

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 exercises.

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 calculator for checking your answers in process. I will be collecting your notebooks at the beginning of each hour test to verify you attempted the exercises in a step-by-step procedure. Chapter 1 Homework Exercise Solutions that follow provide more detail than 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. $12-3[3(8-8)-2(15-9)]=12-3[3\cdot 0-2\cdot 6]=12-3[0-12]=12-3[-12]=12+36$
 $=12+36=48$
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 Factorization, GCF, LCM

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

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

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

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

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

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

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

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

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

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

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

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

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

15. $168/2 \rightarrow 84/2 \rightarrow 42/2 \rightarrow 21/3 \rightarrow 7 \Rightarrow 2 \cdot 2 \cdot 2 \cdot 3 \cdot 7 = 2^3 \cdot 3 \cdot 7$

$280/2 \rightarrow 140/2 \rightarrow 70/2 \rightarrow 35/5 \rightarrow 7 \Rightarrow 2 \cdot 2 \cdot 2 \cdot 5 \cdot 7 = 2^3 \cdot 5 \cdot 7$

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.

$84/2 \rightarrow 42/2 \rightarrow 21/3 \rightarrow 7 \Rightarrow 2 \cdot 2 \cdot 3 \cdot 7 = 2^2 \cdot 3 \cdot 7$

$168/2 \rightarrow 84/2 \rightarrow 42/2 \rightarrow 21/3 \rightarrow 7 \Rightarrow 2 \cdot 2 \cdot 2 \cdot 3 \cdot 7 = 2^3 \cdot 3 \cdot 7$

$252/2 \rightarrow 126/2 \rightarrow 63/3 \rightarrow 21/3 \rightarrow 7 \Rightarrow 2 \cdot 2 \cdot 3 \cdot 7 = 2^2 \cdot 3 \cdot 7$

greatest common factor (GCF) of 84, 168, and 252 = $2^2 \cdot 3 \cdot 7 = 84$

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

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

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

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

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

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. $\frac{23}{5} = 23 \div 5 = 4R3 = 4\frac{3}{5}$

13. $-\frac{57}{12} = -57 \div 12 = -4R9 = -4\frac{9}{12} = -4\frac{3}{4}$

17. $9.3333333333333333 = 9.\bar{3}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.

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

Step 3: Solve equations for relationships

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

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. $9\sqrt{16} = 9 \cdot 4 = 36$ 7. $\sqrt{157} = 12.53$

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

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

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

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

17. $15\sqrt{242} = 15\sqrt{2 \cdot 121} = 15\sqrt{2} \sqrt{121} = 15 \cdot 11\sqrt{2} = 165\sqrt{2}$

19. $\sqrt{15} \cdot \sqrt{6} = \sqrt{3 \cdot 5} \cdot \sqrt{2 \cdot 3} = \sqrt{2 \cdot 3 \cdot 3 \cdot 5} = 3\sqrt{2 \cdot 5} = 3\sqrt{10}$

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

23. $7\sqrt{6} \cdot 7\sqrt{8} = 7\sqrt{2 \cdot 3} \cdot 7\sqrt{2 \cdot 2 \cdot 2} = 7 \cdot 7\sqrt{2 \cdot 2 \cdot 2 \cdot 3} = 7 \cdot 7 \cdot 2 \cdot 2\sqrt{3} = 196\sqrt{3}$

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. $(-4)^{-2} = \frac{1}{(-4)^2} = \frac{1}{16}$
27. $3^5 \cdot 3^{-8} = 3^{5-8} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$
31. $\frac{2^5}{2^8} = 2^{5-8} = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$
35. $\frac{7^9}{7^{11}} = 7^{9-11} = 7^{-2} = \frac{1}{7^2} = \frac{1}{49}$
43. $\frac{x^{10} \cdot y^7}{x^5 \cdot y^3} = x^{10-5} \cdot y^{7-3} = x^5 \cdot y^4$
51. $\frac{(x^3 \cdot y^7)^{-2}}{(x^5 \cdot y^6)^{-1}} = \frac{(x^5 \cdot y^6)}{(x^6 \cdot y^{14})} = x^{-1} \cdot y^{-8} = \frac{1}{x \cdot y^8}$

$$63. (2.5 \times 10^9) \cdot (2.34 \times 10^{11}) = (2.5 \times 2.34) \times 10^{9+11} = 5.85 \times 10^{20}$$

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

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

75. Given:

1 light year = 5.88×10^{12} miles AND Andromeda galaxy = 2,500,000 light year

Unknown: How many miles away is the Andromeda galaxy?

$$\frac{2.5 \times 10^6 \text{ light years}}{1} \cdot \frac{5.88 \times 10^{12} \text{ miles}}{1 \text{ light year}} = (2.5 \cdot 5.88) \times 10^{6+12} \text{ miles} = 14.7 \times 10^{18} \text{ miles} = 1.47 \times 10^{19} \text{ miles}$$