-11$

65. $3+2[4(2-9)-2(5-16)]=3+2[4(-7)-2(-11)]=3+2[-28+22]=3+2[-6]$
$= 3 - 12 = -9$

67. $12-3[3(8-8)-2(15-9)]=12-3[2\cdot 0-2\cdot 6]=12-3[0-12]=12-3[-12]=12+36$
$= 12 + 36 = 48$

69. $3\{5-2[3]-3[-4+4\cdot 3]\}=3\{5-6-3[-4+12]\}=3\{5-6-3[8]\}=3\{5-6-24\}$
$= 3\{-25\} = -75$

71. $-4\{2[-10]-4[8+4(-8)]\}=-4\{-20-4[8+(-32)]\}=-4\{-20-4[-24]\}$
$-4\{-20+96\}=-4\{76\}=-304$

73. $\$800-4(\$230)-\$275=\$800-920-\$275=-\$120-\$275=-\$395$

Maria has to borrow from roommate \$395

75. $1776-(-753)-1=2528$ years

Section 1.2 Prime Factorizaton, GCF, LCM

1. $36/2\to 18/2\to 9/3\to 3\Rightarrow 2\cdot 2\cdot 3\cdot 3=2^2\cdot 3^2$

3. $100/2\to 50/2\to 25/5\to 5\Rightarrow 2\cdot 2\cdot 5\cdot 5=2^2\cdot 5^2$

5. $220/2\to 110/2\to 55/5\to 11\Rightarrow 2\cdot 2\cdot 5\cdot 11=2^2\cdot 5\cdot 11$

7. $18/2\to 9/3\to 3\Rightarrow 2\cdot 3\cdot 3=2\cdot 3^2$ $\quad$ $45/3\to 15/3\to 5\Rightarrow 3\cdot 3\cdot 5=3^2\cdot 5$

least common multiple (LCM) of 18 and 45 is $2\cdot 3^2\cdot 5 = 90$

9. $120/2\to 60/2\to 30/2\to 15/3\to 5\Rightarrow 2\cdot 2\cdot 2\cdot 3\cdot 5=2^3\cdot 3\cdot 5$

$216/2\to 108/2\to 54/2\to 27/3\to 9/3\to 3\Rightarrow 2\cdot 2\cdot 2\cdot 3\cdot 3\cdot 3=2^3\cdot 3^3$

least common multiple (LCM) of 120 and 216 is $2^3\cdot 3^3\cdot 5 = 1080$

11. $84/2\to 42/2\to 21/3\to 7\Rightarrow 2\cdot 2\cdot 3\cdot 7=2^2\cdot 3\cdot 7$

$108/2\to 54/2\to 27/3\to 9/3\to 3\Rightarrow 2\cdot 2\cdot 3\cdot 3\cdot 3=2^2\cdot 3^3$

$120/2\to 60/2\to 30/2\to 15/3\to 5\Rightarrow 2\cdot 2\cdot 2\cdot 3\cdot 5=2^3\cdot 3\cdot 5$

least common multiple (LCM) of 84, 108, and 120 is $2^3\cdot 3^3\cdot 5\cdot 7 = 7560$

13. $18/2\to 9/3\to 3\Rightarrow 2\cdot 3\cdot 3=2\cdot 3^2$ $\quad$ $24/2\to 12/2\to 6/2\to 3\Rightarrow 2\cdot 2\cdot 2\cdot 3=2^3\cdot 3$
greatest common factor (GCF) of 18 and 24 is $2\cdot 3 = 6$

15. $168/2\to 84/2\to 42/2\to 21/3\to 7\Rightarrow 2\cdot 2\cdot 2\cdot 3\cdot 7=2^3\cdot 3\cdot 7$
$280/2\to 140/2\to 70/2\to 35/5\to 7\Rightarrow 2\cdot 2\cdot 2\cdot 5\cdot 7=2^3\cdot 5\cdot 7$
greatest common factor (GCF) of 168 and 280 is $2^3\cdot 7=8\cdot 7=56$

17. Find the greatest common factor (GCF) of 84. 168. and 252.
$84/2\to 42/2\to 21/3\to 7\Rightarrow 2\cdot 2\cdot 3\cdot 7=2^2\cdot 3\cdot 7$
$168/2\to 84/2\to 42/2\to 21/3\to 7\Rightarrow 2\cdot 2\cdot 2\cdot 3\cdot 7=2^3\cdot 3\cdot 7$
$252/2\to 126/2\to 63/3\to 21/3\to 7\Rightarrow 2\cdot 2\cdot 3\cdot 7=2^2\cdot 3\cdot 7$
greatest common factor (GCF) of 84. 168. and 252 = $2^2\cdot 3\cdot 7=84$

19. $42/2 \to 21/3 \to 7 \Rightarrow 2 \cdot 3 \cdot 7$ $\quad$ $30/2 \to 15/3 \to 5 \Rightarrow 2 \cdot 3 \cdot 5$

$18/2 \to 9/3 \to 3 \Rightarrow 2 \cdot 3 \cdot 3 = 2 \cdot 3^2$

least common multiple (LCM) of 42, 30, and 18 is $2 \cdot 3^2 \cdot 5 \cdot 7$ = 630 students

21. $72/2 \to 36/2 \to 18/2 \to 9/3 \to 3 \Rightarrow 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 = 2^3 \cdot 3^2$

$48/2 \to 24/2 \to 12/2 \to 6/2 \to 3 \Rightarrow 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 = 2^4 \cdot 3$

greatest common factor (GCF) of 72 and 48 = $2^3 \cdot 3 = 24$ exams

Section 1.3 Rational Numbers

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

5. $-5\frac{4}{7} = -\frac{5 \cdot 7 + 4}{7} = -\frac{35+4}{7} = -\frac{39}{7}$

9. $\frac{23}{5} = 23 \div 5 = 4\,R\,3 = 4\frac{3}{5}$

13. $-\frac{57}{12} = -57 \div 12 = -4\,R\,9 = -4\frac{9}{12} = -4\frac{3}{4}$

17. $9.333333333333333 = 9.\overline{3}$

21. $-12\frac{3}{16} = -\left(12 + \frac{3}{16}\right) = -12.1875$

25. $32\frac{5}{6} = 32 + \frac{5}{6} = 32.8\overline{3}$

29. $5.32 = \frac{532}{100} = \frac{2 \cdot 2 \cdot 133}{2 \cdot 2 \cdot 25} = \frac{133}{25}$

33. $\frac{12}{28} = \frac{2}{2} \cdot \frac{2}{2} \cdot \frac{3}{7} = \frac{3}{7}$

37. $\frac{84}{168} = \frac{2 \cdot 2 \cdot 3 \cdot 7}{2 \cdot 2 \cdot 2 \cdot 3 \cdot 7} = \frac{1}{2}$

41. $\frac{7}{27} \cdot \frac{18}{42} = \frac{7 \cdot 18}{27 \cdot 42} = \frac{1 \cdot 2}{3 \cdot 6} = \frac{2}{18} = \frac{1}{9}$

45. $\left(-\frac{5}{12}\right) \cdot \left(-\frac{8}{25}\right) = \frac{5 \cdot 8}{12 \cdot 25} = \frac{1 \cdot 2}{3 \cdot 5} = \frac{2}{15}$

49. $5\frac{1}{9} \cdot \left(-7\frac{2}{3}\right) = \left(\frac{5 \cdot 9 + 1}{9}\right) \cdot \left(-\frac{7 \cdot 3 + 2}{3}\right) = \left(\frac{46}{9}\right) \cdot \left(-\frac{23}{3}\right) = -\frac{46 \cdot 23}{9 \cdot 3} = -\frac{1058}{27} = -39\frac{5}{27}$

53. $\frac{9}{14} \div \frac{27}{35} = \frac{9}{14} \cdot \frac{35}{27} = \frac{1}{2} \cdot \frac{5}{3} = \frac{5}{6}$

57. $-\frac{16}{25} \div \left(-\frac{15}{8}\right) = -\frac{16}{25} \cdot \left(-\frac{8}{15}\right) = \frac{16}{25} \cdot \frac{8}{15} = \frac{128}{375}$

61. $5\frac{5}{8} \div 3\frac{1}{3} = \frac{5 \cdot 8 + 5}{8} \div \frac{3 \cdot 3 + 1}{3} = \frac{45}{8} \div \frac{10}{3} = \frac{45}{8} \cdot \frac{3}{10} = \frac{9}{8} \cdot \frac{3}{2} = \frac{27}{16} = 1\frac{11}{16}$

65. $-3\frac{5}{6}\div\left(-11\frac{1}{2}\right)=\frac{3\cdot6+5}{6}\div\left(\frac{11\cdot2+1}{2}\right)=\frac{23}{6}\cdot\left(\frac{2}{23}\right)=\frac{2}{6}=\frac{1}{3}$

69. $\left(-\frac{5}{7}\right)^2=\frac{25}{49}$

73. $\frac{3}{7}+\frac{2}{7}=\frac{3+2}{7}=\frac{5}{7}$

77. $\frac{1}{4}+\frac{2}{3}\rightarrow \text{LCD}=12\rightarrow\frac{3}{3}\cdot\frac{1}{4}+\frac{2}{3}\cdot\frac{4}{4}=\frac{3+8}{12}=\frac{11}{12}$

81. $-\frac{5}{6}-\left(-\frac{3}{10}\right)\rightarrow \text{LCD}=30\rightarrow-\frac{5}{6}\cdot\left(\frac{5}{5}\right)+\frac{3}{10}\cdot\frac{3}{3}=\frac{-25+9}{30}=\frac{-16}{30}=-\frac{8}{15}$

85. $2\frac{5}{6}+11\frac{2}{3}\rightarrow \text{Add Wholes then Fractions}\rightarrow 2+11\cdots\frac{5}{6}+\frac{2}{3}\cdot\frac{2}{2}=13\frac{9}{6}=14\frac{1}{2}$

89. $3\frac{5}{6}+4\frac{3}{4}=\frac{3\cdot6+5}{6}+\frac{4\cdot4+3}{4}=\frac{23}{6}+\frac{19}{4}\rightarrow \text{LCD}=12\rightarrow\frac{2}{2}\cdot\frac{23}{6}+\frac{19}{4}\cdot\frac{3}{3}=\frac{46+57}{12}=\frac{103}{12}=8\frac{7}{12}$

93. $\dfrac{\frac{5}{14}-\frac{4}{7}}{\frac{4}{21}+\frac{11}{3}}=\dfrac{\frac{5}{14}-\frac{4}{7}\cdot\frac{2}{2}}{\frac{4}{21}+\frac{11}{3}\cdot\frac{7}{7}}=\dfrac{\frac{5-8}{14}}{\frac{4+77}{21}}=\dfrac{\frac{-3}{14}}{\frac{81}{21}}=\frac{-3}{14}\cdot\frac{21}{81}=-\frac{1}{2}\cdot\frac{3}{27}=-\frac{1}{2}\cdot\frac{1}{9}=-\frac{1}{18}$

97. $\frac{1}{2}+\dfrac{\frac{3}{8}}{\frac{5}{2}-4}\cdot\frac{2}{3}=\frac{1}{2}+\dfrac{\frac{3}{8}}{\left(\frac{5}{2}-\frac{4\cdot2}{2}\right)}\cdot\frac{2}{3}=\frac{1}{2}+\dfrac{\frac{3}{8}}{\left(\frac{5-8}{2}\right)}\cdot\frac{2}{3}$

$=\frac{1}{2}+\dfrac{\frac{3}{8}}{-\frac{3}{2}}\cdot\frac{2}{3}=\frac{1}{2}+\frac{3}{8}\cdot\left(-\frac{2}{3}\right)\cdot\frac{2}{3}=\frac{1}{2}+\left(-\frac{6}{24}\right)\cdot\frac{2}{3}=\frac{1}{2}+\left(-\frac{1}{6}\right)=\frac{3}{6}+\left(-\frac{1}{6}\right)=\frac{3-1}{6}=\frac{1}{3}$

101. $\left(-\frac{5}{6}\right)\cdot\frac{7}{15}\cdot\frac{9}{10}=\left(-\frac{1}{2}\right)\cdot\frac{7}{15}\cdot\frac{3}{2}=\left(-\frac{1}{2}\right)\cdot\frac{7}{5}\cdot\frac{1}{2}=\left(-\frac{7}{20}\right)$

103. $\frac{2}{3}+\frac{4}{9}+\left(-\frac{5}{6}\right)\rightarrow \text{LCD}=18\rightarrow\frac{2}{3}\cdot\frac{6}{6}+\frac{4}{9}\cdot\frac{2}{2}+\left(-\frac{5}{6}\right)\cdot\frac{3}{3}=\frac{12+8-15}{18}=\frac{5}{18}$

105. $\frac{11}{27}\div\frac{5}{18}=\frac{11}{27}\cdot\frac{18}{5}=\frac{11}{9}\cdot\frac{6}{5}=\frac{11}{3}\cdot\frac{2}{5}=\frac{22}{15}=1\frac{7}{15}$

107. $-4\frac{4}{7}-2\frac{3}{14}=-\frac{4\cdot7+4}{7}-\frac{2\cdot14+3}{14}=-\frac{32}{7}-\frac{31}{14}\rightarrow \text{LCD}=14\rightarrow \frac{2}{2}\cdot\left(-\frac{32}{7}\right)-\frac{31}{14}=\frac{-64-31}{14}$

$= \frac{-95}{14}=-6\frac{11}{14}$

109. *Step 1:* Given Car's tank = $12\frac{2}{3}$ gallons and you want to fill $\frac{3}{5}$ of tank with gas.

Unknown = How many Gallons?

Step 2: Determine relationship between Known items to find unknown.

How many Gallons are required to fill tank 60% = $12\frac{2}{3}\cdot\frac{3}{5}$

Step 3: Solve equations for relationships

$$\text{Gallons}=12\frac{2}{3}\cdot\frac{3}{5}=\frac{12\cdot3+2}{3}\cdot\frac{3}{5}=\frac{38}{3}\cdot\frac{3}{5}=\frac{38}{5}=7\frac{3}{5}\text{ gallons of gas}$$

Step 4: Check your answer by stating the word problem with the solved answer

Yes, the answer is correct.

Section 1.4 Irrational Numbers

1. $\sqrt{49}=7$ 3. $\sqrt{64}=8$ 5. $9\sqrt{16}=9\cdot4=36$ 7. $\sqrt{157}=12.53$

9. $21\sqrt{45{,}693}=4488.9434$

11. $\sqrt{32}=\sqrt{16\cdot2}=4\sqrt{2}$ or use paired prime factors $\sqrt{2\cdot2\cdot2\cdot2\cdot2}=4\sqrt{2}$

13. $\sqrt{128}=\sqrt{64\cdot2}=\sqrt{64}\cdot\sqrt{2}=8\sqrt{2}$

15. $5\sqrt{27}=5\sqrt{9\cdot3}=5\cdot3\sqrt{3}=15\sqrt{3}$ or pair prime factors $5\sqrt{3\cdot3\cdot3}=5\cdot3\sqrt{3}=15\sqrt{3}$

17. $15\sqrt{242}=15\sqrt{2\cdot121}=15\sqrt{2}\sqrt{121}=15\cdot11\sqrt{2}=165\sqrt{2}$

19. $\sqrt{15}\cdot\sqrt{6}=\sqrt{3\cdot5}\cdot\sqrt{2\cdot3}=\sqrt{2\cdot3\cdot3\cdot5}=3\sqrt{2\cdot5}=3\sqrt{10}$

21. $\sqrt{30}\cdot\sqrt{70}=\sqrt{3}\cdot\sqrt{10}\cdot\sqrt{7}\cdot\sqrt{10}=10\sqrt{3\cdot7}=10\sqrt{21}$

23. $7\sqrt{6}\cdot7\sqrt{8}=7\sqrt{2\cdot3}\cdot7\sqrt{2\cdot2\cdot2}=7\cdot7\sqrt{2\cdot2\cdot2\cdot2\cdot3}=7\cdot7\cdot2\cdot2\sqrt{3}=196\sqrt{3}$

25. $7\sqrt{24}\cdot 5\sqrt{36}=7\sqrt{4\cdot 6}\cdot 5\cdot 6=7\cdot 2\cdot 5\cdot 6\sqrt{6}=420\sqrt{6}$

27. $\sqrt{5}\cdot(\sqrt{15}+\sqrt{5})=\sqrt{5}\cdot\sqrt{3\cdot 5}+\sqrt{5}\cdot\sqrt{5}=\sqrt{5}\cdot\sqrt{3}\cdot\sqrt{5}+\sqrt{5}\cdot\sqrt{5}=5\sqrt{3}+5$

29. $\sqrt{7}\cdot(\sqrt{14}-\sqrt{7})=\sqrt{7}\cdot(\sqrt{2}\cdot\sqrt{7}-\sqrt{7})=7\sqrt{2}-7$

31. $3\sqrt{5}\cdot(2\sqrt{5}-3\sqrt{15})=3\sqrt{5}\cdot 2\sqrt{5}-3\sqrt{5}\cdot 3\sqrt{3\cdot 5}=6\cdot 5-9\cdot 5\sqrt{3}=30-45\sqrt{3}$

33. $7\sqrt{2}\cdot(5\sqrt{6}-4\sqrt{2})=7\sqrt{2}\cdot 5\sqrt{2\cdot 3}-4\sqrt{2}\cdot 7\sqrt{2}=35\cdot 2\sqrt{3}-4\cdot 2\cdot 7=70\sqrt{3}-56$

35. $4\sqrt{3}+7\sqrt{3}-2\sqrt{3}=(4+7-2)\sqrt{3}=9\sqrt{3}$

37. $3\sqrt{5}+6\sqrt{5}-7\sqrt{10}=(3+6)\sqrt{5}-7\sqrt{10}=9\sqrt{5}-7\sqrt{10}$

39. $12\sqrt{12}+3\sqrt{27}-4\sqrt{75}=12\sqrt{3\cdot 4}+3\sqrt{3\cdot 9}-4\sqrt{3\cdot 25}=24\sqrt{3}+9\sqrt{3}-20\sqrt{3}=13\sqrt{3}$

41. $7\sqrt{2\cdot 16}+8\sqrt{2\cdot 25}-10\sqrt{2\cdot 36}=7\cdot 4\sqrt{2}+8\cdot 5\sqrt{2}-10\cdot 6\sqrt{2}=28\sqrt{2}+40\sqrt{2}-60\sqrt{2}=8\sqrt{2}$

43a. $v=100+9.8\sqrt{5000}=793$ km/hour

b. $v=100+9.8\sqrt{600}=340$ km/hour

c. Velocity is a function of depth. As depth decreases so does the velocity.

45. $t=\sqrt{0.204\times 381}=8.8$ seconds

Section 1.5 Exponents and Scientific Notation

Please note all odd problems are assigned, but only select solutions are provided.
See eBook Appendix for answers to all odd problems.

1. $9^2=9\cdot 9=81$

5. $-2^4=-(2\cdot 2\cdot 2\cdot 2)=-16$

9. $-15^0=-(1)=-1$

13. $2^3\cdot 2^2=2^{3+2}=2^5=32$

17. $(4^3)^2=4^{3\cdot 2}=4^6=4096$

23. $(-4)^{-2}=\dfrac{1}{(-4)^2}=\dfrac{1}{16}$

27. $3^5\cdot 3^{-8}=3^{5-8}=3^{-3}=\dfrac{1}{3^3}=\dfrac{1}{27}$

31. $\dfrac{2^5}{2^8}=2^{5-8}=2^{-3}=\dfrac{1}{2^3}=\dfrac{1}{8}$

35. $\dfrac{7^9}{7^{11}}=7^{9-11}=7^{-2}=\dfrac{1}{7^2}=\dfrac{1}{49}$

43. $\dfrac{x^{10}\cdot y^7}{x^5\cdot y^3}=x^{10-5}\cdot y^{7-3}=x^5\cdot y^4$

51. $\dfrac{\left(x^3\cdot y^7\right)^{-2}}{\left(x^5\cdot y^6\right)^{-1}}=\dfrac{\left(x^5\cdot y^6\right)}{\left(x^6\cdot y^{14}\right)}=x^{-1}\cdot y^{-8}=\dfrac{1}{x\cdot y^8}$

63. $(2.5\times10^{9})\cdot(2.34\times10^{11})=(2.5\times2.34)\times10^{9+11}=5.85\times10^{20}$

67. $\dfrac{6.82\times10^{-6}}{2.2\times10^{10}}=\left(\dfrac{6.82}{2.2}\right)\times10^{-6-10}=3.1\times10^{-16}$

71. $\dfrac{(1.6\times10^{6})\cdot(4.5\times10^{-4})}{(1.2\times10^{-6})\cdot(3\times10^{8})}=\dfrac{(1.6\cdot4.5)\times(10^{6-4})}{(1.2\cdot3)\times10^{-6+8}}=\dfrac{7.2\times10^{2}}{3.6\times10^{2}}=\left(\dfrac{7.2}{3.6}\right)\times10^{2-2}=2\times10^{0}=2$

75. Given:

$1\,\text{light year}=5.88\times10^{12}\,\text{miles}$ AND Andromeda galaxy = 2,500,000 light year

Unknown: How many miles away is the Andromeda galaxy?

$$\frac{2.5\times10^{6}\,\text{light years}}{1}\cdot\frac{5.88\times10^{12}\,\text{miles}}{1\,\text{light year}}=(2.5\cdot5.88)\times10^{6+12}\,\text{miles}=14.7\times10^{18}\,\text{miles}=1.47\times10^{19}\,\text{miles}$$

