

Section P.2 Operations with Real Numbers

1. $13 + 32 = 45$
3. $-13 + 32 = +(32 - 13) = 19$
5. $13 + (-32) = -(32 - 13) = -19$
7. $-7 - 15 = -7 + (-15)$
 $= -(7 + 15) = -22$
9. $-13 + (-8) = -(13 + 8) = -21$
11. $4 - 16 + (-8) = 4 + (-16) + (-8)$
 $= -(16 - 4) + (-8)$
 $= -12 + (-8)$
 $= -(12 + 8)$
 $= -20$
13. $5.8 - 6.2 + 1.1 = 5.8 + (-6.2) + 1.1$
 $= -(6.2 - 5.8) + 1.1$
 $= -0.4 + 1.1$
 $= +(1.1 - 0.4)$
 $= 0.7$
15. $\frac{3}{8} + \frac{7}{8} = \frac{3+7}{8}$
 $= \frac{10}{8}$
 $= \frac{5}{4}$
17. $\frac{3}{4} - \frac{1}{4} = \frac{3-1}{4}$
 $= \frac{2}{4} = \frac{1}{2}$
19. $\frac{3}{5} + \left(-\frac{1}{2}\right) = \frac{3(2)}{5(2)} - \frac{1(5)}{2(5)}$
 $= \frac{6}{10} - \frac{5}{10}$
 $= \frac{6-5}{10}$
 $= \frac{1}{10}$
21. $\frac{5}{8} + \frac{1}{4} - \frac{5}{6} = \frac{5(3)}{8(3)} + \frac{1(6)}{4(6)} - \frac{5(4)}{6(4)}$
 $= \frac{15}{24} + \frac{6}{24} - \frac{20}{24}$
 $= \frac{15+6-20}{24}$
 $= \frac{1}{24}$
23. $5\frac{3}{4} + 7\frac{3}{8} = \frac{23}{4} + \frac{59}{8}$
 $= \frac{23(2)}{4(2)} + \frac{59(1)}{8(1)}$
 $= \frac{46+59}{8}$
 $= \frac{105}{8}$ or $13\frac{1}{8}$
25. $85 - |-25| = 85 - 25 = 60$
27. $-(-11.325) + |34.625| = 11.325 + 34.625$
 $= 45.95$
29. $-|-15.667| - 12.333 = -15.667 - 12.333$
 $= -15.667 + (-12.333)$
 $= -28.000$
 $= -28$
31. $4(5) = 5 + 5 + 5 + 5$
33. $3(-4) = (-4) + (-4) + (-4)$
35. $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 6\left(\frac{1}{4}\right)$
37. $(-15) + (-15) + (-15) + (-15) = 4(-15)$
39. $5(-6) = -30$
41. $(-8)(-6) = 48$
43. $-6(12) = -72$
45. $\left(-\frac{5}{8}\right)\left(-\frac{4}{5}\right) = \frac{1}{2}$

$$47. \frac{-3(8)}{2(5)} = \frac{-24}{10} = \frac{-12}{5}$$

$$49. \frac{1(\frac{1}{6})}{2} = \frac{1}{12}$$

$$51. \frac{-9(\frac{16}{27})(\frac{1}{2})}{8 \cdot 9 \cdot 3 \cdot 2} = \frac{-9 \cdot 2 \cdot 8 \cdot 1}{8 \cdot 9 \cdot 3 \cdot 2} \\ = -\frac{1}{3}$$

$$53. \frac{-18}{-3} = 6$$

$$55. \frac{-48}{16} = -3$$

$$57. 63 \div (-7) = \frac{63}{-7} = -9$$

$$59. \frac{4}{5} \div \frac{8}{25} = \frac{4}{5} \cdot \frac{25}{8} = -\frac{5}{2}$$

$$61. \left(\frac{-1}{3}\right) \div \left(\frac{-5}{6}\right) = \left(\frac{-1}{3} \div \frac{-5}{6}\right) = \left(\frac{-1}{3} \cdot \frac{-6}{5}\right) = \frac{2}{5}$$

$$63. 5\frac{3}{4} \div 2\frac{1}{8} = \frac{23}{4} \div \frac{17}{8} \\ = \frac{23}{4} \cdot \frac{8}{17} \\ = \frac{46}{17}$$

$$65. 4\frac{1}{8} \div 3\frac{3}{2} = \frac{33}{8} \div \frac{9}{2} \\ = \frac{33}{8} \cdot \frac{2}{9} \\ = \frac{11}{12}$$

$$67. 4^3 = (4)(4)(4)$$

$$69. \left(\frac{-3}{4}\right)^4 = \left(\frac{-3}{4}\right)\left(\frac{-3}{4}\right)\left(\frac{-3}{4}\right)\left(\frac{-3}{4}\right)$$

$$71. (-0.8)^6 = (-0.8)(-0.8)(-0.8)(-0.8)(-0.8)(-0.8)$$

$$73. (-7) \times (-7) \times (-7) = (-7)^3$$

$$75. (-5)(-5)(-5)(-5) = (-5)^4$$

$$77. -(7 \times 7 \times 7) = -7^3$$

$$79. (-2)^4 = (-2)(-2)(-2)(-2) \\ = 16$$

$$81. (-2)^3 = (-2)(-2)(-2) \\ = -8$$

$$83. -4^3 = -(4)(4)(4) \\ = -64$$

$$85. \left(\frac{4}{5}\right)^3 = \left(\frac{4}{5}\right)\left(\frac{4}{5}\right)\left(\frac{4}{5}\right) \\ = \frac{64}{125}$$

$$87. -\left(-\frac{1}{2}\right)^5 = -\left(-\frac{1}{2}\right)\left(-\frac{1}{2}\right)\left(-\frac{1}{2}\right)\left(-\frac{1}{2}\right)\left(-\frac{1}{2}\right) \\ = -\left(-\frac{1}{32}\right) \\ = \frac{1}{32}$$

$$89. (0.3)^3 = (0.3)(0.3)(0.3) \\ = 0.027$$

$$91. 5(-0.4)^3 = 5(-0.4)(-0.4)(-0.4) \\ = 5(-0.064) \\ = -0.32$$

$$93. 16 - 6 - 10 = (16 - 6) - 10 \\ = 10 - 10 \\ = 0$$

$$95. 24 - 5 \cdot 2^2 = 24 - 5 \cdot 4 \\ = 24 - (5 \cdot 4) \\ = 24 - 20 \\ = 4$$

$$97. 28 \div 4 + 3 \cdot 5 = (28 \div 4) + (3 \cdot 5) \\ = 7 + 15 \\ = 22$$

$$99. 14 - 2(8 - 4) = 14 - 2(4) \\ = 14 - 8 \\ = 6$$

$$101. 45 + 3(16 \div 4) = 45 + 3(4) \\ = 45 + 12 \\ = 57$$

$$\begin{aligned} 103. \quad 2 + [8 - (14 \div 2)] &= 2 + [8 - 7] \\ &= 2 + 1 \\ &= 3 \end{aligned}$$

$$\begin{aligned} 105. \quad 5^2 - 2[9 - (18 - 8)] &= 25 - 2[9 - 10] \\ &= 25 - 2[-1] \\ &= 25 + 2 \\ &= 27 \end{aligned}$$

$$\begin{aligned} 107. \quad 5^3 + |-14 + 4| &= 125 + |-10| \\ &= 125 + 10 \\ &= 135 \end{aligned}$$

$$109. \quad \frac{8 + 7}{12 - 15} = \frac{15}{-3} = -5$$

$$\begin{aligned} 111. \quad \frac{4^2 - 5}{11} - 7 &= \frac{16 - 5}{11} - 7 \\ &= \frac{11}{11} - 7 \\ &= 1 - 7 \\ &= -6 \end{aligned}$$

$$\begin{aligned} 113. \quad \frac{6 \cdot 2^2 - 12}{3^2 + 3} &= \frac{6 \cdot 4 - 12}{9 + 3} \\ &= \frac{24 - 12}{12} \\ &= \frac{12}{12} \\ &= 1 \end{aligned}$$

$$\begin{aligned} 115. \quad 5.6[13 - 2.5(-6.3)] &= 5.6[13 + 15.75] \\ &= 5.6[28.75] \\ &= 161 \end{aligned}$$

$$117. \quad 5^6 - 3(400) = 15,625 - 1200 = 14,425$$

$$119. \quad \frac{500}{(1.055)^{20}} = \frac{500}{2.9177575} = 171.36448 \approx 171.36$$

$$121. \quad \frac{1}{4} + \frac{2}{9} + \frac{1}{10} + x + \frac{1}{3} = 1$$

Thus:

$$\begin{aligned} x &= 1 - \left(\frac{1}{4} + \frac{2}{9} + \frac{1}{10} + \frac{1}{3} \right) \\ &= 1 - \left(\frac{45}{180} + \frac{40}{180} + \frac{18}{180} + \frac{60}{180} \right) = 1 - \left(\frac{45 + 40 + 18 + 60}{180} \right) = 1 - \frac{163}{180} = \frac{180}{180} - \frac{163}{180} = \frac{17}{180} \end{aligned}$$

$$123. \quad \$2618.68 + \$1236.45 - \$25.62 - \$455.00 - \$125.00 - \$715.95 = \$2533.56$$

125. (a)

| Day | Daily Gain or Loss |
|-----------|--------------------|
| Tuesday | +5 |
| Wednesday | +8 |
| Thursday | -5 |
| Friday | +16 |

(b) $(+5) + (+8) + (-5) + (+16) = +24$ = the sum of the daily gains and losses. The sum of the daily gains and losses is equal to the difference of the value of the stock on Friday and the value of the stock on Monday. This sum could be determined from the graph by $\$524$ (value on Friday) $-$ $\$500$ (value on Monday) $=$ $\$24$.

127. (a) $\$50(12)(18) = \$10,800$

(b) $50 \left[\left(1 + \frac{0.09}{12} \right)^{216} - 1 \right] \left(1 + \frac{12}{0.09} \right) \approx 27,018.71558 \approx 27,018.72$

The fund would have \$27,018.72.

(c) $27,018.72 - 10,800 = \$16,218.72$

131. $b = 8 \text{ cm}, h = 5 \text{ cm}$

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(8)(5) = 20 \text{ square inches}$$

133. $V = l \cdot w \cdot h = 14'' \cdot 18'' \cdot 42'' = 10,584 \text{ in}^3 \div 1728 \text{ in}^3 = 6.125 \text{ ft}^3$

129. $l = 5m, w = 3m$

$$A = lw$$

$$A = 5 \cdot 3 = 15 \text{ square meters}$$

135. (a) $20 \times 3 + 18 = 20 \times 21 = 420$

Student incorrectly added the 3 and the 18 instead of multiplying the 20 and the 3 first. Order of operations must be followed.

$$20 \times 3 + 18 = 60 + 18 = 78$$

(b) UPC of 07673720012 9

1. $(0 + 6 + 3 + 2 + 0 + 2) \times 3 = 39$

2. $7 + 7 + 7 + 0 + 1 = 22$

3. $39 + 22 = 61$

4. Next highest multiple of 10 = 70

$$70 - 61 = 9 \text{ which is the check digit}$$

Yes, it checks.

(c) UPC of 04180048700 3

1. $(0 + 1 + 0 + 4 + 7 + 0) \times 3 = 36$

2. $4 + 8 + 0 + 8 + 0 = 20$

3. $36 + 20 = 56$

4. Next highest multiple of 10 = 60

$$60 - 56 = 4 \text{ which is not the check digit}$$

No, it does not check.

139. False. If a negative number is raised to an odd power, the result will be negative.

143. If the numbers have like signs, the product or quotient is positive.

If the numbers have unlike signs, the product or quotient is negative.

147. Only common factors (not terms) of the numerator and denominator can be canceled.

137. True. A rational number is an integer divided by an integer. The reciprocal of such a number is still an integer divided by an integer, and thus, a rational number.

141. Yes. For example, $(-3) + (-4) = -7$

$$-7 < -3 \text{ and } -7 < -4$$

145. Evaluate additions and subtractions from left to right.

$$6 - 5 - 2 = (6 - 5) - 2 \quad \text{not} \quad 6 - (5 - 2)$$

$$= 1 - 2 \quad \quad \quad 6 - 3$$

$$= -1 \quad \quad \quad 3$$

149. The squaring of the four must be performed before multiplying by the three by order of operations.

$$3 \cdot 4^2 = 3 \cdot 16$$

$$= 48$$