SOLUTIONS

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Chapter 1

page 11

J

10,500	
7,983	*n*

Explanations may vary. Knowing that subtraction is the inverse operation for addition, I can solve by writing a subtraction problem. 10,500 – 7,983 = *n*; *n* = 2,517

page 13

41. twenty-eight million, three hundred seven thousand, thirteen; 20,000,000 + 8,000,000 + 300,000 + 7,000 + 10 + 3

J Sum is the answer to an addition problem; 17 + 38 = (55). Difference is the answer to a subtraction problem; 55 – 38 = (17) or 55 – 17 = (38).

page 14

4.

1,336	
987	349

5.

$3.28	
$1.39	$1.89

6.

4,500	
2,013	2,487

7.

$20	
$13.39	$6.61

8.

100 ft	
38.5 ft	61.5 ft

9.

60 min	
35 min	25 min

page 17

29.

980	
745	235

30.

3,270	
1,485	1,785

31.

97.66	
15.96	81.7

32.

4,986	
3,009	1,977

33.

21.75	
15	6.75

34.

2.75	
1.4	1.35

35.

⁻11	
⁻3	⁻8

36.

2	
4	⁻2

37.

2	
⁻1	3

41. possible answers: 0 + 10 = 10, 10 + 0 = 10; 1 + 9 = 10, 9 + 1 = 10; 2 + 8 = 10, 8 + 2 = 10; 3 + 7 = 10, 7 + 3 = 10; 4 + 6 = 10, 6 + 4 = 10; 5 + 5 = 10

46. 195.5 ft

217.5 ft

page 21

16.

18. Step 4

Step 5

Chapter 2

page 31

31. 6 × (10 + 2) =
(6 × 10) + (6 × 2) =
60 + 12 = 72

32. 8 × (10 + 5) =
(8 × 10) + (8 × 5) =
80 + 40 = 120

33. 4 × (20 + 3) =
(4 × 20) + (4 × 3) =
80 + 12 = 92

34. 5 × (10 + 7) =
(5 × 10) + (5 × 7) =
50 + 35 = 85

42. 3: 3 (6) (9) (12) 15 (18) 21 (24) (27) (30) 33 (36)

6: (6) (12) (18) (24) (30) (36) 42 48 54 60 66 72

9: (9) (18) (27) (36) 45 54 63 72 81 90 99 108

43. green circles above

44. red circles above

45. No; the next multiple of 3 is 39. It is not a multiple of 6 or 9. Since 36 was *also* a multiple of 6 and 9, you would need to write 2 more multiples of 3 to find a multiple of 6 or 3 more multiples of 3 to find a multiple of 9.

page 32

1. (3 × 2) × 10 =
6 × 10 = 60

2. (4 × 5) × 10 =
20 × 10 = 200

3. (7 × 9) × (10 × 10) =
63 × 100 = 6,300

4. (3 × 8) × (10 × 100) =
24 × 1,000 = 24,000

page 33

22. 40 × (60 + 8) =
(40 × 60) + (40 × 8) =
2,400 + 320 = 2,720

23. 200 × (10 + 3) =
(200 × 10) + (200 × 3) =
2,000 + 600 = 2,600

24. (70 + 5) × 300 =
(70 × 300) + (5 × 300) =
21,000 + 1,500 = 22,500

25. 20 × (400 + 10 + 5) =
(20 × 400) + (20 × 10) + (20 × 5) =
8,000 + 200 + 100 =
8,300

26. (20 + 1) × 50 =
(20 × 50) + (1 × 50) =
1,000 + 50 = 1,050

27. 80 × (100 + 10) =
(80 × 100) + (80 × 10) =
8,000 + 800 = 8,800

28. 40 × (90 + 2) =
(40 × 90) + (40 × 2) =
3,600 + 80 = 3,680

29. (10 + 6) × 30 =
(10 × 30) + (6 × 30) =
300 + 180 = 480

32. 4 × 30 = 120; 20 × 12 = 240; 60 × 400 = 24,000

page 34

10. 4 × 4 × 4 × 4 × 4

12. 2 × 2 × 2 × 2

13. 7 × 7 × 7 × 7

14. 3 × 3

15. 9 × 9 × 9

16. 5 × 5 × 5 × 5 × 5 × 5

17. 1 × 1 × 1 × 1 × 1 × 1 × 1 × 1 × 1 × 1

18. 6 × 6 × 6 × 6 × 6 × 6

19. 8 × 8 × 8 × 8 × 8

page 37

37. $7 \times (400 + 70 + 3) =$
$(7 \times 400) + (7 \times 70) + (7 \times 3) =$
$2{,}800 + 490 + 21 = 3{,}311$

38. The estimated product is greater than the product because 473 was rounded up to 500.

J By multiplying 3 times each place, I am able to add the partial products and do less renaming. $3 \times 2{,}326 =$ $6{,}000 + 900 + 60 + 18 = 6{,}978$

page 44

29. $(40 + 9) \times 80 =$
$(40 \times 80) + (9 \times 80) =$
$3{,}200 + 720 = 3{,}920$

30. $60 \times (100 + 7) =$
$(60 \times 100) + (60 \times 7) =$
$6{,}000 + 420 = 6{,}420$

31. $(200 + 10 + 9) \times 30 =$
$(200 \times 30) + (10 \times 30) + (9 \times 30) =$
$6{,}000 + 300 + 270 =$
$6{,}570$

Chapter 3

page 52

11. $3 \times 8 = 24$
$8 \times 3 = 24$
$24 \div 3 = 8$
$24 \div 8 = 3$

12. $8 \times 9 = 72$
$9 \times 8 = 72$
$72 \div 8 = 9$
$72 \div 9 = 8$

13. $5 \times 12 = 60$
$12 \times 5 = 60$
$60 \div 5 = 12$
$60 \div 12 = 5$

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24. $20 \div 5 = 4$

20				
4	4	4	4	4

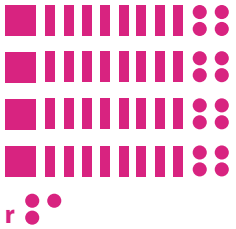
25. $40 \div 4 = 10$

40									
4	4	4	4	4	4	4	4	4	4

26. $96 \div 8 = 12$

96							
12	12	12	12	12	12	12	12

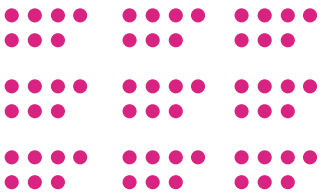
J



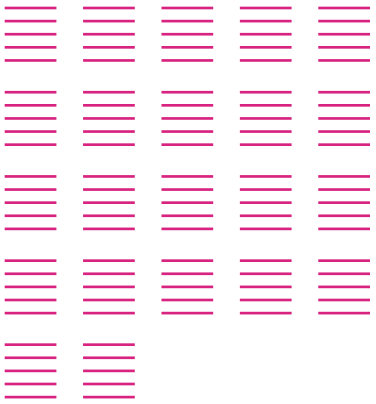
r

page 55

33.



34.



35.

The 2 remaining segments could be given to the parents.

page 56

20. 135 is divisible by 5 because the ones digit is a 5; it is not divisible by 10 because the ones digit is not a 0.

21. 642 is divisible by 2 because it is even; it is divisible by 3 because the sum of the digits (12) is divisible by 3; it is not divisible by 4 because the last 2 digits (42) are not divisible by 4; it is divisible by 6 because it is divisible by 2 and 3.

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22. The 1 remaining card was given to their sister.

23. Another table is needed for the 2 remaining guests.

24. The 12 remaining cookies could be bagged as only 1 dozen.

25. The remaining 5 books could be placed on 5 of the shelves or the 5 books could be displayed on a separate shelf.

26. The remaining 5 flowers could be planted in 5 of the rows or planted in another location

34. Possible answer: The owners of a pumpkin patch placed all 198 of their pumpkins in 18 containers. How many pumpkins were in each container? $198 \div 18 = 11$ pumpkins

36. $360 \div 20 = 18$ popcorn balls (finding the number in each set); $360 \div 20 = 18$ baskets (finding the number of sets)

page 63

J

a. added the digits in the 2 greatest places

b. subtracted the digits in the 2 greatest places

c. multiplied the multiplier (5) times the digits in the 2 greatest places of the multiplicand

d. divided the 2 greatest places of the dividend by the divisor (12)

page 64

7. 5×9
45

8. $6 \times 6 + 4$
$36 + 4$
40

9. $28 + 2$
30

10. $16 \div 2 \times 8$
8×8
64

11. 6×16
96

12. $36 - 4$
32

13. $10 + 16$
26

14. $37 - 12 \div 2$
$37 - 6$
31

page 65

15. $48 \div (2 + 4)$
$48 \div 6$
8

16. $10^3 \times 8$
$1{,}000 \times 8$
$8{,}000$

17. $4 - 3 + 8 + 9$
$1 + 8 + 9$
$9 + 9$
18

18. $5 + 12 \div (6 - 2)$
$5 + 12 \div 4$
$5 + 3$
8

19. $3^2 \times 7$
9×7
63

20. $2{,}500 \div 100$
25

21. 5^2
25

22. $7 + 10 - 30 \div 5$
$7 + 10 - 6$
$17 - 6$
11

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5. $5 + 3 \times 10$
$5 + 30$
35

6. $8 \times 4 + 6$
$32 + 6$
38

7. $5 + 24$
29

8. $24 - 2 \times 2$
$24 - 4$
20

9. $8 + 8 + 2 \times 16$
$8 + 8 + 32$
$16 + 32$
48

10. $24 \div 8 + 5^2$
$24 \div 8 + 25$
$3 + 25$
28

11. $10 + 24 - 1$
$34 - 1$
33

12. $12 - 2 + 5$
$10 + 5$
15

13. $54 - 2^2 + 6$
$54 - 4 + 6$
$50 + 6$
56

page 69

41. $3 + 56$
59

42. $54 \div 3$
18

43. $18 - 5$
13

44. 6×2
12

45. 20×5
100

Chapter 4

page 78

7. 16 → $4 \cdot 4$ → $2 \cdot 2 \cdot 2 \cdot 2$; $16: 2^4$

18 → $2 \cdot 9$ → $2 \cdot 3 \cdot 3$; $18: 2 \cdot 3^2$

8. 24 → $4 \cdot 6$ → $2 \cdot 2 \cdot 2 \cdot 3$; $24: 2^3 \cdot 3$

56 → $7 \cdot 8$ → $7 \cdot 2 \cdot 4$ → $7 \cdot 2 \cdot 2 \cdot 2$; $56: 2^3 \cdot 7$

9. 14 → $2 \cdot 7$; $14: 2 \cdot 7$

25 → $5 \cdot 5$; $25: 5^2$

10. 13 → $1 \cdot 13$

21 → $3 \cdot 7$

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20. 12 → $3 \cdot 4$ → $3 \cdot 2 \cdot 2$

21. 16 → $4 \cdot 4$ → $2 \cdot 2 \cdot 2 \cdot 2$

22. 56 → $7 \cdot 8$ → $7 \cdot 2 \cdot 4$ → $7 \cdot 2 \cdot 2 \cdot 2$

23. 72 → $8 \cdot 9$ → $2 \cdot 4 \cdot 3 \cdot 3$ → $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

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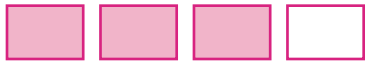
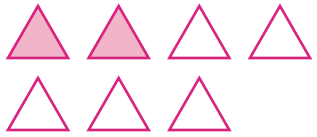
9. 

10. 

11. 

12. 

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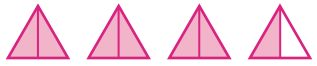
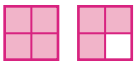
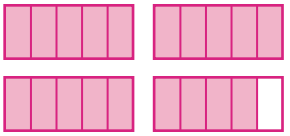
5. 

6. 

7. 

8. 

9. 

10. 

11. 

12. 

page 83

13. $2)\overline{10}$, -10, 0; quotient 5

14. $5)\overline{12}$, -10, 2; quotient $2\frac{2}{5}$

15. $3 \cdot \frac{4}{4} = \frac{12}{4}$; $\frac{12}{4} + \frac{1}{4} = \frac{13}{4}$

16. $4 \cdot \frac{5}{5} = \frac{20}{5}$; $\frac{20}{5} + \frac{1}{5} = \frac{21}{5}$

17. $1 \cdot \frac{10}{10} = \frac{10}{10}$; $\frac{10}{10} + \frac{9}{10} = \frac{19}{10}$

18. $4)\overline{31}$, -28, 3; quotient $7\frac{3}{4}$

19. $6)\overline{25}$, -24, 1; quotient $4\frac{1}{6}$

20. $5 \cdot \frac{3}{3} = \frac{15}{3}$; $\frac{15}{3} + \frac{2}{3} = \frac{17}{3}$

21. $3)\overline{27}$, -27, 0; quotient 9

22. $2 \cdot \frac{8}{8} = \frac{16}{8}$; $\frac{16}{8} + \frac{5}{8} = \frac{21}{8}$

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40. go-carts;

bowling: $\frac{1}{3} = \frac{5}{15}$;

miniature golf: $\frac{4}{15}$;

go carts: $\frac{2}{5} = \frac{6}{15}$;

$\frac{6}{15} > \frac{5}{15}$ and $\frac{6}{15} > \frac{4}{15}$

Chapter 5

There are no Worktext Solutions for Chapter 5. See the Solutions section on the CD.

Chapter 6

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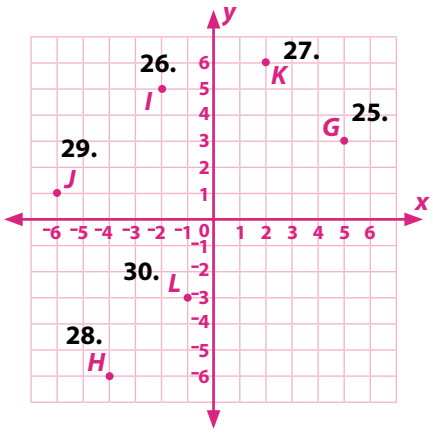
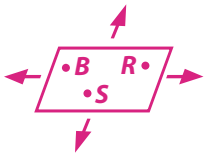


J To graph each point, you must first move 3 units to the right along the *x*-axis. However, to graph the *y*-coordinate for (3, ⁻6), you move down 6 units along the *y*-axis; and to graph the *y*-coordinate for (3, 6), you move up 6 units along the *y*-axis.

page 124

1. Angles will vary.
2. 

3. 

4. •*M*
5. 

6. 

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9. No; the sum of the two acute angles can be less than or greater than 90°.
10. Obtuse angles are greater than 90°, so the sum of two obtuse angles will always be greater than 90°.
11. A right angle measures 90° and 90° + 90° = 180°.
12. No; obtuse angles are greater than 90° so the sum of two obtuse angles is always greater than 180°.
13. Supplementary ; perpendicular lines form two right angles, 90° + 90° = 180°.

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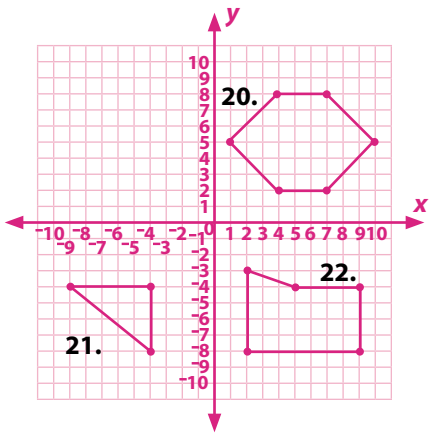

29. 

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1. 2 pairs of opposite sides parallel; opposite sides congruent; opposite angles congruent
2. 1 pair of opposite sides parallel
3. 2 pairs of opposite sides parallel; opposite sides congruent; all right angles
4. 2 pairs of opposite sides parallel; all sides congruent; all right angles
5. 4 sides
   4 vertices
   4 angles
6. 2 pairs of opposite sides parallel; all sides congruent; opposite angles congruent
12. A square has all the properties of a rectangle: 2 pairs of opposite sides parallel; opposite sides congruent; all right angles.
13. No; all 4 sides of a rectangle are not always congruent.
14. No; a trapezoid needs to have only 1 pair of opposite sides parallel.
15. A rectangle has all the properties of a parallelogram: 2 pairs of opposite sides parallel; opposite sides congruent; opposite angles congruent.
16. No; all 4 sides of a parallelogram are not always congruent.

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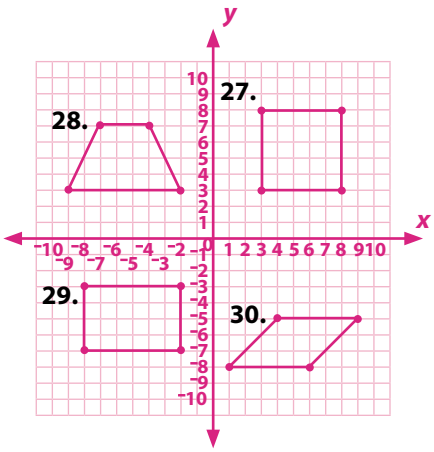
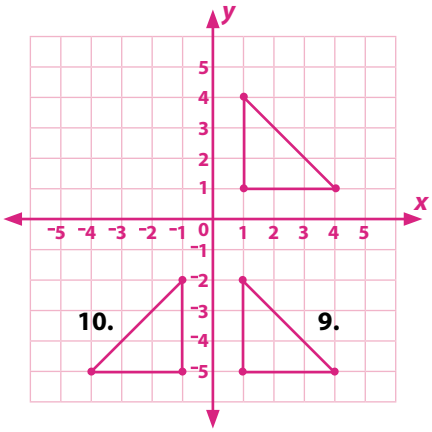


page 135

29. $(20 + 1) \times 60$
$(20 \times 60) + (1 \times 60)$
$1{,}200 + 60$
$1{,}260$

J If the figures are exactly the same shape and size, they are similar but more specifically they are congruent.

page 136



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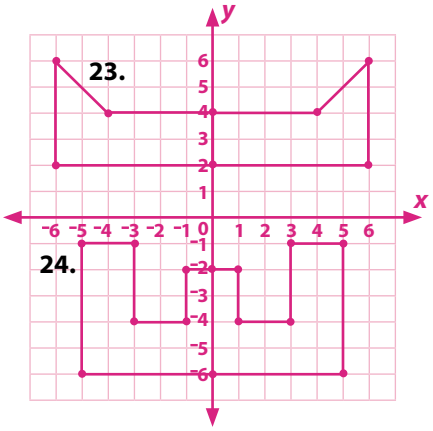
20. Isosceles; only one line can be drawn to divide the isosceles triange into congruent halves.

21. Equilateral; three different lines can be drawn to divide the equilateral into congruent halves.

22. Scalene; no lines can be drawn to divide the scalene triangle into congruent halves.



Chapter 7

page 150

1. $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{5}{4}=1\frac{1}{4}$

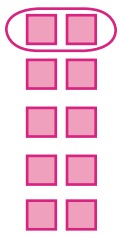
2. $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{4}{8}=\frac{1}{2}$

3. $\frac{4}{7}+\frac{4}{7}+\frac{4}{7}=\frac{12}{7}=1\frac{5}{7}$

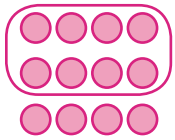
4. $\frac{5}{8}+\frac{5}{8}=\frac{10}{8}=1\frac{2}{8}=1\frac{1}{4}$

5. $\frac{2}{9}+\frac{2}{9}+\frac{2}{9}+\frac{2}{9}=\frac{8}{9}$

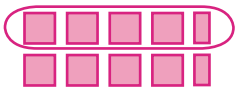
6. $\frac{1}{5}\times\frac{10}{1}=\frac{10}{5}=2$ stamps



7. $\frac{2}{3}\times\frac{12}{1}=\frac{24}{3}=8$ marbles

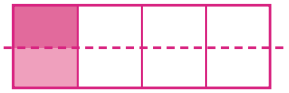


8. $\frac{1}{2}\times\frac{9}{1}=\frac{9}{2}=4\frac{1}{2}$ squares



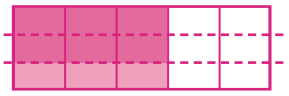
page 151

22. $\frac{1}{2}\times\frac{1}{4}=\frac{1}{8}$

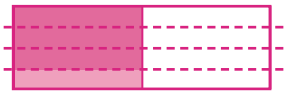


23. $\frac{1}{2}\times\frac{4}{7}=\frac{4}{14}=\frac{2}{7}$

24. $\frac{2}{3}\times\frac{3}{5}=\frac{6}{15}=\frac{2}{5}$



25. $\frac{3}{4}\times\frac{1}{2}=\frac{3}{8}$



J The figure could be divided in fourths drawing 3 horizontal lines. Shade $\frac{3}{4}$ of the figure. The parts that are double shaded show the product. $\frac{3}{4}\times\frac{5}{8}=\frac{15}{32}$

page 152

1. $\frac{3\times\cancel{2}^{1}\times\cancel{2}^{1}}{\cancel{2}_{1}\times\cancel{2}_{1}\times2\times5}=\frac{3}{10}$

2. $\frac{\cancel{5}^{1}\times3}{7\times2\times\cancel{5}_{1}}=\frac{3}{14}$

3. $\frac{\cancel{2}^{1}\times\cancel{3}^{1}}{\cancel{3}_{1}\times\cancel{2}_{1}\times2}=\frac{1}{2}$

4. $\frac{\cancel{3}^{1}\times\cancel{3}^{1}\times\cancel{5}^{1}}{2\times\cancel{5}_{1}\times2\times\cancel{3}_{1}\times\cancel{3}_{1}}=\frac{1}{4}$

9. $\frac{\cancel{8}^{4}}{\cancel{9}_{3}}\times\frac{\cancel{3}^{1}}{\cancel{10}_{5}}=\frac{4}{15}$

10. $\frac{\cancel{5}^{1}}{\cancel{7}_{1}}\times\frac{\cancel{14}^{2}}{\cancel{15}_{3}}=\frac{2}{3}$

11. $\frac{\cancel{8}^{8}}{\cancel{9}_{3}}\times\frac{\cancel{6}^{2}}{7}=\frac{16}{21}$

12. $\frac{4}{\cancel{5}_{1}}\times\frac{\cancel{10}^{2}}{1}=8$

13. $\frac{\cancel{5}^{5}}{\cancel{12}_{4}}\times\frac{\cancel{15}^{5}}{1}=\frac{25}{4}=6\frac{1}{4}$

14. $\frac{\cancel{15}^{3}}{\cancel{28}_{7}}\times\frac{\cancel{12}^{3}}{\cancel{35}_{7}}=\frac{9}{49}$

15. $\frac{1}{\cancel{4}_{1}}\times\frac{\cancel{4}^{1}}{9}=\frac{1}{9}$

18. $\frac{1}{\cancel{3}_{1}}\times\frac{\cancel{6}^{2}}{1}=2$

19. $\frac{7}{\cancel{10}_{5}}\times\frac{1}{\cancel{2}_{9}}=\frac{7}{45}$

20. $\frac{\cancel{7}^{7}}{\cancel{30}_{2}}\times\frac{1}{\cancel{32}_{16}}=\frac{7}{32}$

21. $\frac{1}{\cancel{2}_{1}}\times\frac{\cancel{4}^{2}}{5}=\frac{2}{5}$

22. $\frac{1}{\cancel{8}_{4}}\times\frac{\cancel{2}^{1}}{3}=\frac{1}{12}$

23. $\frac{\cancel{8}^{2}}{1}\times\frac{5}{\cancel{12}_{3}}=3\frac{1}{3}=\frac{10}{3}$

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7. $\frac{41}{\cancel{10}_{2}}\times\frac{\cancel{6}^{1}}{6}=\frac{41}{12}=3\frac{5}{12}$

8. $\frac{5}{\cancel{4}_{2}}\times\frac{\cancel{10}^{5}}{3}=\frac{25}{6}=4\frac{1}{6}$

9. $\frac{3}{8}\times\frac{29}{4}=\frac{87}{32}=2\frac{23}{32}$

10. $\frac{1}{\cancel{2}_{1}}\times\frac{\cancel{37}^{37}}{\cancel{9}}=\frac{37}{9}=4\frac{1}{9}$

11. $\frac{\cancel{3}^{3}}{\cancel{4}_{2}}\times\frac{\cancel{2}^{1}}{\cancel{3}_{1}}=\frac{3}{2}=1\frac{1}{2}$

12. $\frac{6}{\cancel{7}_{1}}\times\frac{\cancel{42}^{6}}{5}=\frac{36}{5}=7\frac{1}{5}$

13. $\frac{11}{\cancel{5}_{1}}\times\frac{\cancel{20}^{4}}{3}=\frac{44}{3}=14\frac{2}{3}$

14. $\frac{28}{5}\times\frac{4}{1}=\frac{112}{5}=22\frac{2}{5}$

15. $\frac{\cancel{7}^{1}}{\cancel{8}_{2}}\times\frac{\cancel{52}^{13}}{\cancel{7}_{1}}=\frac{13}{2}=6\frac{1}{2}$

16. $7\frac{3}{10}\text{ ft}\times1\frac{1}{2}\text{ ft}=\frac{73}{10}\text{ ft}\times\frac{3}{2}\text{ ft}=\frac{219}{20}\text{ square feet}=10\frac{19}{20}\text{ square feet}$

17. $2\frac{1}{5}$ yd × $1\frac{9}{16}$ yd =
$1\frac{11}{5}$ yd × $\frac{25}{16}$ yd =
$\frac{55}{16}$ square yards =
$3\frac{7}{16}$ square yards

18. $(3 \times 5) + (\frac{3}{1} \times \frac{1}{2}) = 15 + 1\frac{1}{2} = 16\frac{1}{2}$

19. $(\frac{3}{4} \times \frac{4}{1}) + (\frac{3}{4} \times \frac{5}{8}) = 3 + \frac{15}{32} = 3\frac{15}{32}$

20. $(16 \times 10) + (\frac{4}{5} \times \frac{10}{1}) = 160 + 8 = 168$

21. $(9 \times 12) + (\frac{9}{1} \times \frac{2}{3}) = 108 + 6 = 114$

22. $(\frac{2}{1} \times \frac{5}{8}) + (\frac{1}{3} \times \frac{5}{8}) = \frac{5}{4} + \frac{5}{24} =$
$\frac{30}{24} + \frac{5}{24} = \frac{35}{24} = 1\frac{11}{24}$

23. $(\frac{7}{1} \times \frac{6}{7}) + (\frac{1}{2} \times \frac{6}{7}) = 6 + \frac{3}{7} = 6\frac{3}{7}$

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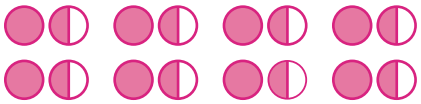
J 8 sets of $1\frac{1}{2}$



$1\frac{1}{2}$ sets of 8

$8 \times 1\frac{1}{2} = 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} +$
$1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} = 8\frac{8}{2} = 12$

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16. $(3 \times 13) + (3 \times 0.25) =$
$39 + 0.75 = 39.75$

17. $(8 \times 32) + (8 \times 0.6) =$
$256 + 4.8 = 260.8$

18. $(0.8 \times 10) + (0.8 \times 0.3) =$
$8 + 0.24 = 8.24$

19. $(0.5 \times 50) + (0.5 \times 0.2) =$
$25 + 0.1 = 25.1$

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29. $3 \times 1.69 = 5.07$ oz
$2 \times 2.48 = 4.96$ oz

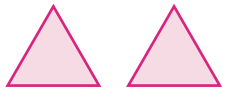
30. $3 \times \$24.95 = \$74.85$
$\$74.85 - \$10.00 = \$64.85$

31. $180° - (60° + 60°) =$
$180° - 120° = 60°$

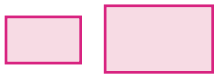
32. $180° - (60° + 90°) =$
$180° - 150° = 30°$

33. $180° - 100° = 80°$

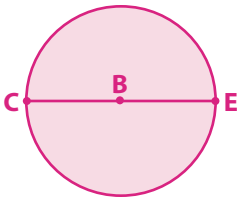
35. Congruent



Similar



36.



The product will be less than 45 because 0.6 is finding only part of a whole. The product will be greater than 20 because 0.6 is greater than $\frac{1}{2}$.

0.6 of 45 is > 20

$\frac{1}{2}$ of 45 is $22\frac{1}{2}$

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7. $\frac{52}{10} \times \frac{50}{8} = \frac{65}{2} = 32\frac{1}{2}$

8. $\frac{14}{9} = 1\frac{5}{9}$

10. $\frac{42}{8} \times \frac{19}{3} = \frac{266}{8} = 33\frac{1}{4}$

11. $\frac{3}{4} \times \frac{20}{1} = 15$

12. $\frac{8}{1} \times \frac{7}{2} = 28$

13. $\frac{10}{3} \times \frac{19}{4} = \frac{95}{6} = 15\frac{5}{6}$

15. $\frac{11}{4} \times \frac{7}{1} = \frac{77}{4} = 19\frac{1}{4}$

Chapter 8

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5.

6.

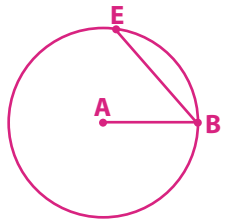
7.

8.

page 173

25. $(3 + \frac{1}{2}) \times \frac{5}{12} = (3 \times \frac{5}{12}) + (\frac{1}{2} \times \frac{5}{12}) =$
$\frac{15}{12} + \frac{5}{24} = \frac{30}{24} + \frac{5}{24} = \frac{35}{24} = 1\frac{11}{24}$

32.
33.



34. $\frac{1}{4} + \frac{2}{3} + \frac{1}{2} + n = 2$
$\frac{3}{12} + \frac{8}{12} + \frac{6}{12} = \frac{17}{12} = 1\frac{5}{12}$
$\frac{24}{12} - \frac{17}{12} = \frac{7}{12}$
or $2 - 1\frac{5}{12} = 1\frac{12}{12} - 1\frac{5}{12} = \frac{7}{12}$

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21. $\frac{2}{15} \times 5 = \frac{2}{3}$
$\frac{2}{3} \div 5 = \frac{2}{15}$
$\frac{2}{3} \div \frac{2}{15} = 5$

22. $\frac{3}{4} \times \frac{2}{5} = \frac{3}{10}$
$\frac{3}{10} \div \frac{3}{4} = \frac{2}{5}$
$\frac{3}{10} \div \frac{2}{5} = \frac{3}{4}$

23. $\frac{3}{5} \times \frac{1}{4} = \frac{3}{20}$
$\frac{3}{20} \div \frac{3}{5} = \frac{1}{4}$
$\frac{3}{20} \div \frac{1}{4} = \frac{3}{5}$

28.

$3 \div \frac{1}{8} = 24$

31. $(\frac{3}{8} + \frac{5}{8}) + (\frac{1}{2} + \frac{5}{6}) + \frac{4}{9} = \frac{8}{8} + (\frac{3}{6} + \frac{5}{6}) +$
$\frac{4}{9} = 1 + \frac{8}{6} + \frac{4}{9} = 1 + \frac{24}{18} + \frac{8}{18} = 1 + \frac{32}{18} =$
$1 + 1\frac{14}{18} = 2\frac{7}{9}$

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31. $\frac{13}{7} \times \frac{14}{5} = \frac{26}{5} = 5\frac{1}{5}$

$\frac{8}{1} \times \frac{5}{14} = \frac{20}{7} = 2\frac{6}{7}$

32. $\frac{4}{3} \times \frac{1}{3} = \frac{4}{9}$

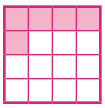
$\frac{8}{9} \times \frac{3}{1} = \frac{8}{3} = 2\frac{2}{3}$

33. $\frac{11}{5} \times \frac{5}{4} = \frac{11}{4} = 2\frac{3}{4}$

$\frac{21}{8} \times \frac{4}{5} = \frac{21}{10} = 2\frac{1}{10}$

39.

40.



41. $42\overline{)3896}$ $92\frac{32}{42} = 92\frac{16}{21}$

-378

116

$-\ 84$

32

page 178

1. $75 - (\frac{1}{5} \times 75) = 75 - \frac{75}{5} = 75 - 15 = 60$

$60 - (\frac{1}{3} \times 60) = 60 - \frac{60}{3} = 60 - 20 =$

40 bags of apples

2. $(2\frac{1}{2} \times 1\frac{1}{2}) + 4 = (\frac{5}{2} \times \frac{3}{2}) + 4 =$

$\frac{15}{4} + 4 = 3\frac{3}{4} + 4 = 7\frac{3}{4}$ bushels

3. $8\frac{7}{8} \div 2\frac{1}{4} = \frac{71}{8} \div \frac{9}{4} = \frac{71}{4} \times \frac{4}{9} = \frac{71}{18} = 3\frac{17}{18}$;

3 shelves can be made from 1 board;

6 shelves can be made from 2 boards

4. $1\frac{3}{4} + 2\frac{1}{2} = 1\frac{3}{4} + 2\frac{2}{4} = 3\frac{5}{4} = 4\frac{1}{4}$ hr

5. $\frac{1}{2} + \frac{3}{4} + 2\frac{7}{8} = \frac{4}{8} + \frac{6}{8} + 2\frac{7}{8} = 2\frac{17}{8} =$

$4\frac{1}{8}$ pounds

6. $(2\frac{1}{2} + 4\frac{1}{4}) \div 3 = (2\frac{2}{4} + 4\frac{1}{4}) \div 3 =$

$6\frac{3}{4} \div 3 = \frac{27}{4} \div 3 = \frac{27}{4} \times \frac{1}{3} = \frac{9}{4} =$

$2\frac{1}{4}$ pounds

7. $10\frac{1}{3} \div \frac{2}{3} = \frac{31}{3} \div \frac{2}{3} = \frac{31}{2} = 15\frac{1}{2}$ red

roses; $2\frac{2}{3} \div \frac{2}{3} = \frac{8}{3} \div \frac{2}{3} = 4$ peach

roses; $15 + 4 = 19$ ribbons

8. $5\frac{1}{4} \div 2 = \frac{21}{4} \div \frac{2}{1} = \frac{21}{4} \times \frac{1}{2} = \frac{21}{8} = 2\frac{5}{8}$

pounds of chicken; $6\frac{1}{2} \div 2 = \frac{13}{2} \div \frac{2}{1} =$

$\frac{13}{2} \times \frac{1}{2} = \frac{13}{4} = 3\frac{1}{4}$ pounds of ham

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10. $\frac{2}{3} \times \frac{1}{4} \times \frac{1}{2} = \frac{2}{24} = \frac{1}{12}$

11. $\frac{1}{4} \times \frac{4}{9} + \frac{5}{9} = \frac{1}{9} + \frac{5}{9} = \frac{6}{9} = \frac{2}{3}$

12. $5 + (\frac{1}{4} \times \frac{1}{5}) - \frac{1}{4} = 5 + \frac{1}{20} - \frac{1}{4} =$

$5\frac{1}{20} - \frac{5}{20} = 4\frac{21}{20} - \frac{5}{20} = 4\frac{16}{20} = 4\frac{4}{5}$

13. $\frac{7}{8} \div \frac{1}{4} + \frac{3}{4} = \frac{7}{8} \times \frac{4}{1} + \frac{3}{4} = \frac{7}{2} + \frac{3}{4} =$

$\frac{14}{4} + \frac{3}{4} = \frac{17}{4} = 4\frac{1}{4}$

14. $4 - (\frac{3}{4} \div \frac{1}{4}) \times \frac{1}{2} = 4 - 3 \times \frac{1}{2} = 4 - \frac{3}{2} =$

$4 - 1\frac{1}{2} = 3\frac{2}{2} - 1\frac{1}{2} = 2\frac{1}{2}$

15. $(\frac{1}{4} + \frac{1}{5}) \times (\frac{3}{4} - \frac{1}{4}) = (\frac{5}{20} + \frac{4}{20}) \times \frac{2}{4} =$

$\frac{9}{20} \times \frac{2}{4} = \frac{9}{40}$

16. $\frac{2}{3} + \frac{3}{8} = \frac{16}{24} + \frac{9}{24} = \frac{25}{24} = 1\frac{1}{24}$

17. $5 - \frac{3}{8} = 4\frac{8}{8} - \frac{3}{8} = 4\frac{5}{8}$

18. $\frac{1}{4} + \frac{1}{4} \times \frac{8}{1} = \frac{1}{4} + 2 = 2\frac{1}{4}$

19. $(\frac{5}{15} + \frac{3}{15}) \div (\frac{5}{8} - \frac{2}{8}) = \frac{8}{15} \div \frac{3}{8} = \frac{8}{15} \times \frac{8}{3}$

$= \frac{64}{45} = 1\frac{19}{45}$

20. $(\frac{3}{24} + \frac{16}{24}) \times (\frac{2}{4} - \frac{1}{4}) = \frac{19}{24} \times \frac{1}{4} = \frac{19}{96}$

21. $\frac{5}{2} \div (\frac{5}{6} - \frac{2}{6}) + 1 = \frac{5}{2} \div \frac{3}{6} + 1 = \frac{5}{2} \times \frac{6}{3} +$

$1 = \frac{15}{3} + 1 = 5 + 1 = 6$

22. $2\frac{3}{4} \div (\frac{6}{8} - \frac{2}{8}) + 1\frac{1}{2} = 2\frac{3}{4} \div \frac{4}{8} + 1\frac{1}{2} =$

$\frac{11}{4} \times \frac{8}{4} + 1\frac{1}{2} = \frac{22}{4} + 1\frac{1}{2} = 5\frac{1}{2} + 1\frac{1}{2} =$

$6\frac{2}{2} = 7$

23. $\frac{3}{2} \div (\frac{2}{6} + \frac{5}{6}) + 2 = \frac{3}{2} \times \frac{6}{7} + 2 = \frac{9}{7} + 2 =$

$2\frac{9}{7} = 3\frac{2}{7}$

24. $\frac{1}{5} + \frac{4}{9} \times \frac{8}{5} = \frac{1}{5} + \frac{32}{45} = \frac{9}{45} + \frac{32}{45} = \frac{41}{45}$

Chapter 9

page 195

38. $8\overline{)5.240}$ 0.655

-48

44

-40

40

-40

0

39. 56

$\times 3.9$

504

$+1680$

218.4

page 199

J $7\overline{)22.000}$ $3.142 \approx 3.14$

-21

10

$-\ 7$

30

-28

20

-14

6

page 201

J $2\overline{)9.70}$ 4.85

-8

17

-16

10

-10

0

$5\overline{)23.0}$ 4.6

-20

30

-30

0

$10\overline{)9.0}$ 0.9

-90

0

page 203

J $0.8\overline{)5.6}$ 7

-56

0

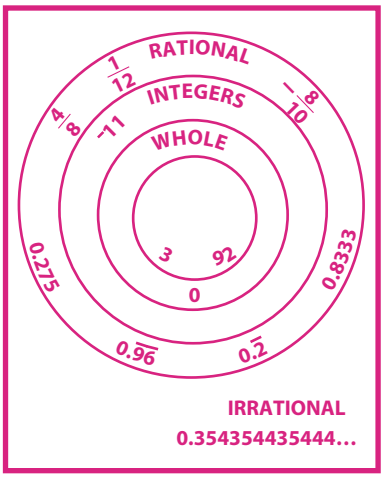
$0.08\overline{)0.56}$ 7

$-\ 56$

0

page 204

1–12.



Chapter 10

page 215

33. 36: 1, 2, 3, 4, 6, 9, 12, 18, 36

72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72

GCF = 36

36. The fractions, $\frac{6}{16}$, $\frac{9}{24}$, and $\frac{12}{32}$, are equivalent to $\frac{3}{8}$.

page 219

22. $8x + (4x + 2) =$ Commutative
$(8x + 4x) + 2 =$ Associative
$12x + 2$

24. $(2 + 3) + x$ Associative
$x + 5$

25. $(3 \cdot 7)x$ Associative
$21x$

26. $(8 + 2) + x$ Associative
$x + 10$

27. $x(8 \cdot 9)$ Associative
$72x$ Commutative

28. $6 + (5x + 7)$ Associative
$6 + (7 + 5x)$ Commutative
$(6 + 7) + 5x$ Associative
$5x + 13$

29. $x \cdot (5 \cdot 6)$ Associative
$30x$ Commutative

30. $(12 \cdot 2)x$ Associative
$24x$

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1. $n + 5 - 5 = 21 - 5$
$n = 16$
$16 + 5 = 21$

2. $x + 12 - 12 = 40 - 12$
$x = 28$
$28 + 12 = 40$

3. $c - 6 + 6 = 17 + 6$
$c = 23$
$23 - 6 = 17$

4. $a - 4 + 4 = 36 + 4$
$a = 40$
$40 - 4 = 36$

5. $d + 45 - 45 = 90 - 45$
$d = 45$
$45 + 45 = 90$

6. $16 - 16 + f = 35 - 16$
$f = 19$
$16 + 19 = 35$

7. $s - 39 + 39 = 61 + 39$
$s = 100$
$100 - 39 = 61$

8. $24 - 24 + n = 100 - 24$
$n = 76$
$24 + 76 = 100$

9. $d + 60 = 85$
$d + 60 - 60 = 85 - 60$
$d = 25$
$25 + 43 + 17 = 85$

10. $s + 11.5 = 20$
$s + 11.5 - 11.5 = 20 - 11.5$
$s = 8.5$
$8.5 + 14 - 3 + 0.5 = 20$

11. $19.8 + b = 29$
$19.8 - 19.8 + b = 29 - 19.8$
$b = 9.2$
$3.8 + 16 + 9.2 = 29$

12. $1\frac{1}{4} + f = 1\frac{1}{2}$
$1\frac{1}{4} - 1\frac{1}{4} + f = 1\frac{1}{2} - 1\frac{1}{4}$
$f = \frac{1}{4}$
$\frac{3}{4} + \frac{1}{2} + \frac{1}{4} = 1\frac{1}{2}$

13. $14 - 8 = 6$; yes

14. $17 + 13 \neq 40$; no
$x + 13 - 13 = 40 - 13$
$x = 27$

15. $2.6 - 17 \neq 9$; no
$f - 17 + 17 = 9 + 17$
$f = 26$

16. $0.8 + 0.8 \neq 1.7$; no
$n + 0.8 - 0.8 = 1.7 - 0.8$
$n = 0.9$

17. $8 - 1\frac{1}{2} = 6\frac{1}{2}$; yes

18. $20.2 + 17 + 3.5 = 40.7$; yes

page 221

28. $n + 5 = 12$
$n + 5 - 5 = 12 - 5$
$n = 7$
$7 + 5 = 12$

29. $n - 8 = 3$
$n - 8 + 8 = 3 + 8$
$n = 11$
$11 - 8 = 3$

30. $10 + n = 17$
$10 - 10 + n = 17 - 10$
$n = 7$
$10 + 7 = 17$

31. $n - 2 = 5$
$n - 2 + 2 = 5 + 2$
$n = 7$
$7 - 2 = 5$

32. $n - 6 = 12$
$n - 6 + 6 = 12 + 6$
$n = 18$
$18 - 6 = 12$

33. $n + 3 = 16$
$n + 3 - 3 = 16 - 3$
$n = 13$
$13 + 3 = 16$

34. $n - 7 = 9$
$n - 7 + 7 = 9 + 7$
$n = 16$
$16 - 7 = 9$

35. $7 + n = 10$
$7 - 7 + n = 10 - 7$
$n = 3$
$7 + 3 = 10$

36.
$$\begin{array}{r} 113 \\ \times 609 \\ \hline 1017 \\ +67800 \\ \hline 68{,}817 \end{array}$$

42.
$$\begin{array}{r} 17 \\ 3\overline{)51} \\ -3 \\ \hline 21 \\ -21 \\ \hline 0 \end{array}$$

page 222

1. $a \times \frac{5}{5} = \frac{30}{5}$
$a = 6$
$6 \times 5 = 30$

2. $\frac{2m}{2} = \frac{18}{2}$
$m = 9$
$2(9) = 18$

3. $f \cdot \frac{3}{3} = \frac{24}{3}$
$f = 8$
$8 \cdot 3 = 24$

4. $\frac{12}{12} \cdot b = \frac{36}{12}$
$b = 3$
$12 \cdot 3 = 36$

5. $\frac{9p}{9} = \frac{54}{9}$
$p = 6$
$9(6) = 54$

6. $\frac{8}{8} \cdot p = \frac{64}{8}$
$p = 8$
$8 \cdot 8 = 64$

7. $\frac{4n}{4} = \frac{32}{4}$
$n = 8$
$4(8) = 32$

8. $\frac{7n}{7} = \frac{56}{7}$
$n = 8$
$7(8) = 56$

9. $c \cdot \frac{7}{7} = \frac{49}{7}$
$c = 7$
$7 \cdot 7 = 49$

10. $d \times 2^2 = 48$
$d \times 4 = 48$
$d \times \frac{4}{4} = \frac{48}{4}$
$d = 12$
$12 \cdot 2^2 = 48$

11. $a \cdot \frac{0.9}{0.9} = \frac{3.6}{0.9}$
$a = 4$
$4 \cdot 0.9 = 3.6$

12. $\frac{1.8}{1.8} \times a = \frac{36}{1.8}$
$a = 20$
$1.8 \times 20 = 36$

13. $a \cdot 7 = 21$ or $7a = 21$
$a \cdot \frac{7}{7} = \frac{21}{7}$
$a = 3$

14. $y \cdot 9 = 54$ or $9y = 54$
$y \cdot \frac{9}{9} = \frac{54}{9}$
$y = 6$

15. $8 \cdot b = 48$ or $8b = 48$
$\frac{8}{8} \cdot b = \frac{48}{8}$
$b = 6$

16. $3 \cdot n = 36$ or $3n = 36$
$\frac{3}{3} \cdot n = \frac{36}{3}$
$n = 12$

17. $x \cdot 7 = 35$ or $7x = 35$
$x \cdot \frac{7}{7} = \frac{35}{7}$
$x = 5$

page 224

1. $\frac{n}{7} \cdot 7 = 63 \times 7$
$n = 441$
$441 \div 7 = 63$

2. $\frac{3}{3} \cdot x = \frac{15}{3}$
$x = 5$
$3 \cdot 5 = 15$

3. $\frac{2}{3} \div \frac{2}{3} \cdot x = 15 \div \frac{2}{3}$
$x = 15 \cdot \frac{3}{2}$
$x = \frac{45}{2} = 22\frac{1}{2}$
$\frac{2}{3} \cdot \frac{45}{2} = 15$

4. $\frac{1}{2} \div \frac{1}{2} \cdot p = 45 \div \frac{1}{2}$
$p = 45 \times \frac{2}{1}$
$p = 90$
$\frac{1}{2}(90) = 45$

5. $\frac{m}{4} \cdot 4 = 3 \cdot 4$
$m = 12$
$\frac{12}{4} = 3$

6. $n \cdot \frac{1}{5} \div \frac{1}{5} = 9 \div \frac{1}{5}$
$n = 9 \times \frac{5}{1}$
$n = 45$
$45 \cdot \frac{1}{5} = 9$

7. $\frac{x}{9} \cdot 9 = 18 \cdot 9$
$x = 162$
$\frac{162}{9} = 18$

8. $\frac{3n}{3} = \frac{78.12}{3}$
$n = 26.04$
$3(26.04) = 78.12$

9. $\frac{x}{8} \cdot 8 = 14.5 \cdot 8$
$x = 116$
$116 \div 8 = 14.5$

10. $\frac{r}{0.3} \cdot 0.3 = 57.5 \cdot 0.3$
$r = 17.25$
$17.25 \div 0.3 = 57.5$

11. $\frac{4}{4} \cdot c = \frac{32}{4}$
$c = 8$
$4 \cdot 8 = 32$

12. $p \cdot \frac{3}{5} \div \frac{3}{5} = 5 \div \frac{3}{5}$
$p = 5 \cdot \frac{5}{3}$
$p = \frac{25}{3} = 8\frac{1}{3}$
$\frac{25}{3} \cdot \frac{3}{5} = 5$

13. $n \div 12 = 3$
$\frac{n}{12} \cdot 12 = 3 \cdot 12$
$n = 36$
$36 \div 12 = 3$

14. $x \cdot 7 = 35$
$x \cdot \frac{7}{7} = \frac{35}{7}$
$x = 5$
$5 \cdot 7 = 35$

15. $n \div 5 = 11$
$\frac{n}{5} \cdot 5 = 11 \cdot 5$
$n = 55$
$55 \div 5 = 11$

16. $6n = 54$
$\frac{6n}{6} = \frac{54}{6}$
$n = 9$
$6(9) = 54$

17. $y \div 7 = 2$
$\frac{y}{7} \cdot 7 = 2 \cdot 7$
$y = 14$
$14 \div 7 = 2$

18. $n \div 20 = 3$
$\frac{n}{20} \cdot 20 = 3 \cdot 20$
$n = 60$
$60 \div 20 = 3$

19. $2n = 18$
$\frac{2n}{2} = \frac{18}{2}$
$n = 9$
$2(9) = 18$

20. $n \cdot 5 = 10$
$n \cdot \frac{5}{5} = \frac{10}{5}$
$n = 2$
$2 \cdot 5 = 10$

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21. $a + 5 - 5 = 33 - 5$
$a = 28$
$28 + 5 = 33$

22. $x - 1.2 + 1.2 = 10 + 1.2$
$x = 11.2$
$11.2 - 1.2 = 10$

23. $\frac{a}{12} \cdot 12 = 3 \cdot 12$
$a = 36$
$\frac{36}{12} = 3$

24. $\frac{8x}{8} = \frac{1}{8}$
$x = \frac{1}{8}$
$8 \cdot \frac{1}{8} = 1$

25. $n - 16 + 16 = 140 + 16$
$n = 156$
$156 - 16 = 140$

26. $\frac{8x}{8} = \frac{480}{8}$
$x = 60$
$8(60) = 480$

27. $y - 43 + 43 = 129 + 43$
$y = 172$
$172 - 43 = 129$

28. $\frac{3}{4} \div \frac{3}{4} \cdot x = 6 \div \frac{3}{4}$
$x = 6 \cdot \frac{4}{3}$
$x = \frac{24}{3} = 8$
$\frac{3}{4}(8) = \frac{24}{4} = 6$

29. $\frac{2x}{2} = \frac{14.8}{2}$
$x = 7.4$
$2(7.4) = 14.8$

30. $x - 6 + 6 = 1.4 + 6$
$x = 7.4$
$7.4 - 6 = 1.4$

31. $\frac{1.5w}{1.5} = \frac{30}{1.5}$
$w = 20$
$1.5(20) = 30$

32. $\frac{3.8}{3.8}p = \frac{64.6}{3.8}$
$p = 17$
$3.8 \times 17 = 64.6$

33. $\frac{x}{9} \cdot 9 = 4 \cdot 9$
$x = 36$
$\frac{36}{9} = 4$

34. $a + 1.7 - 1.7 = 1.9 - 1.7$
$a = 0.2$
$0.2 + 1.7 = 1.9$

35. $\frac{x}{12} \cdot 12 = 62 \cdot 12$
$x = 744$
$\frac{744}{12} = 62$

39. $p \cdot 8 = 200$
$p \cdot \frac{8}{8} = \frac{200}{8}$
$p = 25$

40. $i + 9 = 20$
$i + 9 - 9 = 20 - 9$
$i = 11$

44. $\frac{1}{2}n = 118$
$\frac{1}{2}n \div \frac{1}{2} = 118 \div \frac{1}{2}$
$n = 118 \cdot \frac{2}{1}$
$n = 236$

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1. $d = r \cdot t$
$11247 = r \cdot 102$
$\frac{11247}{102} = r\frac{102}{102}$
$r \approx 110$ kilometers per hour

2. $d = r \cdot t$
$96 = r \cdot 4$
$\frac{96}{4} = r \cdot \frac{4}{4}$
$r = 24$ miles per day

3. $d = r \cdot t$
$d = 93 \cdot 52$
$d = 4836$ kilometers

4. $d = r \cdot t$
$380 = 95 \cdot t$
$\frac{380}{95} = \frac{95}{95} \cdot t$
$t = 4$ hours

5. $d = r \cdot t$
$d = 85 \cdot 4$
$d = 340$ kilometers

6. $d = r \cdot t$
$33 = 11 \cdot t$
$\frac{33}{11} = \frac{11}{11} \cdot t$
$t = 3$ hours

7. $d = r \cdot t$
$d = 22 \cdot 15$
$d = 330$ yards

8. $d = r \cdot t$
$1760 = 22 \cdot t$
$\frac{1760}{22} = \frac{22}{22} \cdot t$
$t = 80$ minutes

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34. $\frac{x}{4} \cdot 4 = 9 \cdot 4$
$x = 36$
$\frac{36}{4} = 9$

35. $n - 8 + 8 = 61 + 8$
$n = 69$
$69 - 8 = 61$

36. $\frac{4a}{4} = \frac{56}{4}$
$a = 14$
$4 \cdot 14 = 56$

37. $n + 3 - 3 = 32 - 3$
$n = 29$
$29 + 3 = 32$

38. $x - 1.6 + 1.6 = 1.4 + 1.6$
$x = 3$
$3 - 1.6 = 1.4$

39. $\frac{y}{5} \cdot 5 = 25 \cdot 5$
$y = 125$
$125 \div 5 = 25$

40. $b + 5 - 5 = 48 - 5$
$b = 43$
$43 + 5 = 48$

41. $\frac{7n}{7} = \frac{85.4}{7}$
$n = 12.2$
$7 \cdot 12.2 = 85.4$

Chapter 11

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16. $12 \text{ m} = (3 \text{ m} + 4 \text{ m}) + n$
$12 \text{ m} = 7 \text{ m} + n$
$12 \text{ m} - 7 \text{ m} = 7 \text{ m} - 7 \text{ m} + n$
$n = 5 \text{ m}$

17. $24 \text{ yd} = (2 \cdot 4 \text{ yd}) + 6 \text{ yd} + 8 \text{ yd} + n$
$24 \text{ yd} = 8 \text{ yd} + 6 \text{ yd} + 8 \text{ yd} + n$
$24 \text{ yd} = 22 \text{ yd} + n$
$24 \text{ yd} - 22 \text{ yd} = 22 \text{ yd} - 22 \text{ yd} + n$
$n = 2 \text{ yd}$

18. $P = (2 \cdot l) + (2 \cdot w)$
$P = 2(2 \cdot 4\text{cm}) + (2 \cdot 4 \text{ cm})$
$P = 2(8 \text{ cm}) + 8 \text{ cm}$
$P = 16 \text{ cm} + 8 \text{ cm}$
$P = 24 \text{ cm}$

19. $P = (2 \cdot l) + (2 \cdot w)$
$P = 2(4 \text{ cm} + 3 \text{ cm}) + (2 \cdot 4 \text{ cm})$
$P = 2(7\text{cm}) + 8 \text{ cm}$
$P = 14 \text{ cm} + 8 \text{ cm}$
$P = 22 \text{ cm}$

22. $P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 100 \text{ yd}) + (2 \cdot 50 \text{ yd})$
$P = 200 \text{ yd} + 100 \text{ yd}$
$P = 300 \text{ yd}$

23. $P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 50 \text{ yd}) + (2 \cdot 20 \text{ yd})$
$P = 100 \text{ yd} + 40 \text{ yd}$
$P = 140 \text{ yd}$

24. $P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 50 \text{ yd}) + (2 \cdot 55 \text{ yd})$
$P = 100 \text{ yd} + 110 \text{ yd}$
$P = 210 \text{ yd}$

25. $P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 40 \text{ yd}) + (2 \cdot 50 \text{ yd})$
$P = 80 \text{ yd} + 100 \text{ yd}$
$P = 180 \text{ yd}$

26. $P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 200 \text{ yd}) + (2 \cdot 75 \text{ yd})$
$P = 400 \text{ yd} + 150 \text{ yd}$
$P = 550 \text{ yd}$

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9. $C = \pi d$
$C = 3.14 \cdot 8 \text{ yd}$
$C = 25.12 \text{ yd}$

10. $C = \pi d$
$C = 3.14 \cdot 3.5 \text{ m}$
$C = 10.99 \text{ m}$

11. $C = 2\pi r$
$C = 2 \cdot 3.14 \cdot 2.7 \text{ cm}$
$C = 16.956 \text{ cm} \approx 16.96 \text{ cm}$

12. $C = \pi d$
$C = 3.14 \cdot 1\frac{3}{4} \text{ ft}$
$C = 3.14 \cdot 1.75 \text{ ft}$
$C = 5.495 \text{ ft} \approx 5.50 \text{ ft or } 5.5 \text{ ft}$

13. $C = 2\pi r$
$C = 2 \cdot 3.14 \cdot 13 \text{ m}$
$C = 81.64 \text{ m}$

14. $P = 6 \cdot 4 \text{ ft}$
$P = 24 \text{ ft}$

15. $P = (2 \cdot 6 \text{ cm}) + (2 \cdot 2 \text{ cm})$
$P = 12 \text{ cm} + 4 \text{ cm}$
$P = 16 \text{ cm}$

16. $P = (2 \cdot 20 \text{ m}) + (2 \cdot 15 \text{ m}) + 25 \text{ m} + 30 \text{ m}$
$P = 40 \text{ m} + 30 \text{ m} + 25 \text{ m} + 30 \text{ m}$
$P = 125 \text{ m}$

19. $C = 2\pi r$
$C = 2 \cdot 3.14 \cdot 4 \text{ ft}$
$C = 25.12 \text{ ft}$

20. $C = \pi d$
$C = 3.14 \cdot 60 \text{ in.}$
$C = 188.4 \text{ in.}$

21. $P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 10) + (2 \cdot 5)$
$P = 20 + 10$
$P = 30 \text{ ft}$
$30 \cdot \$4.50 = \$135.00$

22. $C = \pi d$
$C = 3.14 \cdot 212 \text{ ft}$
$C = 665.68 \text{ ft}$

23. $C = \pi d$
$C = 3.14 \cdot 20 \text{ in.}$
$C = 62.8 \text{ in.}$

24. $P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 12) + (2 \cdot 8)$
$P = 24 + 16$
$P = 40 \text{ ft}$
$40 \div 15 = 2.\overline{6}$; 3 rolls

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5. $A = b \cdot h$
$A = 2.3 \text{ m} \cdot 2.7 \text{ m}$
$A = 6.21 \text{ m}^2$

6. $A = b \cdot h$
$A = 5 \text{ in.} \cdot 12 \text{ in.}$
$A = 60 \text{ in.}^2$

7. $A = l \cdot w$
$A = (10 \text{ yd} \cdot 12 \text{ yd}) + (18 \text{ yd} \cdot 20 \text{ yd})$
$A = 120 \text{ yd}^2 + 360 \text{ yd}^2$
$A = 480 \text{ yd}^2$

8. $A = l \cdot w$
$A = (2 \text{ cm} \cdot 2 \text{ cm}) + (2 \text{ cm} \cdot 1 \text{ cm}) + (1\text{cm} \cdot 1\text{cm})$
$A = 4 \text{ cm}^2 + 2 \text{ cm}^2 + 1 \text{ cm}^2$
$A = 7 \text{ cm}^2$

9. $n = A \div s$
$n = 25 \text{ ft}^2 \div 5 \text{ ft}$
$n = 5 \text{ ft}$

10. $n = A \div s$
$n = 136 \text{ yd}^2 \div 17 \text{ yd}$
$n = 8 \text{ yd}$

11. $n = A \div s$
$n = 70 \text{ m}^2 \div 5.6 \text{ m}$
$n = 12.5 \text{ m}$

12. $n = A \div s$
$n = 140 \text{ cm}^2 \div 10 \text{ cm}$
$n = 14 \text{ cm}$

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20. $A = l \cdot w$
$A = 2(3 \text{ m} \cdot 3 \text{ m}) + (13 \text{ m} \cdot 6 \text{ m})$
$A = 18 \text{ m}^2 + 78 \text{ m}^2$
$A = 96 \text{ m}^2$

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1. $A = b \cdot h$
$A = 8 \text{ m} \cdot 6 \text{ m}$
$A = 48 \text{ m}^2$

2. $A = \frac{1}{2}(b \cdot h)$
$A = \frac{1}{2}(8 \text{ m} \cdot 6 \text{ m})$
$A = \frac{1}{2}(48 \text{ m}^2)$
$A = 24 \text{ m}^2$

3. $A = b \cdot h$
$A = 7 \text{ in.} \cdot 5 \text{ in.}$
$A = 35 \text{ in.}^2$

4. $A = \frac{1}{2}(b \cdot h)$
$A = \frac{1}{2}(7 \text{ in.} \cdot 5 \text{ in.})$
$A = \frac{1}{2}(35 \text{ in.}^2)$
$A = 17.5 \text{ in.}^2$

5. $A = \frac{1}{2}(b \cdot h)$
$A = \frac{1}{2}(5 \text{ in.} \cdot 3 \text{ in.})$
$A = \frac{1}{2}(15 \text{ in.}^2)$
$A = 7.5 \text{ in.}^2$

6. $A = \frac{1}{2}(b \cdot h)$
$A = \frac{1}{2}(2.5 \text{ cm} \cdot 2.5 \text{ cm})$
$A = \frac{1}{2}(6.25 \text{ cm}^2)$
$A = 3.125 \text{ cm}^2$

7. $A = \frac{1}{2}(b \cdot h)$
$A = \frac{1}{2}(1\frac{1}{4} \text{ in.} \cdot 2 \text{ in.})$
$A = \frac{1}{2}(\frac{5}{4} \text{ in.} \cdot 2 \text{ in.})$
$A = \frac{1}{2}(\frac{10}{4} \text{ in.}^2)$
$A = \frac{10}{8} \text{ in.}^2 = 1\frac{1}{4} \text{ in.}^2$

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11. $A = \frac{1}{2}(b \cdot h)$
$30 = \frac{1}{2}(10 \cdot h)$
$30 = \frac{1}{2}(10h)$
$\frac{30}{5} = \frac{5h}{5}$
$h = 6 \text{ ft}$

12. $A = \frac{1}{2}(b \cdot h)$
$15 = \frac{1}{2}(b \cdot 10)$
$15 = \frac{1}{2}(10b)$
$\frac{15}{5} = \frac{5b}{5}$
$b = 3 \text{ m}$

13. $A = \frac{1}{2}(b \cdot h)$
$24 = \frac{1}{2}(6 \cdot h)$
$24 = \frac{1}{2}(6h)$
$\frac{24}{3} = \frac{3h}{3}$
$h = 8 \text{ yd}$

17. $A = l \cdot w$
$A = (2 \cdot w) \cdot w$
$A = (2 \cdot 6 \text{ ft}) \cdot 6 \text{ ft}$
$A = 12 \text{ ft} \cdot 6 \text{ ft}$
$A = 72 \text{ ft}^2$

18. $C = \pi d$
$C = 3.14 \cdot 8.6 \text{ in.}$
$C = 27.004 \text{ in.}$
27 beads

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1. $A = \pi r^2$
$A = 3.14(6^2)$
$A = 3.14(36)$
$A = 113.04 \text{ cm}^2$

2. $A = \pi r^2$
$A = 3.14(9^2)$
$A = 3.14(81)$
$A = 254.34 \text{ yd}^2$

3. $A = \pi r^2$; $d = 42$; $r = 21$
$A = 3.14(21^2)$
$A = 3.14(441)$
$A = 1{,}384.74 \text{ in.}^2$

4. $A = \pi r^2$; $d = 20$; r = 10
$A = 3.14(10^2)$
$A = 3.14(100)$
$A = 314 \text{ m}^2$

5. $3 \cdot 15^2$
$3 \cdot 225 = 675 \text{ m}^2$

6. $3 \cdot 2^2$
$3 \cdot 4 = 12 \text{ cm}^2$

7. $3 \cdot 6^2$
$3 \cdot 36 = 108 \text{ ft}^2$

8. $3 \cdot 13^2$
$3 \cdot 169 = 507 \text{ ft}^2$

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21. $A = \pi r^2$; $d = 4$; $r = 2$
$A = \frac{1}{2}(\pi r^2)$
$A = \frac{1}{2}(3.14 \cdot 2^2)$
$A = \frac{1}{2}(3.14 \cdot 4)$
$A = \frac{1}{2}(12.56)$
$A = 6.28 \text{ cm}^2$

22. $A = \pi r^2$; $d = 6$; $r = 3$
$A = \frac{1}{4}(\pi r^2)$
$A = \frac{1}{4}(3.14 \cdot 3^2)$
$A = \frac{1}{4}(3.14 \cdot 9)$
$A = \frac{1}{4}(28.26)$
$A = 7.065 \text{ cm}^2$

23. $A = l \cdot w$ and $A = \pi r^2$
$A = (10 \cdot 10) - (3.14 \cdot 5^2)$
$A = 100 - (3.14 \cdot 25)$
$A = 100 - 78.50$
$A = 21.5 \text{ ft}^2$

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17. $2(10 \cdot 5) = 100 \text{ in.}^2$
$2(10 \cdot 5) = 100 \text{ in.}^2$
$2(5 \cdot 5) = 50 \text{ in.}^2$
Total Surface Area = 250 in.^2 or
$2(10 \cdot 5) + 2(10 \cdot 5) + 2(5 \cdot 5) =$
$100 + 100 + 50 = 250 \text{ in.}^2$

18. $6(5 \cdot 5) = 150 \text{ in.}^2$
Total Surface Area = 150 in.^2

19. $16 \cdot 3 = 48$ cm²
$2(10 \cdot 3) = 60$ cm²
$2 \cdot \frac{1}{2}(16 \cdot 6) = 96$ cm²
Total Surface Area = 204 cm² or
$(16 \cdot 3) + 2(10 \cdot 3) \cdot 2 \cdot \frac{1}{2}(6 \cdot 16) =$
$48 + 60 + 96 = 204$ cm²

20. $2(4 \cdot 7) = 56$ cm²
$2(4 \cdot 2) = 16$ cm²
$2(2 \cdot 7) = 28$ cm²
Total Surface Area = 100 cm² or
$2(7 \cdot 4) + 2(4 \cdot 2) + 2(2 \cdot 7) =$
$56 + 16 + 28 = 100$ cm²

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1. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 5^2)$ $A = (2 \cdot 3.14 \cdot 5) \cdot 6$
$A = 2(3.14 \cdot 25)$ $A = 188.4$ cm²
$A = 2(78.5)$
$A = 157$ cm²
Total Surface Area = $157 + 188.4 =$
345.4 cm²

2. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 2^2)$ $A = (2 \cdot 3.14 \cdot 2) \cdot 10$
$A = 2(3.14 \cdot 4)$ $A = 125.6$ cm²
$A = 2(12.56)$
$A = 25.12$ cm²
Total Surface Area = $25.12 + 125.6 =$
150.72 cm²

3. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 2^2)$ $A = (2 \cdot 3.14 \cdot 2) \cdot 6$
$A = 2(3.14 \cdot 4)$ $A = 75.36$ in.²
$A = 2(12.56)$
$A = 25.12$ in.²
Total Surface Area = $25.12 + 75.36 =$
100.48 in.²

4. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 3^2)$ $A = (2 \cdot 3.14 \cdot 3) \cdot 7$
$A = 2(3.14 \cdot 9)$ $A = 131.88$ in.²
$A = 2(28.26)$
$A = 56.52$ in.²
Total Surface Area = $56.52 + 131.88$
$= 188.4$ in.²

5. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 3^2)$ $A = (2 \cdot 3.14 \cdot 3) \cdot 4$
$A = 2(3.14 \cdot 9)$ $A = 75.36$ in.²
$A = 2(28.26)$
$A = 56.52$ in.²
Total Surface Area = $56.52 + 75.36 =$
131.88 in.²

6. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 4^2)$ $A = (2 \cdot 3.14 \cdot 4) \cdot 5$
$A = 2(3.14 \cdot 16)$ $A = 125.6$ cm²
$A = 2(50.24)$
$A = 100.48$ cm²
Total Surface Area = $100.48 + 125.6$
$= 226.08$ cm²

7. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 3^2)$ $A = (2 \cdot 3.14 \cdot 3) \cdot 6$
$A = 2(3.14 \cdot 9)$ $A = 113.04$ in.²
$A = 2(28.26)$
$A = 56.52$ in.²
Total Surface Area = $56.52 + 113.04$
$= 169.56$ in.²

8. $A = \pi r^2$ $A = l \cdot w$; $(l = 2\pi r)$
$A = 2(3.14 \cdot 6^2)$ $A = (2 \cdot 3.14 \cdot 6) \cdot 5$
$A = 2(3.14 \cdot 36)$ $A = (37.68)5$
$A = 2(113.04)$ $A = 188.4$ cm²
$A = 226.08$
Total Surface Area = $226.08 + 188.4$
$= 414.48$ cm²

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J Perimeter is the distance around a figure; area is the number of square units needed to cover a figure or a surface.

Chapter 12

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1. $V = (l \cdot w) \cdot h$
$V = (7 \cdot 4) \cdot 2$
$V = 28 \cdot 2$
$V = 56$ cubic units

2. $V = (l \cdot w) \cdot h$
$V = (5 \cdot 3) \cdot 3$
$V = 15 \cdot 3$
$V = 45$ cubic units

3. $V = (l \cdot w) \cdot h$
$V = (6 \cdot 5) \cdot 4$
$V = 30 \cdot 4$
$V = 120$ cubic units

4. $V = (l \cdot w) \cdot h$
$V = (4 \cdot 3) \cdot 2$
$V = 12 \cdot 2$
$V = 24$ cubic units

5. $V = (l \cdot w) \cdot h$
$V = (8 \cdot 5) \cdot 1$
$V = 40 \cdot 1$
$V = 40$ cubic units

6. $V = (l \cdot w) \cdot h$
$V = (7 \cdot 2) \cdot 3$
$V = 14 \cdot 3$
$V = 42$ cubic units

7. $V = (l \cdot w) \cdot h$
$V = (3 \text{ cm} \cdot 2 \text{ cm}) \cdot 3 \text{ cm}$
$V = 6 \text{ cm}^2 \cdot 3 \text{ cm}$
$V = 18 \text{ cm}^3$

8. $V = (l \cdot w) \cdot h$
$V = (4 \text{ cm} \cdot 1 \text{ cm}) \cdot 2 \text{ cm}$
$V = 4 \text{ cm}^2 \cdot 2 \text{ cm}$
$V = 8 \text{ cm}^3$

9. $V = (l \cdot w) \cdot h$
$V = (4 \text{ cm} \cdot 3 \text{ cm}) \cdot 4 \text{ cm}$
$V = 12 \text{ cm}^2 \cdot 4 \text{ cm}$
$V = 48 \text{ cm}^3$

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10. $V = (l \cdot w) \cdot h$
$V = (4 \text{ cm} \cdot 3 \text{ cm}) \cdot 9 \text{ cm}$
$V = 12 \text{ cm}^2 \cdot 9 \text{ cm}$
$V = 108 \text{ cm}^3$

11. $V = (l \cdot w) \cdot h$
$V = (5.2 \text{ m} \cdot 2.4 \text{ m}) \cdot 3.5 \text{ m}$
$V = 12.48 \text{ m}^2 \cdot 3.5 \text{ m}$
$V = 43.68 \text{ m}^3 \approx 43.7 \text{ m}^3$

12. $V = (l \cdot w) \cdot h$
$V = (\frac{3}{4} \text{ in.} \cdot \frac{1}{2} \text{ in.}) \cdot 4 \text{ in.}$
$V = \frac{3}{8} \text{ in.}^2 \cdot 4 \text{ in.}$
$V = \frac{3}{2} \text{ in.}^3 = 1\frac{1}{2} \text{ in.}^3$

13. $V = (l \cdot w) \cdot h$
$V = (8 \text{ m} \cdot 4 \text{ m}) \cdot 7 \text{ m}$
$V = 32 \text{ m}^2 \cdot 7 \text{ m}$
$V = 224 \text{ m}^3$

14. $V = (l \cdot w) \cdot h$
$V = (4.2 \text{ cm} \cdot 3.5 \text{ cm}) \cdot 6 \text{ cm}$
$V = 14.7 \text{ cm}^2 \cdot 6 \text{ cm}$
$V = 88.2 \text{ cm}^3$

15. $V = (l \cdot w) \cdot h$
$V = (8 \text{ in.} \cdot 2 \text{ in.}) \cdot 2 \text{ in.}$
$V = 16 \text{ in.}^2 \cdot 2 \text{ in.}$
$V = 32 \text{ in.}^3$

16. $V = (l \cdot w) \cdot h$
$V = (5 \text{ in.} \cdot 7 \text{ in.}) \cdot 2 \text{ in.}$
$V = 35 \text{ in.}^2 \cdot 2 \text{ in.}$
$V = 70 \text{ in.}^3$

17. $V = (l \cdot w) \cdot h$
$V = (12 \text{ cm} \cdot 8 \text{ cm}) \cdot 10 \text{ cm}$
$V = 96 \text{ cm}^2 \cdot 10 \text{ cm}$
$V = 960 \text{ cm}^3$

18. $V = (l \cdot w) \cdot h$
$V = (\frac{3}{8} \text{ in.} \cdot \frac{2}{3} \text{ in.}) \cdot \frac{1}{2} \text{ in.}$
$V = \frac{1}{4} \text{ in.}^2 \cdot \frac{1}{2} \text{ in.}$
$V = \frac{1}{8} \text{ in.}^3$

19. $V = Bh$
$V = 15 \text{ ft}^2 \cdot 2 \text{ ft}$
$V = 30 \text{ ft}^3$

20. $V = Bh$
$V = 25 \text{ m}^2 \cdot 8 \text{ m}$
$V = 200 \text{ m}^3$

21. $V = Bh$
$V = 46 \text{ cm}^2 \cdot 5.2 \text{ cm}$
$V = 239.2 \text{ cm}^3$

22. $V = (l \cdot w) \cdot h$
$V = (24 \text{ in.} \cdot 18 \text{ in.}) \cdot 12 \text{ in.}$
$V = 432 \text{ in.}^2 \cdot 12 \text{ in.}$
$V = 5{,}184 \text{ in.}^3$

23. Surface area:
$2(24 \text{ in.} \cdot 18 \text{ in.}) + 2(24 \text{ in.} \cdot 12 \text{ in.}) +$
$2(18 \text{ in.} \cdot 12 \text{ in.}) =$
$2(432 \text{ in.}^2) + 2(288 \text{ in.}^2) +$
$2(216 \text{ in.}^2) =$
$864 \text{ in.}^2 + 576 \text{ in.}^2 + 432 \text{ in.}^2 =$
$1{,}872 \text{ in.}^2$

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1. $V = s^3$
$V = 16 \text{ cm}^2 \cdot 4 \text{ cm}$
$V = 64 \text{ cm}^3$

2. $V = s^3$
$V = (10 \text{ in.})^3$
$V = 1{,}000 \text{ in.}^3$

3. $V = (s \cdot s)s$
$V = (3.2 \text{ m} \cdot 3.2 \text{ m}) \cdot 3.2 \text{ m}$
$V = 10.24 \text{ m}^2 \cdot 3.2 \text{ m}$
$V = 32.768 \text{ m}^3 \approx 32.8 \text{ m}^3$

4. $V = s^3$
$V = 36 \text{ ft}^2 \cdot 6 \text{ ft}$
$V = 216 \text{ ft}^3$

5. $V = (s \cdot s)s$
$V = (1\frac{1}{2} \text{ yd} \cdot 1\frac{1}{2} \text{ yd}) \cdot 1\frac{1}{2} \text{ yd}$
$V = (\frac{3}{2} \text{ yd} \cdot \frac{3}{2} \text{ yd}) \cdot \frac{3}{2} \text{ yd}$
$V = \frac{9}{4} \text{ yd}^2 \cdot \frac{3}{2} \text{ yd}$
$V = \frac{27}{8} \text{ yd}^3 = 3\frac{3}{8} \text{ yd}^3$

6. $V = (s \cdot s)s$
$V = (4.5 \text{ m} \cdot 4.5 \text{ m}) \cdot 4.5 \text{ m}$
$V = 20.25 \text{ m}^2 \cdot 4.5 \text{ m}$
$V = 91.125 \text{ m}^3 \approx 91.1 \text{ m}^3$

11. $V = (l \cdot w) \cdot h$
$V = (2 \text{ cm} \cdot 2 \text{ cm}) \cdot 2 \text{ cm}$
$V = 4 \text{ cm}^2 \cdot 2 \text{ cm}$
$V = 8 \text{ cm}^3$
or
$V = s^3$
$V = (2 \text{ cm})^3$
$V = 8 \text{ cm}^3$

12. $V = (l \cdot w) \cdot h$
$V = (3 \text{ cm} \cdot 3 \text{ cm}) \cdot 3 \text{ cm}$
$V = 9 \text{ cm}^2 \cdot 3 \text{ cm}$
$V = 27 \text{ cm}^3$
or
$V = s^3$
$V = (3 \text{ cm})^3$
$V = 27 \text{ cm}^3$

13. $V = (l \cdot w) \cdot h$
$V = (4 \text{ cm} \cdot 3 \text{ cm}) \cdot 5 \text{ cm}$
$V = 12 \text{ cm}^2 \cdot 5 \text{ cm}$
$V = 60 \text{ cm}^3$

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14. $V = (l \cdot w) \cdot h$
$24 \text{ ft}^3 = (2 \text{ ft} \cdot 3 \text{ ft}) \cdot h$
$\frac{24 \text{ ft}^3}{6 \text{ ft}^2} = \frac{6 \text{ ft}^2 \cdot h}{6 \text{ ft}^2}$
$h = 4 \text{ ft}$

15. $V = (l \cdot w) \cdot h$
$248 \text{ m}^3 = (l \cdot 4 \text{ m}) \cdot 6.2 \text{ m}$
$248 \text{ m}^3 = l(4 \text{ m} \cdot 6.2 \text{ m})$
$\frac{248 \text{ m}^3}{24.8 \text{ m}^2} = \frac{l \cdot 24.8 \text{ m}^2}{24.8 \text{ m}^2}$
$l = 10 \text{ m}$

16. $V = (l \cdot w) \cdot h$
$144 \text{ cm}^3 = (6 \text{ cm} \cdot w) \cdot 8 \text{ cm}$
$144 \text{ cm}^3 = w(6 \text{ cm} \cdot 8 \text{ cm})$
$\frac{144 \text{ cm}^3}{48 \text{ cm}^2} = \frac{w \cdot 48 \text{ cm}^2}{48 \text{ cm}^2}$
$w = 3 \text{ cm}$

17. $V = (l \cdot w) \cdot h$
$75 \text{ in.}^3 = (5 \text{ in.} \cdot 3 \text{ in.}) \cdot h$
$\frac{75 \text{ in.}^3}{15 \text{ in.}^2} = \frac{15 \text{ in.}^2 \cdot h}{15 \text{ in.}^2}$
$h = 5 \text{ in.}$

18. $V = (l \cdot w) \cdot h$
$48 \text{ cm}^3 = (2 \text{ cm} \cdot w) \cdot 4 \text{ cm}$
$48 \text{ cm}^3 = w(2 \text{ cm} \cdot 4 \text{ cm})$
$\frac{48 \text{ cm}^3}{8 \text{ cm}^2} = \frac{w \cdot 8 \text{ cm}^2}{8 \text{ cm}^2}$
$w = 6 \text{ cm}$

19. $V = Bh$
$90 \text{ in.}^3 = 6 \text{ in.}^2 \cdot h$
$\frac{90 \text{ in.}^3}{6 \text{ in.}^2} = \frac{6 \text{ in.}^2 \cdot h}{6 \text{ in.}^2}$
$h = 15 \text{ in.}$

20. $V = Bh$
$51.3 \text{ cm}^3 = 5.7 \text{ cm}^2 \cdot h$
$\frac{51.3 \text{ cm}^3}{5.7 \text{ cm}^2} = \frac{5.7 \text{ cm}^2 \cdot h}{5.7 \text{ cm}^2}$
$h = 9 \text{ cm}$

J Apple juice box:
Surface area:
$2(3 \text{ in.} \cdot 4 \text{ in.}) + 2(1 \text{ in.} \cdot 4 \text{ in.}) +$
$2(1 \text{ in.} \cdot 3 \text{ in.}) =$
$24 \text{ in.}^2 + 8 \text{ in.}^2 + 6 \text{ in.}^2 = 38 \text{ in.}^2$
$V = (l \cdot w) \cdot h$
$V = (3 \text{ in.} \cdot 1 \text{ in.}) \cdot 4 \text{ in.}$
$V = 3 \text{ in.}^2 \cdot 4 \text{ in.}$
$V = 12 \text{ in.}^3$

Clown box:
Surface area:
$6(8 \text{ cm} \cdot 8 \text{ cm}) =$
$6 \cdot 64 \text{ cm}^2 = 384 \text{ cm}^2$
$V = s^3$
$V = 64 \text{ cm}^2 \cdot 8 \text{ cm}$
$V = 512 \text{ cm}^3$

Spaghetti box:
Surface area:
$2(3 \text{ in.} \cdot 10 \text{ in.}) + 2(1\frac{1}{2} \text{ in.} \cdot 10 \text{ in.}) +$
$2(3 \text{ in.} \cdot 1\frac{1}{2} \text{ in.}) =$
$60 \text{ in.}^2 + 30 \text{ in.}^2 + 9 \text{ in.}^2 = 99 \text{ in.}^2$
$V = (l \cdot w) \cdot h$
$V = (3 \text{ in.} \cdot 1\frac{1}{2} \text{ in.}) \cdot 10 \text{ in.}$
$V = (3 \text{ in.} \cdot \frac{3}{2} \text{ in.}) \cdot 10 \text{ in.}$
$V = \frac{9}{2} \text{ in.}^2 \cdot 10 \text{ in.}$
$V = 45 \text{ in.}^3$

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1. $V = Bh$ or $(\frac{1}{2}bh_1)h_2$
$V = (\frac{1}{2} \cdot 4 \text{ cm} \cdot 3 \text{ cm}) \cdot 10 \text{ cm}$
$V = 6 \text{ cm}^2 \cdot 10 \text{ cm}$
$V = 60 \text{ cm}^3$

2. $V = Bh$ or $(\frac{1}{2}bh_1)h_2$
$V = (\frac{1}{2} \cdot 6 \text{ cm} \cdot 2 \text{ cm}) \cdot 8 \text{ cm}$
$V = 6 \text{ cm}^2 \cdot 8 \text{ cm}$
$V = 48 \text{ cm}^3$

3. $V = Bh$ or $(\frac{1}{2}bh_1)h_2$
$V = (\frac{1}{2} \cdot 4 \text{ cm} \cdot 2 \text{ cm}) \cdot 7 \text{ cm}$
$V = 4 \text{ cm}^2 \cdot 7 \text{ cm}$
$V = 28 \text{ cm}^3$

4. $V = Bh$ or $(\pi r^2)h$
$V = 3.14 \cdot (3 \text{ cm})^2 \cdot 9 \text{ cm}$
$V = (3.14 \cdot 9 \text{ cm}^2) \cdot 9 \text{ cm}$
$V = 28.26 \text{ cm}^2 \cdot 9 \text{ cm}$
$V = 254.34 \text{ cm}^3 \approx 254.3 \text{ cm}^3$

5. $V = Bh$ or $(\pi r^2)h$
$V = 3.14 \cdot (5 \text{ cm})^2 \cdot 6 \text{ cm}$
$V = (3.14 \cdot 25 \text{ cm}^2) \cdot 6 \text{ cm}$
$V = 78.5 \text{ cm}^2 \cdot 6 \text{ cm}$
$V = 471 \text{ cm}^3$

6. $V = Bh$ or $(\pi r^2)h$
$V = 3.14 \cdot (4 \text{ cm})^2 \cdot 10 \text{ cm}$
$V = (3.14 \cdot 16 \text{ cm}^2) \cdot 10 \text{ cm}$
$V = 50.24 \text{ cm}^2 \cdot 10 \text{ cm}$
$V = 502.4 \text{ cm}^3$

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18. $V = (l \cdot w) \cdot h$
$36 \text{ ft}^3 = (2 \text{ ft} \cdot 3 \text{ ft}) \cdot h$
$\frac{36 \text{ ft}^3}{6 \text{ ft}^2} = \frac{6 \text{ ft}^2 \cdot h}{6 \text{ ft}^2}$
$h = 6 \text{ ft}$

19. $V = (l \cdot w) \cdot h$
$162 \text{ m}^3 = (l \cdot 4 \text{ m}) \cdot 4.5 \text{ m}$
$162 \text{ m}^3 = l(4 \text{ m} \cdot 4.5 \text{ m})$
$\frac{162 \text{ m}^3}{18 \text{ m}^2} = \frac{l \cdot 18 \text{ m}^2}{18 \text{ m}^2}$
$l = 9 \text{ m}$

20. $V = (l \cdot w) \cdot h$
$240\ cm^3 = (5\ cm \cdot w) \cdot 12\ cm$
$240\ cm^3 = w(5\ cm \cdot 12\ cm)$
$\frac{240\ cm^3}{60\ cm^2} = \frac{w \cdot 60\ cm^2}{60\ cm^2}$
$w = 4\ cm$

24. $V = Bh$
$V = (\pi r^2)h$
$V = 3.14 \cdot (9\ ft)^2 \cdot 4\ ft$
$V = 254.34\ ft^2 \cdot 4\ ft$
$V = 1{,}017.36\ ft^3$

25. Students may solve exact answer or they may estimate.
$1{,}017.36 \cdot 7.5\ gal = 7{,}630.2\ gal$
$1{,}017 \cdot 8\ gal = 8{,}136\ gal$

page 268

1. top & bottom: $2(7\ cm \cdot 1\ cm) = 14\ cm^2$
front & back: $2(7\ cm \cdot 1\ cm) = 14\ cm^2$
left & right sides: $2(1\ cm \cdot 1\ cm) = 2\ cm^2$
Total Surface Area = $30\ cm^2$

2. top & bottom: $2(10\ cm \cdot 1\ cm) = 20\ cm^2$
front & back: $2(10\ cm \cdot 1\ cm) = 20\ cm^2$
left & right sides: $2(1\ cm \cdot 1\ cm) = 2\ cm^2$
Total Surface Area = $42\ cm^2$

top & bottom: $2(5\ cm \cdot 2\ cm) = 20\ cm^2$
front & back: $2(5\ cm \cdot 1\ cm) = 10\ cm^2$
left & right sides: $2(2\ cm \cdot 1\ cm) = 4\ cm^2$
Total Surface Area = $34\ cm^2$

3. top & bottom: $2(12\ cm \cdot 1\ cm) = 24\ cm^2$
front & back: $2(12\ cm \cdot 1\ cm) = 24\ cm^2$
left & right sides: $2(1\ cm \cdot 1\ cm) = 2\ cm^2$
Total Surface Area = $50\ cm^2$

top & bottom: $2(6\ cm \cdot 2\ cm) = 24\ cm^2$
front & back: $2(6\ cm \cdot 1\ cm) = 12\ cm^2$
left & right sides: $2(2\ cm \cdot 1\ cm) = 4\ cm^2$
Total Surface Area = $40\ cm^2$

top & bottom: $2(4\ cm \cdot 3\ cm) = 24\ cm^2$
front & back: $2(4\ cm \cdot 1\ cm) = 8\ cm^2$
left & right sides: $2(3\ cm \cdot 1\ cm) = 6\ cm^2$
Total Surface Area = $38\ cm^2$

top & bottom: $2(3\ cm \cdot 2\ cm) = 12\ cm^2$
front & back: $2(3\ cm \cdot 2\ cm) = 12\ cm^2$
left & right sides: $2(2\ cm \cdot 2\ cm) = 8\ cm^2$
Total Surface Area = $32\ cm^2$

4. top & bottom: $2(16\ cm \cdot 1\ cm) = 32\ cm^2$
front & back: $2(16\ cm \cdot 1\ cm) = 32\ cm^2$
left & right sides: $2(1\ cm \cdot 1\ cm) = 2\ cm^2$
Total Surface Area = $66\ cm^2$

top & bottom: $2(8\ cm \cdot 2\ cm) = 32\ cm^2$
front & back: $2(8\ cm \cdot 1\ cm) = 16\ cm^2$
left & right sides: $2(2\ cm \cdot 1\ cm) = 4\ cm^2$
Total Surface Area = $52\ cm^2$

top & bottom: $2(4\ cm \cdot 2\ cm) = 16\ cm^2$
front & back: $2(4\ cm \cdot 2\ cm) = 16\ cm^2$
left & right sides: $2(2\ cm \cdot 2\ cm) = 8\ cm^2$
Total Surface Area = $40\ cm^2$

5. top & bottom: $2(24\ cm \cdot 1\ cm) = 48\ cm^2$
front & back: $2(24\ cm \cdot 1\ cm) = 48\ cm^2$
left & right sides: $2(1\ cm \cdot 1\ cm) = 2\ cm^2$
Total Surface Area = $98\ cm^2$

top & bottom: $2(12\ cm \cdot 2\ cm) = 48\ cm^2$
front & back: $2(12\ cm \cdot 1\ cm) = 24\ cm^2$
left & right sides: $2(2\ cm \cdot 1\ cm) = 4\ cm^2$
Total Surface Area = $76\ cm^2$

top & bottom: $2(8\ cm \cdot 3\ cm) = 48\ cm^2$
front & back: $2(8\ cm \cdot 1\ cm) = 16\ cm^2$
left & right sides: $2(3\ cm \cdot 1\ cm) = 6\ cm^2$
Total Surface Area = $70\ cm^2$

top & bottom: $2(6\ cm \cdot 4\ cm) = 48\ cm^2$
front & back: $2(6\ cm \cdot 1\ cm) = 12\ cm^2$
left & right sides: $2(4\ cm \cdot 1\ cm) = 8\ cm^2$
Total Surface Area = $68\ cm^2$

top & bottom: $2(6\ cm \cdot 2\ cm) = 24\ cm^2$
front & back: $2(6\ cm \cdot 2\ cm) = 24\ cm^2$
left & right sides: $2(2\ cm \cdot 2\ cm) = 8\ cm^2$
Total Surface Area = $56\ cm^2$

top & bottom: $2(4\ cm \cdot 3\ cm) = 24\ cm^2$
front & back: $2(4\ cm \cdot 2\ cm) = 16\ cm^2$
left & right sides: $2(3\ cm \cdot 2\ cm) = 12\ cm^2$
Total Surface Area = $52\ cm^2$

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6. Lateral Surface Area
$LS = (2\pi r)h$
$LS = 2(3.14 \cdot 3\ cm) \cdot 4\ cm$
$LS = 2(9.42\ cm) \cdot 4\ cm$
$LS = 18.84\ cm \cdot 4\ cm$
$LS = 75.36\ cm^2 \approx 75\ cm^2$

$LS = (2\pi r)h$
$LS = 2(3.14 \cdot 1\ cm) \cdot 12\ cm$
$LS = 2(3.14\ cm) \cdot 12\ cm$
$LS = 6.28\ cm \cdot 12\ cm$
$LS = 75.36\ cm^2 \approx 75\ cm^2$

Volume
$V = (\pi r^2)h$
$V = 3.14 \cdot (3\ cm)^2 \cdot 4\ cm$
$V = (3.14 \cdot 9\ cm^2) \cdot 4\ cm$
$V = 28.26\ cm^2 \cdot 4\ cm$
$V = 113.04\ cm^3 \approx 113\ cm^3$

$V = (\pi r^2)h$
$V = 3.14 \cdot (1\ cm)^2 \cdot 12\ cm$
$V = (3.14 \cdot 1\ cm^2) \cdot 12\ cm$
$V = 3.14\ cm^2 \cdot 12\ cm$
$V = 37.68\ cm^3 \approx 38\ cm^3$

7. Lateral Surface Area
$LS = (2\pi r)h$
$LS = 2(3.14 \cdot 1.5\ cm) \cdot 14\ cm$
$LS = 2(4.71\ cm) \cdot 14\ cm$
$LS = 9.42\ cm \cdot 14\ cm$
$LS = 131.88\ cm^2 \approx 132\ cm^2$

$LS = (2\pi r)h$
$LS = 2(3.14 \cdot 1\ cm) \cdot 21\ cm$
$LS = 2(3.14\ cm) \cdot 21\ cm$
$LS = 6.28\ cm \cdot 21\ cm$
$LS = 131.88\ cm^2 \approx 132\ cm^2$

Volume
$V = (\pi r^2)h$
$V = 3.14 \cdot (1.5\ cm)^2 \cdot 14\ cm$
$V = (3.14 \cdot 2.25\ cm^2) \cdot 14\ cm$
$V = 7.065\ cm^2 \cdot 14\ cm$
$V = 98.91\ cm^3 \approx 99\ cm^3$

$V = (\pi r^2)h$
$V = 3.14 \cdot (1\ cm)^2 \cdot 21\ cm$
$V = (3.14 \cdot 1\ cm^2) \cdot 21\ cm$
$V = 3.14\ cm^2 \cdot 21\ cm$
$V = 65.94\ cm^3 \approx 66\ cm^3$

8. Lateral Surface Area
$LS = 2(6\ cm \cdot 2\ cm) = 24\ cm^2$
$LS = 2(4\ cm \cdot 2\ cm) = 16\ cm^2$
$LS = 40\ cm^2$

$LS = 2(5\ cm \cdot 2\ cm) = 20\ cm^2$
$LS = 2(5\ cm \cdot 2\ cm) = 20\ cm^2$
$LS = 40\ cm^2$

Volume
$V = (l \cdot w) \cdot h$
$V = (6\ cm \cdot 4\ cm) \cdot 2\ cm$
$V = 24\ cm^2 \cdot 2\ cm$
$V = 48\ cm^3$

$V = (l \cdot w) \cdot h$
$V = (5\ cm \cdot 5\ cm) \cdot 2\ cm$
$V = 25\ cm^2 \cdot 2\ cm$
$V = 50\ cm^3$

J Students may refer to the chart on page 268 to find the least amount of surface area for 16 and 24 blocks. From that chart they should be able to follow the pattern to find the least surface area for 36.

Surface Area for containers holding 36 blocks.
36 in. • 1 in. • 1 in.; $146\ in.^2$
18 in. • 2 in. • 1 in.; $112\ in.^2$
12 in. • 3 in. • 1 in.; $102\ in.^2$
9 in. • 4 in. • 1 in.; $98\ in.^2$
6 in. • 6 in. • 1 in.; $96\ in.^2$
9 in. • 2 in. • 2 in.; $80\ in.^2$
6 in. • 3 in. • 2 in.; $72\ in.^2$
4 in. • 3 in. • 3 in.; $66\ in.^2$; the least surface area

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5. $V = (l \cdot w) \cdot h$
$V = (3 \text{ cm} \cdot 3 \text{ cm}) \cdot 3 \text{ cm}$
$V = 9 \text{ cm}^2 \cdot 3 \text{ cm}$
$V = 27 \text{ cm}^3$

6. $V = (l \cdot w) \cdot h$
$V = (4 \text{ cm} \cdot 1 \text{ cm}) \cdot 5 \text{ cm}$
$V = 4 \text{ cm}^2 \cdot 5 \text{ cm}$
$V = 20 \text{ cm}^3$

7. $V = Bh$
$V = 6 \text{ cm}^2 \cdot 2 \text{ cm}$
$V = 12 \text{ cm}^3$

8. $V = (l \cdot w) \cdot h$
$V = (3 \text{ cm} \cdot 2 \text{ cm}) \cdot 5 \text{ cm}$
$V = 6 \text{ cm}^2 \cdot 5 \text{ cm}$
$V = 30 \text{ cm}^3$

9. $V = (l \cdot w) \cdot h$
$V = (4.2 \text{ m} \cdot 1.5 \text{ m}) \cdot 2.8 \text{ m}$
$V = 6.3 \text{ m}^2 \cdot 2.8 \text{ m}$
$V = 17.64 \text{ m}^3 \approx 17.6 \text{ m}^3$

10. $V = (l \cdot w) \cdot h$
$V = (\frac{2}{3} \text{ m} \cdot \frac{1}{2} \text{ m}) \cdot 6 \text{ m}$
$V = \frac{1}{3} \text{ m}^2 \cdot 6 \text{ m}$
$V = 2 \text{ m}^3$

11. $V = s^3$
$V = (4 \text{ ft})^3$
$V = 4 \text{ ft} \cdot 4 \text{ ft} \cdot 4 \text{ ft}$
$V = 64 \text{ ft}^3$

12. $V = s^3$
$V = (2 \text{ yd})^3$
$V = 2 \text{ yd} \cdot 2 \text{ yd} \cdot 2 \text{ yd}$
$V = 8 \text{ yd}^3$

13. $V = s^3$
$V = (3.2 \text{ m})^3$
$V = 3.2 \text{ m} \cdot 3.2 \text{ m} \cdot 3.2 \text{ m}$
$V = 32.768 \text{ m}^3 \approx 32.8 \text{ m}^3$

14. $V = (\frac{1}{2}bh_1)h_2$
$V = \frac{1}{2}(5 \text{ cm} \cdot 2 \text{ cm}) \cdot 3 \text{ cm}$
$V = \frac{1}{2}(10 \text{ cm}^2) \cdot 3 \text{ cm}$
$V = 5 \text{ cm}^2 \cdot 3 \text{ cm}$
$V = 15 \text{ cm}^3$

15. $V = (\frac{1}{2}bh_1)h_2$
$V = \frac{1}{2}(4 \text{ cm} \cdot 6 \text{ cm}) \cdot 5 \text{ cm}$
$V = \frac{1}{2}(24 \text{ cm}^2) \cdot 5 \text{ cm}$
$V = 12 \text{ cm}^2 \cdot 5 \text{ cm}$
$V = 60 \text{ cm}^3$

16. $V = (\frac{1}{2}bh_1)h_2$
$V = \frac{1}{2}(6 \text{ cm} \cdot 4 \text{ cm}) \cdot 2 \text{ cm}$
$V = \frac{1}{2}(24 \text{ cm}^2) \cdot 2 \text{ cm}$
$V = 12 \text{ cm}^2 \cdot 2 \text{ cm}$
$V = 24 \text{ cm}^3$

17. $V = (\pi r^2)h$
$V = 3.14 \cdot (2 \text{ cm})^2 \cdot 7 \text{ cm}$
$V = (3.14 \cdot 4 \text{ cm}^2) \cdot 7 \text{ cm}$
$V = 12.56 \text{ cm}^2 \cdot 7 \text{ cm}$
$V = 87.92 \text{ cm}^3 \approx 87.9 \text{ cm}^3$

18. $V = (\pi r^2)h$
$V = 3.14 \cdot (6 \text{ cm})^2 \cdot 5 \text{ cm}$
$V = (3.14 \cdot 36 \text{ cm}^2) \cdot 5 \text{ cm}$
$V = 113.04 \text{ cm}^2 \cdot 5 \text{ cm}$
$V = 565.2 \text{ cm}^3$

19. $V = (\pi r^2)h$
$V = 3.14 \cdot (3 \text{ in.})^2 \cdot 6 \text{ in.}$
$V = (3.14 \cdot 9 \text{ in.}^2) \cdot 6 \text{ in.}$
$V = 28.26 \text{ in.}^2 \cdot 6 \text{ in.}$
$V = 169.56 \text{ in.}^3 \approx 169.6 \text{ in.}^3$

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24. $V = (l \cdot w) \cdot h$
$36 \text{ ft}^3 = (3 \text{ ft} \cdot 3 \text{ ft}) \cdot h$
$\frac{36 \text{ ft}^3}{9 \text{ ft}^2} = \frac{9 \text{ ft}^2 \cdot h}{9 \text{ ft}^2}$
$h = 4 \text{ ft}$

25. $V = (l \cdot w) \cdot h$
$70 \text{ m}^3 = (l \cdot 2 \text{ m}) \cdot 3.5 \text{ m}$
$70 \text{ m}^3 = l(2 \text{ m} \cdot 3.5 \text{ m})$
$\frac{70 \text{ m}^3}{7 \text{ m}^2} = \frac{l \cdot 7 \text{ m}^2}{7 \text{ m}^2}$
$l = 10 \text{ m}$

26. $V = (l \cdot w) \cdot h$
$216 \text{ cm}^3 = (6 \text{ cm} \cdot w) \cdot 9 \text{ cm}$
$216 \text{ cm}^3 = w(6 \text{ cm} \cdot 9 \text{ cm})$
$\frac{216 \text{ cm}^3}{54 \text{ cm}^2} = \frac{w \cdot 54 \text{ cm}^2}{54 \text{ cm}^2}$
$w = 4 \text{ cm}$

27. $V = (l \cdot w) \cdot h$
$80 \text{ in.}^3 = (5 \text{ in.} \cdot 2 \text{ in.}) \cdot h$
$\frac{80 \text{ in.}^3}{10 \text{ in.}^2} = \frac{10 \text{ in.}^2 \cdot h}{10 \text{ in.}^2}$
$h = 8 \text{ in.}$

28. $V = (l \cdot w) \cdot h$
$144 \text{ cm}^3 = (6 \text{ cm} \cdot w) \cdot 4 \text{ cm}$
$144 \text{ cm}^3 = w(6 \text{ cm} \cdot 4 \text{ cm})$
$\frac{144 \text{ cm}^3}{24 \text{ cm}^2} = \frac{w \cdot 24 \text{ cm}^2}{24 \text{ cm}^2}$
$w = 6 \text{ cm}$

29. $V = (l \cdot w) \cdot h$
$V = (9 \text{ ft} \cdot 4 \text{ ft}) \cdot 1.5 \text{ ft}$
$V = 36 \text{ ft}^2 \cdot 1.5 \text{ ft}$
$V = 54 \text{ ft}^3$

30. $V = (l \cdot w) \cdot h$
$V = (4 \text{ ft} \cdot 4 \text{ ft}) \cdot 1.5 \text{ ft}$
$V = 16 \text{ ft}^2 \cdot 1.5 \text{ ft}$
$V = 24 \text{ ft}^3$

31. $V = (\pi r^2)h$
$V = 3.14 \cdot (10 \text{ in.})^2 \cdot 37 \text{ in.}$
$V = (3.14 \cdot 100 \text{ in.}^2) \cdot 37 \text{ in.}$
$V = 314 \text{ in.}^2 \cdot 37 \text{ in.}$
$V = 11{,}618 \text{ in.}^3$

Chapter 13

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24. $\frac{480 \text{ mi}}{16 \text{ gal}} = \frac{n}{1 \text{ gal}}$
$n = 480 \text{ mi} \div 16 \text{ gal}$
$n = 30 \text{ mi/gal (or mpg)}$

25. $\frac{\$48}{8 \text{ hr}} = \frac{n}{1 \text{ hr}}$
$n = \$48 \div 8 \text{ hr}$
$n = \$6/\text{hr}$

26. $\frac{2{,}250 \text{ mi}}{3 \text{ d}} = \frac{n}{1 \text{ d}}$
$n = 2{,}250 \text{ mi} \div 3 \text{ d}$
$n = 750 \text{ mi/day}$

27. $\frac{30 \text{ pg}}{60 \text{ min}} = \frac{n}{1 \text{ min}}$
$n = 30 \text{ pg} \div 60 \text{ min}$
$n = \frac{30 \text{ pg}}{60 \text{ min}} = \frac{1}{2} \text{ pg/min}$

28. $\frac{\$3.16}{4 \text{ lb}} = \frac{n}{1 \text{ lb}}$
$n = \$3.16 \div 4 \text{ lb}$
$n = \$0.79/\text{lb}$

29. $\frac{165 \text{ words}}{3 \text{ min}} = \frac{n}{1 \text{ min}}$
$n = 165 \text{ words} \div 3 \text{ min}$
$n = 55 \text{ words/min}$

30. $\frac{\$3.15}{1 \text{ gal}} = \frac{n}{5 \text{ gal}}$
$n = 5 \times \$3.15$
$n = \$15.75$

31. $\frac{\$7}{1 \text{ hr}} = \frac{n}{4 \text{ hr}}$
$n = 4 \times \$7$
$n = \$28$

32. $\frac{60 \text{ mi}}{1 \text{ hr}} = \frac{n}{6 \text{ hr}}$
$n = 6 \times 60 \text{ mi}$
$n = 360 \text{ mi}$

33. $\frac{230 \text{ mi}}{1 \text{ d}} = \frac{n}{9 \text{ d}}$
$n = 9 \times 230 \text{ mi}$
$n = 2{,}070 \text{ mi}$

34. $\frac{7\text{ km}}{1\text{ hr}} = \frac{n}{0.5\text{ hr}}$

$n = 0.5 \times 7\text{ km}$

$n = 3.5\text{ km}$

35. $\frac{\$10}{1\text{ hr}} = \frac{n}{3.5\text{ hr}}$

$n = 3.5 \times \$10$

$n = \$35$

36. $\frac{180\text{ mi}}{2\text{ hr}} = \frac{n}{6}$

$n = 3 \times 180\text{ mi}$

$n = 540\text{ mi}$

37. $\frac{420\text{ mi}}{2\text{ hr}} = \frac{n}{4\text{ hr}}$

$n = 2 \times 420\text{ mi}$

$n = 840\text{ mi}$

38. Note: Finding the unit rate first makes this problem easier to solve.

$\frac{300\text{ mi}}{12\text{ gal}} = \frac{1{,}000\text{ mi}}{n}$

$\frac{300\text{ mi}}{12\text{ gal}} = \frac{25\text{ mi}}{1\text{ gal}}$

$\frac{25\text{ mi}}{1\text{ gal}} = \frac{1{,}000\text{ mi}}{n}$

$n = 1{,}000 \div 25 = 40\text{ gal}$

$n = 40 \times 1\text{ gal}$

$n = 40\text{ gal}$

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10–12.

ft	5,280	10,560	15,840	21,120	26,400
mi	1	2	3	4	5

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21. $4 \times 5 = 20$

$4 \times \$32.50 = \$130.00$

22. $2 \times 12 = 24$

$2 \times \$78 = \$156$

23. $9 \times 3 = 27$

$9 \times \$19.50 = \$175.50$

24. $2 \times 20 = 40$

$2 \times 560\text{ mi} = 1{,}120\text{ mi}$

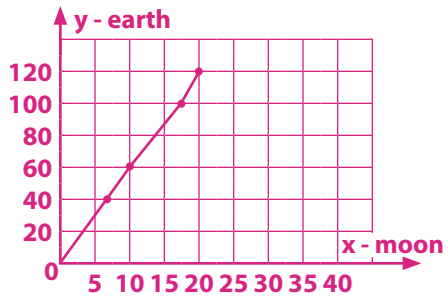
25. $20 + 30 = 50$

$560\text{ mi} + 840\text{ mi} = 1{,}400\text{ mi}$

26. $20 \div 5 = 4$

$560 \div 5 = 112\text{ mi}$

J



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13.

$$\begin{array}{r} 0.5 \\ 4\overline{)2.0} \\ -20 \\ \hline 0 \end{array} \qquad \begin{array}{r} 0.5 \\ 30\overline{)15.0} \\ -150 \\ \hline 0 \end{array}$$

$0.5 = 0.5$

14.

$$\begin{array}{r} 0.375 \\ 8\overline{)3.000} \\ -24 \\ \hline 60 \\ -56 \\ \hline 40 \\ -40 \\ \hline 0 \end{array} \qquad \begin{array}{r} 0.25 \\ 16\overline{)4.00} \\ -32 \\ \hline 80 \\ -80 \\ \hline 0 \end{array}$$

$0.375 \neq 0.25$

15.

$$\begin{array}{r} 0.\overline{6} \\ 3\overline{)2.00} \\ -18 \\ \hline 20 \end{array} \qquad \begin{array}{r} 0.6 \\ 5\overline{)3.0} \\ -30 \\ \hline 0 \end{array}$$

$0.\overline{6} \neq 0.6$

16.

$$\begin{array}{r} 0.125 \\ 72\overline{)9.000} \\ -72 \\ \hline 180 \\ -144 \\ \hline 360 \\ -360 \\ \hline 0 \end{array} \qquad \begin{array}{r} 0.125 \\ 48\overline{)6.000} \\ -48 \\ \hline 120 \\ -96 \\ \hline 240 \\ -240 \\ \hline 0 \end{array}$$

$0.125 = 0.125$

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23. $\frac{\$6}{4\text{ lb}} = \frac{\$15}{10\text{ lb}}$

$\$6 \div 4 = \$1.50/\text{lb}$

$\$15 \div 10 = \$1.50/\text{lb}$

24. $\frac{\$2}{12\text{ eggs}} = \frac{\$3}{18\text{ eggs}}$

$\$2 \div 12 = \$0.1\overline{6}/\text{egg}$

$\$3 \div 18 = \$0.1\overline{6}/\text{egg}$

25. $\frac{\$7}{5\text{ bottles}} \neq \frac{\$8}{6\text{ bottles}}$

$\$7 \div 5 = \$1.40/\text{bottle}$

$\$8 \div 6 \approx \$1.33/\text{bottle}$

26. $\frac{55¢}{12\text{ oz}} \neq \frac{95¢}{20\text{ oz}}$

$\$0.55 \div 12 = \$0.045/\text{oz}$

$\$0.95 \div 20 = \$0.047/\text{oz}$

27. $\frac{\$1}{1\text{ qt}} = \frac{\$4}{\cancel{1\text{ gal}}\ 4\text{ qt}}$

$\$1 \div 1 = \$1/\text{qt}$

$\$4 \div 4 = \$1/\text{qt}$

28. $\frac{50¢}{5\text{ oz}} \neq \frac{75¢}{8\text{ oz}}$

$\$0.50 \div 5 = \$0.10/\text{oz}$

$\$0.75 \div 8 \approx \$0.09/\text{oz}$

29. $\frac{3\text{ hr}}{2\text{ driveways}} = \frac{n}{5\text{ driveways}}$

$3\text{ hr} \div 2 = 1.5\text{ hr/driveway};$

$n = 5 \cdot 1.5$

$n = 7.5\text{ hr}$

30. $\frac{480\text{ mi}}{3\text{ hr}} = \frac{n}{5\text{ hr}}$

$480\text{ mi} \div 3\text{ hr} = 160\text{ mi/hr (or mph)}$

$n = 5 \cdot 160\text{ mi}$

$n = 800\text{ mi}$

31. $\frac{\$15}{2\text{ pizzas}} = \frac{n}{7\text{ pizzas}}$

$\$15 \div 2 = \$7.50/\text{pizza}$

$n = 7 \cdot \$7.50$

$n = \$52.50$

32. $\frac{30\text{ hr}}{25\text{ items}} = \frac{n}{60\text{ items}}$

$30 \div 25 = 1.2\text{ items/hr}$

$n = 60 \times 1.2$

$n = 72\text{ items/hr}$

33. $\frac{3}{1} = \frac{n}{5}$

$5 \times 3 = n$

$n = 15\text{ votes}$

34. $\frac{24}{3} = \frac{n}{4}$

$24 \times 4 = 3n$

$\frac{96}{3} = \frac{3n}{3}$

$n = 32\text{ ounces}$

35. $\frac{36}{120} = \frac{n}{10}$

$10 \cdot 36 = 120n$

$\frac{360}{120} = \frac{120n}{10}$

$n = 3\text{ students}$

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1. $\frac{10}{5} = \frac{70}{n}$ or $\frac{10}{70} = \frac{5}{n}$

$10n = 5 \cdot 70$

$\frac{10n}{10} = \frac{350}{10}$

$n = 35\text{ cm}$

2. $\frac{8}{12} = \frac{6}{n}$ or $\frac{8}{6} = \frac{12}{n}$

$8n = 12 \cdot 6$

$\frac{8n}{8} = \frac{72}{8}$

$n = 9\text{ m}$

3. $\frac{10}{n} = \frac{75}{60}$ or $\frac{10}{75} = \frac{n}{60}$

$60 \cdot 10 = 75n$

$\frac{600}{75} = \frac{75n}{75}$

$n = 8\text{ cm}$

4. $\frac{12}{n} = \frac{9}{15}$ or $\frac{12}{9} = \frac{n}{15}$

$15 \cdot 12 = 9n$

$\frac{180}{9} = \frac{9n}{9}$

$n = 20$ m

5. $\frac{15}{n} = \frac{30}{60}$ or $\frac{15}{30} = \frac{n}{60}$

$60 \cdot 15 = 30n$

$\frac{900}{30} = \frac{30n}{30}$

$n = 30$ cm

6. $\frac{n}{60} = \frac{25}{125}$ or $\frac{n}{25} = \frac{60}{125}$

$125n = 60 \cdot 25$

$\frac{125n}{125} = \frac{1{,}500}{125}$

$n = 12$ cm

7. $\frac{2}{4} = \frac{6}{n}$

$2n = 4 \cdot 6$

$\frac{2n}{2} = \frac{24}{2}$

$n = 12$ in.

8. $\frac{9}{12} = \frac{n}{10}$

$10 \cdot 9 = 12n$

$\frac{90}{12} = \frac{12n}{12}$

$n = 7.5$ in.

9. $\frac{\$0.48}{3} = \frac{n}{20}$

$20 \cdot \$0.48 = 3n$

$\frac{\$9.60}{3} = \frac{3n}{3}$

$n = \$3.20$

10. $\frac{126}{4.5} = \frac{n}{8}$

$8 \cdot 126 = 4.5n$

$\frac{1{,}008}{4.5} = \frac{4.5n}{4.5}$

$n = 224$ miles

11. $\frac{9}{16.5} \neq \frac{10.5}{24}$

$24 \cdot 9 = 216$

$16.5 \cdot 10.5 = 173.25$

216 cm $\neq 173.25$ cm

12. $\frac{50}{25} = \frac{20}{n}$

$50n = 25 \cdot 20$

$\frac{50n}{50} = \frac{500}{50}$

$n = 10$ m

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1. $\frac{1}{12} = \frac{1.2}{n}$

$n = 12 \cdot 1.2$

$n = 14.4$ ft

2. $\frac{1}{12} = \frac{3.5}{n}$

$n = 12 \cdot 3.5$

$n = 42$ ft

3. $\frac{1}{12} = \frac{2.3}{n}$

$n = 12 \cdot 2.3$

$n = 27.6$ ft

4. $\frac{1}{12} = \frac{0.5}{n}$

$n = 12 \cdot 0.5$

$n = 6$

$n = 6$ ft long

$\frac{1}{12} = \frac{1}{n}$

$n = 12 \cdot 1$

$n = 12$

$n = 12$ ft wide

5. $\frac{1}{32} = \frac{3}{n}$

$n = 32 \cdot 3$

$n = 96$ km

6. $\frac{1}{32} = \frac{4.5}{n}$

$n = 32 \cdot 4.5$

$n = 144$ km

7. $\frac{1}{32} = \frac{7}{n}$

$n = 32 \cdot 7$

$n = 224$ km

8. $\frac{1}{32} = \frac{5.5}{n}$

$n = 32 \cdot 5.5$

$n = 176$ km

9. $\frac{1}{32} = \frac{3.5}{n}$

$n = 32 \cdot 3.5$

$n = 112$ km

10. $\frac{1}{32} = \frac{6}{n}$

$n = 32 \cdot 6$

$n = 192$ km

11. $\frac{1}{32} = \frac{5}{n}$

$n = 32 \cdot 5$

$n = 160$ km

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15. $\frac{1}{150} = \frac{4}{n}$

$n = 150 \cdot 4$

$n = 600$ mi

16. $\frac{1}{150} = \frac{9}{n}$

$n = 150 \cdot 9$

$n = 1{,}350$ mi

17. $\frac{1}{150} = \frac{3.6}{n}$

$n = 150 \cdot 3.6$

$n = 540$ mi

18. $\frac{1}{150} = \frac{0.6}{n}$

$n = 150 \cdot 0.6$

$n = 90$ mi

19. $\frac{1}{150} = \frac{5.8}{n}$

$n = 150 \cdot 5.8$

$n = 870$ mi

20. $\frac{1}{150} = \frac{13}{n}$

$n = 150 \cdot 13$

$n = 1{,}950$ mi

21. $\frac{1}{16} = \frac{n}{80}$

$\frac{80}{16} = \frac{16n}{16}$

$n = 5$ in.

22. $\frac{1}{16} = \frac{n}{160}$

$\frac{160}{16} = \frac{16n}{16}$

$n = 10$ in.

23. $\frac{1}{16} = \frac{n}{120}$

$\frac{120}{16} = \frac{16n}{16}$

$n = 7.5$ in.

24. $\frac{1}{16} = \frac{n}{48}$

$\frac{48}{16} = \frac{16n}{16}$

$n = 3$ in.

25. $\frac{1}{16} = \frac{n}{8}$

$\frac{8}{16} = \frac{16n}{16}$

$n = 0.5$ in.

26. $\frac{1}{16} = \frac{n}{67.2}$

$\frac{67.2}{16} = \frac{16n}{16}$

$n = 4.2$ in.

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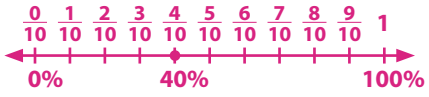
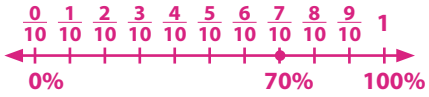
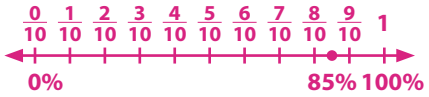
1. 

2. 

3. 

13. 

14. 

15. 

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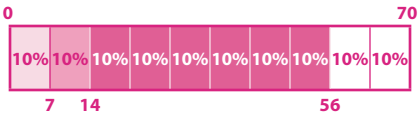
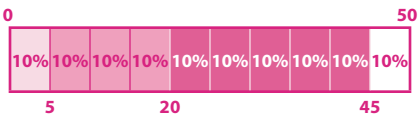
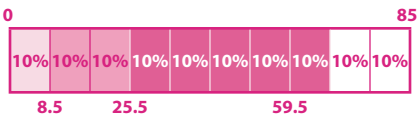
1. $\frac{50}{100} \times 78 = 39$
2. $\frac{30}{100} \times 80 = \frac{120}{5} = 24$
3. $\frac{40}{100} \times 200 = 80$
4. $\frac{25}{100} \times 48 = 12$
5. $\frac{60}{100} \times 25 = 15$
6. $\frac{75}{100} \times 52 = 39$
7. $\frac{20}{100} \times 85 = 17$
8. $\frac{33}{100} \times 100 = 33$
9. $\frac{10}{100} \times 250 = 25$
10. $\frac{70}{100} \times 15 = 10.5$ or $10\frac{1}{2}$
11. $0.15 \times 80 = 12$
12. $0.35 \times 120 = 42$
13. $0.24 \times 400 = 96$
14. $0.05 \times 64 = 3.2$
15. $1.0 \times 25 = 25$
16. $0.18 \times 65 = 11.7$
17. $0.52 \times 65 = 33.8$
18. $0.39 \times 200 = 78$
19. $0.99 \times 50 = 49.5$
20. $0.45 \times 20 = 9$
21. 

10% of 70 = 7
20% = 2 × 7 = 14
80% = 8 × 7 = 56

22. 

10% of 50 = 5
40% = 4 × 5 = 20
90% = 9 × 5 = 45

23. 

10% of 85 = 8.5
30% = 3 × 8.5 = 25.5
70% = 7 × 8.5 = 59.5

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33. $\frac{5}{100} = \frac{n}{24}$; $n = 1.2$ hours
34. $\frac{35}{100} = \frac{n}{40}$; $n = 14$ shots
35. $\frac{25}{100} = \frac{n}{\$64}$; $n = \$16$;
$\$64 - \$16 = \$48$
36. $\frac{8}{100} = \frac{n}{\$37.50}$; $n = \$3.00$
37. $\frac{20}{100} = \frac{n}{\$60}$; $n = \$12$
38. $\frac{10}{100} = \frac{n}{\$80}$; $n = \$8$;
$\frac{40}{100} = \frac{n}{\$80}$; $n = \$32$
39. $\frac{2}{100} = \frac{n}{\$150}$; $n = \$3$
40. $\frac{65}{100} = \frac{n}{200}$; $n = 130$ people
41. $\frac{80}{100} = \frac{n}{6}$; $n = 4.8$ feet

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1. $15\% \cdot n = 12$

$\frac{0.15n}{0.15} = \frac{12}{0.15}$

$n = 80$

2. $20\% \cdot n = 50$

$\frac{0.20n}{0.20} = \frac{50}{0.20}$

$n = 250$

3. $60\% \cdot n = 15$

$\frac{0.60n}{0.60} = \frac{15}{0.60}$

$n = 25$

4. $75\% \cdot n = 9$

$\frac{0.75n}{0.75} = \frac{9}{0.75}$

$n = 12$

5. $16 = 25\% \cdot n$

$\frac{16}{0.25} = \frac{0.25n}{0.25}$

$n = 64$

6. $14 = 35\% \cdot n$

$\frac{14}{0.35} = \frac{0.35n}{0.35}$

$n = 40$

7. $\frac{35}{100} = \frac{42}{n}$

$\frac{35n}{35} = \frac{4,200}{35}$

$n = 120$

8. $\frac{60}{100} = \frac{24}{n}$

$\frac{60n}{60} = \frac{2,400}{60}$

$n = 40$

9. $\frac{52}{100} = \frac{78}{n}$

$\frac{52n}{52} = \frac{7,800}{52}$

$n = 150$

10. $\frac{3}{100} = \frac{6}{n}$

$\frac{3n}{3} = \frac{600}{3}$

$n = 200$

11. $\frac{14}{100} = \frac{7}{n}$

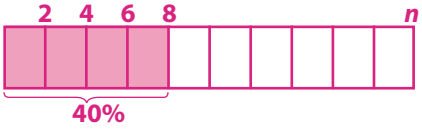
$\frac{14n}{14} = \frac{700}{14}$

$n = 50$

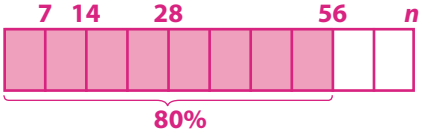
12. $\frac{45}{100} = \frac{36}{n}$

$\frac{45n}{45} = \frac{3,600}{45}$

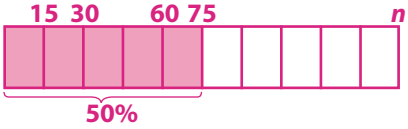
$n = 80$

13. 

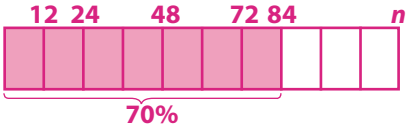
$40\% \cdot n = 8$
$8 \div 4 = 2$; Each part is 2.
$100\% = 10 \cdot 2 = 20$
$n = 20$
$40\% \cdot 20 = 8$

14. 

$80\% \cdot n = 56$
$56 \div 8 = 7$; Each part is 7.
$100\% = 10 \cdot 7 = 70$
$n = 70$
$80\% \cdot 70 = 56$

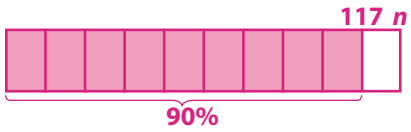
15. 

$50\% \cdot n = 75$
$75 \div 5 = 15$; Each part is 15.
$100\% = 10 \cdot 15 = 150$
$n = 150$
$50\% \cdot 150 = 75$

16. 

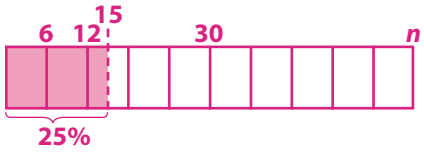
$70\% \cdot n = 84$
$84 \div 7 = 12$; Each part is 12.
$100\% = 10 \cdot 12 = 120$
$n = 120$
$70\% \cdot 120 = 84$

17.



117 = 90% • *n*
117 ÷ 9 = 13; Each part is 13.
100% = 10 • 13 = 130
n = 130
90% • 130 = 117

18.



15 = 25% • *n*
$15 \div 2\frac{1}{2} = 15 \cdot \frac{2}{5} = 6$; Each part is 6.
100% = 10 • 6 = 60
n = 60
25% • 60 = 15

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34. $\frac{4}{6} = \frac{5}{d}$; *d* = 7.5 hr

35. $\frac{240}{2} = \frac{m}{5}$; *m* = 600 mi

36. $\frac{1}{3} \cdot \$45 = \frac{45}{3} = \$15$
$\$45 - \$15 = \$30$

37. $\frac{8}{100} = \frac{t}{\$6.50}$; *t* = $0.52

38. $\frac{35}{100} = \frac{d}{24}$; *d* = 8.4 hr

39. $\frac{30}{100} = \frac{\$12}{b}$; *b* = $40

40. $\frac{20}{100} = \frac{2}{g}$; *g* = 10 goals

41. $\frac{2}{1} = \frac{v}{8}$; *v* = 16 votes

42. $\frac{6}{8} = \frac{n}{28}$; *n* = 21 ft

43. $\frac{1}{3} = \frac{n}{12}$; *n* = 4 m

44. $\frac{29}{33} = \frac{n}{100}$; *n* ≈ 88%

45. $\frac{20}{100} = \frac{n}{\$65}$; *n* = $13
$\frac{45}{100} = \frac{s}{\$65}$; *s* = $29.25
$65.00 - $29.25 = $35.75

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1. $\frac{4 \text{ mi}}{1 \text{ hr}} = \frac{n \text{ mi}}{2 \text{ hr}}$
n = 2 • 4 mi
n = 8 mi

2. $\frac{52 \text{ km}}{1 \text{ hr}} = \frac{n \text{ km}}{5 \text{ hr}}$
n = 5 • 52 km
n = 260 km

3. $\frac{7 \text{ ft}}{1 \text{ sec}} = \frac{n \text{ ft}}{12 \text{ sec}}$
n = 12 • 7 ft
n = 84 ft

4. $\frac{3 \text{ mi}}{1 \text{ hr}} = \frac{5 \text{ mi}}{n \text{ hr}}$
$\frac{3n}{3} = \frac{5}{3}$
n ≈ 1.67 hr

5. $\frac{50 \text{ mi}}{1 \text{ hr}} = \frac{200 \text{ mi}}{n \text{ hr}}$
$\frac{50n}{50} = \frac{200}{50}$
n = 4 hr

6. $\frac{330 \text{ mi}}{1 \text{ hr}} = \frac{165 \text{ mi}}{n \text{ hr}}$
$\frac{330n}{330} = \frac{165}{330}$
n = 0.5 hr

7. $\frac{224 \text{ km}}{3.5 \text{ hr}} = \frac{n \text{ km}}{1 \text{ hr}}$
$n = \frac{64 \text{ km}}{\text{hr}}$

8. $\frac{140 \text{ mi}}{4 \text{ hr}} = \frac{n \text{ mi}}{1 \text{ hr}}$
$n = \frac{35 \text{ mi}}{\text{hr}}$

9. $\frac{270 \text{ mi}}{3 \text{ hr}} = \frac{n \text{ mi}}{1 \text{ hr}}$
$n = \frac{90 \text{ mi}}{\text{hr}}$

10. $\frac{350 \text{ mi}}{1 \text{ hr}} = \frac{d}{2.25 \text{ hr}}$
d = 787.5 mi

11. $\frac{340 \text{ mi}}{1 \text{ hr}} = \frac{1{,}190 \text{ mi}}{t}$
$\frac{340t}{340} = \frac{1{,}190}{340}$
t = 3.5 hr

12. $\frac{12 \text{ mi}}{1 \text{ hr}} = \frac{24 \text{ mi}}{t}$
$\frac{12t}{12} = \frac{24}{12}$
t = 2 hr

13. $\frac{50 \text{ mi}}{1 \text{ hr}} = \frac{600 \text{ mi}}{t}$
$\frac{50t}{50} = \frac{600}{50}$
t = 12 hr
12 – 10 = 2 hr

$\frac{60 \text{ mi}}{1 \text{ hr}} = \frac{600 \text{ mi}}{t}$
$\frac{60t}{60} = \frac{600}{60}$
t = 10 hr

14 1 hr = 60 min
$\frac{30 \text{ mi}}{60 \text{ min}} = \frac{5 \text{ mi}}{t}$
30*t* = 5 • 60
$\frac{30t}{30} = \frac{300}{30}$
t = 10 min
12 – 10 = 2 min

$\frac{25 \text{ mi}}{60 \text{ min}} = \frac{5 \text{ mi}}{t}$
25*t* = 5 • 60
$\frac{25t}{25} = \frac{300}{25}$
t = 12 min

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15. 1 hr = 60 min
$\frac{50 \text{ mi}}{60 \text{ min}} = \frac{d}{60 \text{ min}}$
60 • 50 = 60*d*
$\frac{3{,}000}{60} = \frac{60d}{60}$
d = 50 mi

16. 20 yd = 60 ft
$\frac{5 \text{ ft}}{1 \text{ min}} = \frac{60 \text{ ft}}{t}$
$\frac{5t}{5} = \frac{60}{5}$
t = 12 min

17. $\frac{\frac{1}{2} \text{ mi}}{1 \text{ hr}} = \frac{d}{5 \text{ hr}}$
$5 \cdot \frac{1}{2} = d$
$d = \frac{5}{2} = 2\frac{1}{2}$ mi

18. $\frac{0.5 \text{ mi}}{5 \text{ min}} = \frac{n}{1 \text{ min}}$
$\frac{0.5}{5} = \frac{5n}{5}$
n = 0.1 mi

19. 3 km = 3000 m
$\frac{250 \text{ m}}{1 \text{ min}} = \frac{3000 \text{ m}}{t}$
$\frac{250t}{250} = \frac{3000}{250}$
t = 12 min

20. $\frac{1}{2}$ day = 12 hr
$\frac{540 \text{ mi}}{12 \text{ hr}} = \frac{r}{1 \text{ hr}}$
$\frac{540 \text{ mi}}{12} = \frac{12r}{12}$
r = 45 mi/hr

21. $\frac{21 \text{ ft}}{1 \text{ sec}} = \frac{d}{15 \text{ sec}}$
21 • 15 = *d*
d = 315 ft

22. 1 day = 24 hr
$\frac{600 \text{ mi}}{24 \text{ hr}} = \frac{r}{1 \text{ hr}}$
$\frac{600}{24} = \frac{24r}{24}$
r = 25 mi/hr

23. 1 mi = 5,280 ft

$\frac{40 \text{ ft}}{1 \text{ sec}} = \frac{5{,}280 \text{ ft}}{t}$

$\frac{40t}{40} = \frac{5{,}280}{40}$

$t = 132$ sec

24. 1 hr = 60 min

$\frac{70 \text{ km}}{60 \text{ min}} = \frac{d}{30 \text{ min}}$

$70 \cdot 30 = 60d$

$\frac{2100}{60} = \frac{60d}{60}$

$d = 35$ km

25. $\frac{66 \text{ ft}}{1 \text{ min}} = \frac{d}{15 \text{ min}}$

$66 \cdot 15 = d$

$d = 990$ ft

$\frac{66 \text{ ft}}{1 \text{ min}} = \frac{5{,}280 \text{ ft}}{t}$

$\frac{66t}{66} = \frac{5{,}280}{66}$

$t = 80$ min

Chapter 14

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8. $5 \times 36 = 180$

9. $12 \div 3 = 4$

10. $2 \times 5{,}280 = 10{,}560$

11. $108 \div 36 = 3$

12. $3 \times \frac{5}{3} = \frac{15}{3} = 5$
or 3 ft + 2 ft = 5 ft

13. $117 \div 36 = 3\frac{9}{36} = 3\frac{1}{4}$

14. $30 \div 12 = 2\frac{6}{12} = 2\frac{1}{2}$

15. $7 \div 3 = 2$ r1

16. $(6 \cdot 12) + 6 = 78$

17. $5{,}290 \div 5{,}280 = 1$ r10

18. $\frac{3}{4} \cdot 36 = 27$

19. $\frac{2}{3} \cdot 12 = 8$

20. $\frac{1}{4} \cdot 5{,}280 = 1{,}320$ ft

21. $\frac{3}{4} \cdot 12 = 9$

22. $\frac{2}{3} \cdot 5{,}280 = 3{,}520$

23. $\frac{1}{9} \cdot 36 = 4$

24. $\frac{1}{2} \cdot 36 = 18$

25. $\frac{1}{2} \cdot 5{,}280 = 2{,}640$

26 $\frac{2{,}640}{1{,}760} = 1\frac{1}{2}$

27 $82 \div 12 = 6\frac{5}{6}$

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9. $6 \cdot 16 = 96$

10. $(6 \cdot 16) + 9 =$
$96 + 9 = 105$

11. $(2 \cdot 2{,}000) + 25 =$
$4{,}000 + 25 = 4{,}025$

12. $3 \cdot 2{,}000 = 6{,}000$

13. $(12 \cdot 16) + 9 =$
$192 + 9 = 201$

14. $9 \div 2 = 4$ r1

15. $(4 \cdot 16) + 2 =$
$64 + 2 = 66$

16. $10 \div 4 = 2$ r2

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17. $\frac{1}{2} \cdot 2{,}000 = 1{,}000$

18. $\frac{5}{8} \cdot 16 = 10$

19. $\frac{3}{4} \cdot 4 = 3$

20. $\frac{3}{8} \cdot 8 = 3$

21. $\frac{1}{2} \cdot 16 = 8$

22. $\frac{1}{4} \cdot 2{,}000 = 500$

23. $\frac{3}{4} \cdot 8 = 6$

24. $\frac{1}{2} \cdot 4 = 2$

25. $3\frac{1}{2} \cdot 2 = \frac{7}{2} \cdot 2 = 7$

26. $1\frac{1}{2} \cdot 16 = \frac{3}{2} \cdot 16 = 24$

27. $10\frac{1}{4} \cdot 2{,}000 = \frac{41}{4} \cdot 2{,}000 = 20{,}500$

28. $3\frac{1}{2} \cdot 4 = \frac{7}{2} \cdot 4 = 14$

44. $\frac{3}{4} \cdot 16 = 12$ oz

45. $(2\frac{1}{4} \cdot 12) - 21 =$
$(\frac{9}{4} \cdot 12) - 21 =$
$27 - 21 = 6$ in. or $\frac{1}{2}$ ft

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17.
$$\begin{array}{r} 16.2 \\ 3\overline{)48.6} \\ -3 \\ \hline 18 \\ -18 \\ \hline 06 \\ -\ 6 \\ \hline 0 \end{array}$$

18.
$$\begin{array}{r} 4 \text{ ft } 2 \text{ in.} \\ 4\overline{)16 \text{ ft } 8 \text{ in.}} \\ -16 \text{ ft} \\ \hline 0 \text{ ft } 8 \text{ in.} \\ -\quad 8 \text{ in.} \\ \hline 0 \end{array}$$

19.
$$\begin{array}{r} 3 \text{ tn } 105 \text{ lb} \\ 2\overline{)6 \text{ tn } 210 \text{ lb}} \\ -6 \text{ tn} \\ \hline 0 \text{ tn } 2 \\ -\quad 2 \\ \hline 010 \\ -\ 10 \\ \hline 0 \end{array}$$

20.
$$\begin{array}{r} 6 \text{ gal } 3 \text{ pt} \\ 3\overline{)18 \text{ gal } 9 \text{ pt}} \\ -18 \text{ gal} \\ \hline 0 \text{ gal } 9 \text{ pt} \\ -\quad 9 \text{ pt} \\ \hline 0 \end{array}$$

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15. $C = \frac{5}{9} \cdot (F - 32°)$

$C = \frac{5}{9} \cdot (59° - 32°)$

$C = \frac{5}{9} \cdot 27$

$C = \frac{5}{9} \cdot \frac{27}{1}$

$C = 15°$

16. $C = \frac{5}{9} \cdot (F - 32°)$

$C = \frac{5}{9} \cdot (41° - 32°)$

$C = \frac{5}{9} \cdot 9$

$C = \frac{5}{9} \cdot \frac{9}{1}$

$C = 5°$

17. $C = \frac{5}{9} \cdot (F - 32°)$

$C = \frac{5}{9} \cdot (95° - 32°)$

$C = \frac{5}{9} \cdot 63$

$C = \frac{5}{9} \cdot \frac{63}{1}$

$C = 35°$

18. $F = (\frac{9}{5} \cdot C) + 32°$

$F = (\frac{9}{5} \cdot 10°) + 32°$

$F = (\frac{9}{5} \cdot \frac{10}{1}) + 32°$

$F = 18° + 32°$

$F = 50°$

19. $F = (\frac{9}{5} \cdot C) + 32°$

$F = (\frac{9}{5} \cdot 20) + 32°$

$F = (\frac{9}{5} \cdot \frac{20}{1}) + 32°$

$F = 36° + 32°$

$F = 68°$

20. $F = (\frac{9}{5} \cdot C) + 32°$

$F = (\frac{9}{5} \cdot 50) + 32°$

$F = (\frac{9}{5} \cdot \frac{50}{1}) + 32°$

$F = 90° + 32°$

$F = 122°$

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21. $F = (\frac{9}{5} \cdot 15°) + 32°$

$F = (\frac{9}{5} \cdot \frac{15}{1}) + 32°$

$F = 27° + 32°$

$F = 59°$

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17. $\frac{36 \text{ in.}}{1 \text{ yd}}$ or $\frac{1 \text{ yd}}{36 \text{ in.}}$

$\frac{7 \text{ yd}}{1} \cdot \frac{36 \text{ in.}}{1 \text{ yd}} = 252 \text{ in.}$

18. $\frac{16 \text{ oz}}{1 \text{ lb}}$ or $\frac{1 \text{ lb}}{16 \text{ oz}}$

$\frac{64 \text{ oz}}{1} \cdot \frac{1 \text{ lb}}{16 \text{ oz}} = 4 \text{ lb}$

19. $\frac{4 \text{ qt}}{1 \text{ gal}}$ or $\frac{1 \text{ gal}}{4 \text{ qt}}$

$\frac{8 \text{ gal}}{1} \cdot \frac{4 \text{ qt}}{1 \text{ gal}} = 32 \text{ qt}$

20. $\frac{60 \text{ min}}{1 \text{ hr}}$ or $\frac{1 \text{ hr}}{60 \text{ min}}$

$\frac{3 \text{ hr}}{1} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = 180 \text{ min}$

21. $\frac{1000 \text{ g}}{1 \text{ kg}}$ or $\frac{1 \text{ kg}}{1000 \text{ g}}$

$\frac{3 \text{ kg}}{1} \cdot \frac{1000 \text{ g}}{1 \text{ kg}} = 3000 \text{ g}$

22. $\frac{1000 \text{ mL}}{1 \text{ L}}$ or $\frac{1 \text{ L}}{1000 \text{ mL}}$

$\frac{2500 \text{ mL}}{1} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} = 2.5 \text{ L}$

23. $\frac{100 \text{ cm}}{1 \text{ m}}$ or $\frac{1 \text{ m}}{100 \text{ cm}}$

$\frac{450 \text{ cm}}{1} \cdot \frac{1 \text{ m}}{100 \text{ cm}} = 4.5 \text{ m}$

24. $\frac{8 \text{ oz}}{1 \text{ c}}$ or $\frac{1 \text{ c}}{8 \text{ oz}}$

$\frac{3 \text{ c}}{1} \cdot \frac{8 \text{ oz}}{1 \text{ c}} = 24 \text{ oz}$

25. $\frac{5 \text{ tn}}{1} \cdot \frac{2000 \text{ lb}}{1 \text{ tn}} = 10{,}000 \text{ lb}$

26. $\frac{13 \text{ gal}}{1} \cdot \frac{4 \text{ qt}}{1 \text{ gal}} = 52 \text{ qt}$

27. $\frac{20 \text{ c}}{1} \cdot \frac{1 \text{ pt}}{2 \text{ c}} = 10 \text{ pt}$

28. $\frac{8 \text{ mi}}{1} \cdot \frac{1760 \text{ yd}}{1 \text{ mi}} = 14{,}080 \text{ yd}$

29. $\frac{108 \text{ in.}}{1} \cdot \frac{1 \text{ ft}}{12 \text{ in.}} = 9 \text{ ft}$

30. $\frac{120 \text{ oz}}{1} \cdot \frac{1 \text{ c}}{8 \text{ oz}} = 15 \text{ c}$

31. $\frac{4 \text{ yd}}{1} \cdot \frac{36 \text{ in.}}{1 \text{ yd}} = 144 \text{ in.}$

32. $\frac{128 \text{ oz}}{1} \cdot \frac{1 \text{ lb}}{16 \text{ oz}} = 8 \text{ lb}$

Chapter 15

page 334

6. mean: $[(2 \cdot 10) + (4 \cdot 11) + (3 \cdot 12) + (2 \cdot 13) + (2 \cdot 14)] \div 13 =$
$154 \div 13 \approx 11.8$
median: ~~10~~ ~~10~~ ~~11~~ ~~11~~ ~~11~~ ~~11~~ (12) ~~12~~ ~~12~~ ~~13~~ ~~13~~ ~~14~~ ~~14~~

7–9. See frequency table on CD.

8. mean: $(83 + 81 + 86 + 88 + 80 + 82 + 85) \div 7 =$
$585 \div 7 \approx 83.6$

9. median: ~~80~~ ~~81~~ ~~82~~ (83) ~~85~~ ~~86~~ ~~86~~; $83° < 83.6°$

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14. mean: The sum of the data is 499; $499 \div 6 \approx 83.2$.

median: ~~79~~ ~~81~~ (82 85) ~~85~~ ~~87~~

15. mean: The sum of the data is 232; $232 \div 5 = 46.4$.

median: ~~40~~ ~~41~~ (48) ~~51~~ ~~52~~

16. mean: The sum of the data is 115; $115 \div 8 \approx 14.4$.

median: ~~10~~ ~~12~~ ~~12~~ (12 15) ~~17~~ ~~18~~ ~~19~~

17. mean: $14 + 11 + 10 + 24 = 59$ chairs

25. $4(6 \text{ ft} \cdot 3 \text{ ft}) + 2(3 \text{ ft} \cdot 3 \text{ ft}) =$
$4 \cdot 18 \text{ ft}^2 + 2 \cdot 9 \text{ ft}^2 =$
$72 \text{ ft}^2 + 18 \text{ ft}^2 = 90 \text{ ft}^2$

26. $6 \text{ ft} \cdot 3 \text{ ft} \cdot 3 \text{ ft} = 54 \text{ ft}^3$

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7. mean for Maria: $(30 + 90 + 15 + 75 + 45) \div 5 =$
$255 \div 5 = 51$ min
mean for Mitchell: $(15 + 90 + 30 + 60 + 60) \div 5 =$
$255 \div 5 = 51$ min

9. median for Mitchell:
~~15~~ ~~30~~ (60) ~~60~~ ~~90~~
median for Maria:
~~15~~ ~~30~~ (45) ~~75~~ ~~90~~

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17. range: $5 - 1.5 = 3.5$ km
mean: $(1.5 + 2 + 3 + 3 + 4 + 5) \div 6 =$
$18.5 \div 6 \approx 3.1$ km

18. range: $4 - 1 = 3$ km
mean: $(1 + 2 + 2 + 1.5 + 3 + 4) \div 6$
$13.5 \div 6 \approx 2.3$ km

19. See line graph on CD.

21. mean: The sum of the data is 1,120; $1{,}120 \div 5 = 224$.

J See bar graph on CD.
Each set of bars compares the morning and evening attendance at church.

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1–7. See stem and leaf plot on CD.

8–15. See stem and leaf plot on CD.

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22. See line graph on CD.

23. mean: The sum of the data is 2,645; $2{,}645 \div 5 = 529$ calls

24. mean: The sum of the data is 2,650; $2{,}650 \div 5 = 530$ calls

J mean (average): the sum of the data divided by the number of addends
median: the middle value or an average of the two middle values of a set of data when ordered from least to greatest
mode: the value that occurs most often or has the greatest frequency. Some sets may have more than one mode, and some sets may not have a mode.

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14–18. See line plot on CD.

20. The sum of the data is 370; 370 ÷ 19 ≈ 19.5.

26. 12 ÷ 19 = 0.63; 0.63 × 100 = 63%

J See line plot on CD.
See line graph on CD.

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11–19. See histogram on CD.

28. See double bar graph on CD.

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1–4. See box-and-whisker plot on CD.

8–12. See box-and-whisker plot on CD.

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22. See box-and-whisker plot on CD.

23. See box-and-whisker plot on CD.

28. See histogram on CD.

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10. See box-and-whisker plot on CD.

11. See box-and-whisker plot on CD.

16. See histogram on CD.

Chapter 16

page 358

17. $\frac{4}{6} = 0.\overline{6} \approx 0.67 = 67\%$

$\frac{2}{6} = 0.\overline{3} \approx 0.33 = 33\%$

18. $\frac{2}{6} = 0.\overline{3} \approx 0.33 = 33\%$

$\frac{4}{6} = 0.\overline{6} \approx 0.67 = 67\%$

19. $\frac{3}{6} = 0.5 = 50\%$

$\frac{3}{6} = 0.5 = 50\%$

20. $\frac{1}{6} = 0.1\overline{6} \approx 0.17 = 17\%$

$\frac{5}{6} = 0.8\overline{3} \approx 0.83 = 83\%$

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21. $\frac{1}{6} = 0.1\overline{6} \approx 0.17 = 17\%$

22. $\frac{2}{6} = \frac{1}{3} = 0.\overline{3} \approx 0.33 = 33\%$

23. $\frac{5}{6} = 0.8\overline{3} \approx 0.83 = 83\%$

24. $\frac{1}{6} = 0.1\overline{6} \approx 0.17 = 17\%$

25. $\frac{3}{6} = \frac{1}{2} = 0.50 = 50\%$

26. $\frac{3}{6} = \frac{1}{2} = 0.50 = 50\%$

27. $\frac{0}{6} = 0 = 0\%$

28. $\frac{4}{6} = \frac{2}{3} = 0.\overline{6} \approx 0.67 = 67\%$

29. $\frac{5}{6} = 0.8\overline{3} \approx 0.83 = 83\%$

30. $\frac{2}{6} = \frac{1}{3} = 0.\overline{3} \approx 0.33 = 33\%$

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15. 2 sleeve lengths × 8 colors = 16 shirt choices

16. 2 breads × 3 meats × 2 cheese = 12 sandwich choices

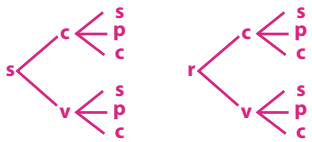
17. 9 digits × 9 digits × 9 digits × 9 digits = 6,561 combinations

18. 4 beds × 2 nightstands × 3 desks = 24 bedroom sets

19.

Sample Space: {s2, s4, a2, a4}
P(automatic transmission, 4-door) = $\frac{1}{4}$ or 25%

20.

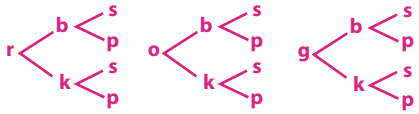


Sample Space: {scs, scp, scc, svs, svp, svc, rcs, rcp, rcc, rvs, rvp, rvc}
P(cone with chocolate ice cream) = $\frac{6}{12} = \frac{1}{2}$; 50%

21.

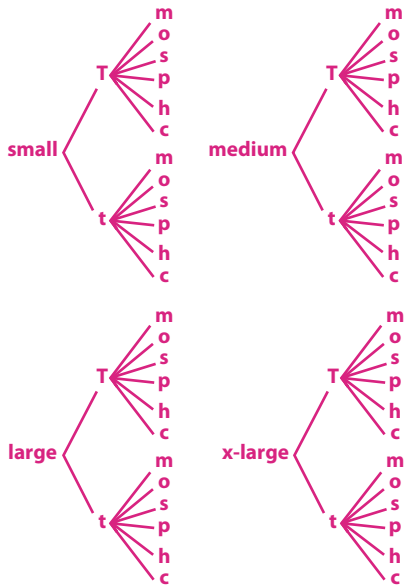
Sample Space: {wr, wt, wb, br, bt, bb}
P(white or black car, black interior) = $\frac{2}{6} = \frac{1}{3}$; 33%

22.



Sample Space: {rbs, rbp, rks, rkp, obs, obp, oks, okp, gbs, gbp, gks, gkp}
P(red shirt, blue pants, solid sweatshirt) = $\frac{1}{12}$; 8%

23. (Note: *T* = thick; *t* = thin)



24. Sample Space: {sTm, sTo, sTs, sTp, sTh, sTc, stm, sto, sts, stp, sth, stc, mTm, mTo, mTs, mTp, mTh, mTc, mtm, mto, mts, mtp, mth, mtc, lTm, lTo, lTs, lTp, lTh, lTc, ltm, lto, lts, ltp, lth, ltc, xTm, xTo, xTs, xTp, xTh, xTc, xtm, xto, xts, xtp, xth, xtc}

25. $\frac{6}{48} = \frac{1}{8}$ or 13%

26. $\frac{1}{48}$ or 2%

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J

Genetic Survey Results (sample = 200 students)				
Trait	Dimples	Straight Hair	Attached Earlobes	Widow's Peak
Yes	80	100	60	100
No	120	100	140	100

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14. *P*(red) = {r, r, b, b, y, g} = $\frac{2}{6}$

P(yellow) = {r, b, b, y, g} = $\frac{1}{5}$

$\frac{2}{6} \times \frac{1}{5} = \frac{2}{30} = \frac{1}{15}$

15. *P*(yellow) = {r, r, b, b, y, g} = $\frac{1}{6}$

P(green) = {r, r, b, b, g} = $\frac{1}{5}$

$\frac{1}{6} \times \frac{1}{5} = \frac{1}{30}$

16. *P*(red) = {r, r, b, b, y, g} = $\frac{2}{6}$

P(*not* yellow) = {r, b, b, y, g} = $\frac{4}{5}$

$\frac{2}{6} \times \frac{4}{5} = \frac{8}{30} = \frac{4}{15}$

17. $P(\text{red}) = \{r, r, b, b, y, g\} = \frac{2}{6}$

$P(\text{blue}) = \{r, b, b, y, g\} = \frac{2}{5}$

$\frac{2}{6} \times \frac{2}{5} = \frac{4}{30} = \frac{2}{15}$

18. $P(\text{yellow}) = \{r, r, b, b, y, g\} = \frac{1}{6}$

$P(\text{blue}) = \{r, r, b, b, g\} = \frac{2}{5}$

$\frac{1}{6} \times \frac{2}{5} = \frac{2}{30} = \frac{1}{15}$

19. $P(\text{green}) = \{r, r, b, b, y, g\} = \frac{1}{6}$

$P(\textit{not}\ \text{blue}) = \{r, r, b, b, y\} = \frac{3}{5}$

$\frac{1}{6} \times \frac{3}{5} = \frac{3}{30} = \frac{1}{10}$

Chapter 17

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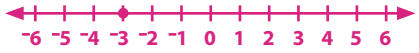
1. 

2. 

3. 

4. 

5. 

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31. 

32. 

33. 

48. $12 \cdot 12 = 144$

49. $8 \cdot 8 \cdot 8 = 512$

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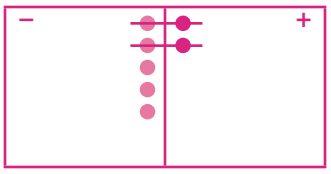
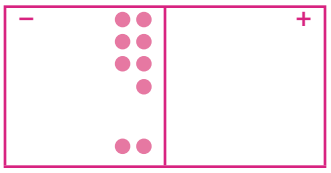
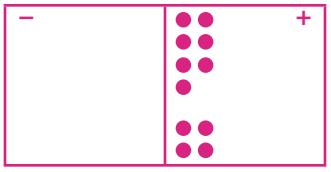
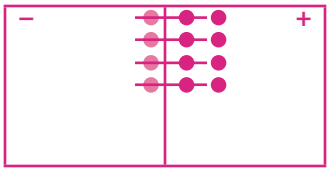
1. 

2. 

3. 

4. 

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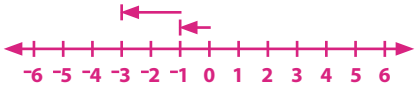
27. 

28. 

29. 

30. 

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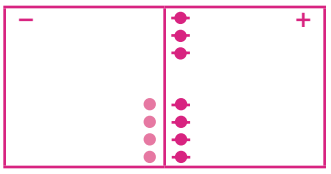
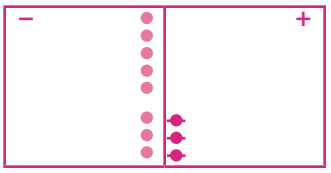
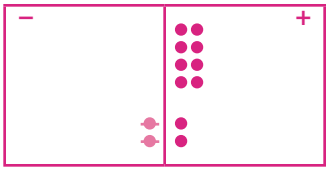
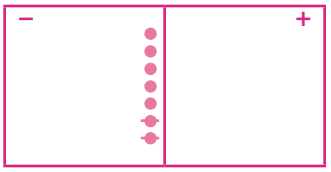
1. 

2. 

3. 

4. 

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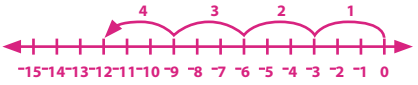
27. 

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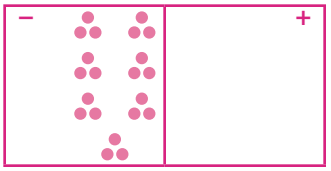
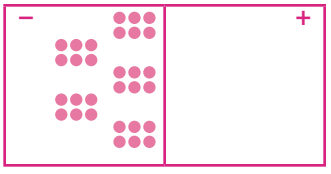
5. 12 negative counters divided into 3 sets equals 4 negative counters in each set.

6. 10 negative counters divided into equal sets of 5 negative counters will make 2 sets.

7. 

8. 

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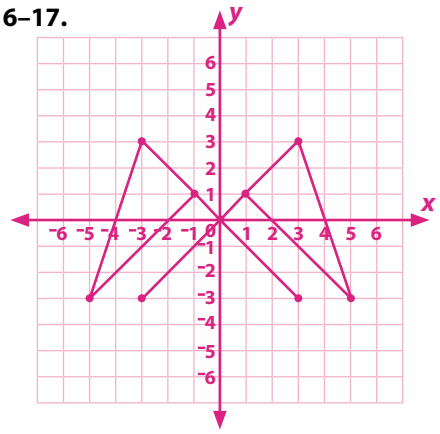
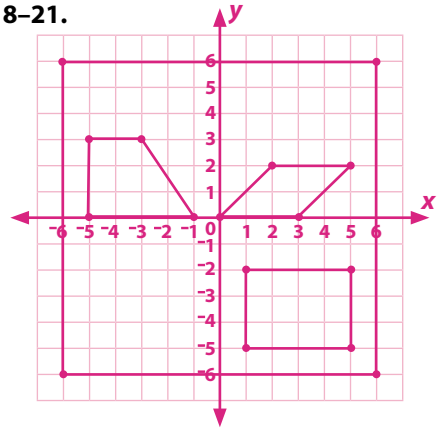
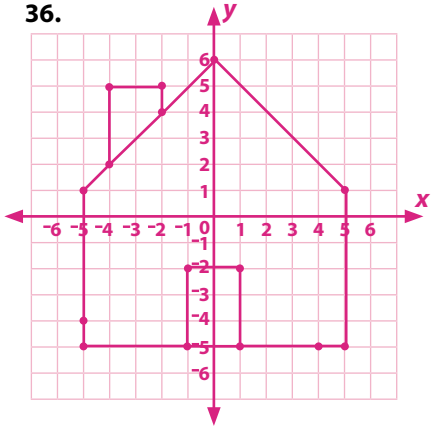
16–17.



18–21.



36.



DAILY REVIEW PAGES

ANSWER KEY

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DAILY 1 REVIEW

a

Add or subtract.

1. 3 / 7 / +8 = 18
2. 3 / 3 / +3 = 9
3. 2 / 8 / +3 = 13
4. 9 / 1 / +7 = 17
5. 20 − 8 = 12
6. 39 − 10 = 29
7. 45 − 9 = 36
8. 80 − 9 = 71
9. 100 − 45 = 55
10. 732 + 149 = 881
11. 4,200 − 1,341 = 2,859
12. 9,851 − 3,480 = 6,371

13. 8 + ? = 15 **7**
14. 7 + ? = 13 **6**
15. 3 + ? = 12 **9**
16. 30 − ? = 25 **5**
17. 35 − ? = 20 **15**
18. 30 − ? = 22 **8**
19. 7 + 8 − 5 + 6 = ? **16**
20. 9 + 3 − 0 + 4 = ? **16**

b

Solve.

1. 23 / 47 / +15 = 85
2. 71 / 69 / +34 = 174
3. 84 / 45 / +61 = 190
4. 999 − 374 = 625
5. 500 − 389 = 111
6. 600 − 421 = 179

7. 54 − ? = 40 **14**
8. 36 − ? = 30 **6**
9. 49 − ? = 30 **19**
10. 27 + ? = 50 **23**
11. 73 + ? = 80 **7**
12. 26 + ? = 40 **14**
13. 8 × ? = 24 **3**
14. 7 × ? = 42 **6**
15. 6 × ? = 48 **8**

16. 89 + 15 = 104
17. 50 − 25 = 25
18. 300 − 72 = 228
19. 1,457 + 2,394 = 3,851
20. 7,000 − 1,329 = 5,671

c

Write the answer using 387,406.

1. The value of 8 in standard form **80,000**
2. The digit in the Hundred Thousands place **3**
3. The value of 4 in standard form **400**
4. Round to the greatest place. **400,000**

Write the numbers from *least* to *greatest*.

5.

42,389	41,857	42,399
41,857	**42,389**	**42,399**

6.

819,234	89,973	809,583	819,233
89,973	**809,583**	**819,233**	**819,234**

Write a comparison sentence using > or <.

7. 63,271,809 **>** 63,270,899
8. 403,241,589 **>** 49,864,101
9. 19 million **<** 9 billion

Complete the equation.

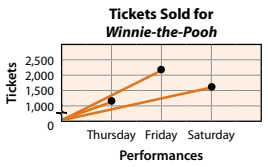
10. 4 + 4 + 4 = ? × 4 **3**
11. 8 + 8 = ? × 8 **2**
12. 9 + 9 + 9 + 9 = ? × 9 **4**
13. 7 + 7 = 2 × ? **7**
14. 6 + 6 + 6 + 6 = 4 × ? **6**
15. 5 + 5 + 5 = ? × 5 **3**
16. 5 × 7 = ? **35**
17. 4 × 8 = ? **32**
18. 9 × 3 = ? **27**
19. 6 × 10 = ? **60**
20. 2 × 9 = ? **18**

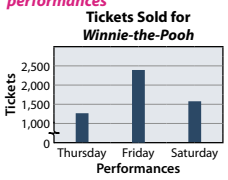
d

Solve.

Calvary Christian School performed *Winnie-the-Pooh* in the Civic Center Auditorium.

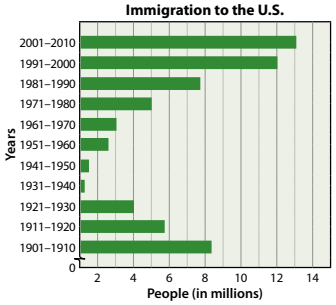
1. Addison bought tickets for the play. His parents, sister, and cousin were going with him to the performance. In addition, he got tickets for the neighbors. He purchased eleven tickets. How many tickets did he purchase for the neighbors? **6 tickets**
2. The ticket office sold 1,243 tickets for the Thursday night performance of the play, 2,390 for the Friday night performance, and 1,596 for the Saturday afternoon performance. How many tickets were sold for the play? **5,229 tickets**
3. Which graph correctly compares the number of tickets sold for each performance? **the bar graph**
4. The main floor of the auditorium can seat 1,500 people. The balcony is used when more seats are needed. Which performances would require seating in the balcony? **Friday and Saturday performances**





e

Use the data from the graph to find the answer.



1. What type of graph is pictured? **bar graph**
2. In what year does the graph begin? **1901**
3. Write in word form the number of immigrants that came to the U.S. from 1991 to 2000. **twelve million**
4. In which years did the smallest number of immigrants come to the U.S.? **1931–1940**
5. In which years did four million immigrants come to the U.S.? **1921–1930**
6. About how many million immigrants came to the U.S. from 2001 to 2010? **13 million**

Complete the fact.

7. 24 ÷ 6 **4**
8. 56 ÷ 7 **8**
9. 27 ÷ 9 **3**
10. 50 ÷ 5 **10**
11. 21 ÷ 7 **3**
12. 45 ÷ 5 **9**
13. 32 ÷ 8 **4**
14. 42 ÷ 6 **7**
15. ?)6 = 3)? **2**
16. ?)28 = 4)? **7**
17. 9)? = 4)? **36**
18. ?)48 = 6)? **8**
19. 7)? = ?)35 **5**
20. 2)? = 9)? **18**

f

Write the value of the given digit in standard form using 925,018,703,460.

1. 8 **8,000,000**
2. 6 **60**
3. 4 **400**
4. 7 **700,000**
5. 2 **20,000,000,000**
6. 9 **900,000,000,000**

Write the digit for the given place.

149.735

7. hundredths **3**
8. hundreds **1**
9. tenths **7**
10. tens **4**

Write a comparison sentence using >, <, or =.

11. 427 **<** 487
12. 6,906 **<** 6,990
13. 0.2 **>** 0.15
14. 0.45 **<** 0.540
15. 0.75 **=** 0.750
16. 0.999 **<** 1.012

Complete the fact.

17. 63 ÷ 7 **9**
18. 24 ÷ 8 **3**
19. 42 ÷ 7 **6**
20. 18 ÷ 3 **6**

g

Solve.

1. 7.4 / +2.5 = 9.9
2. 8.2 − 3.5 = 4.7
3. 62.3 − 19.4 = 42.9
4. $127.39 / +$ 48.80 = $176.19

5. $4.50 + $3.75 **$8.25**
6. $5.00 − $2.08 **$2.92**
7. 1.327 + 2.5 **3.827**

Write the numbers from *least* to *greatest*.

8.

17	0.17	0.0017	1.7
0.0017	**0.17**	**1.7**	**17**

9.

64	6.4	0.64	0.006
0.006	**0.64**	**6.4**	**64**

10.

143.8	14.38	4.389	0.43
0.43	**4.389**	**14.38**	**143.8**

11.

8.3275	83,275	832.75	8,327.5
8.3275	**832.75**	**8,327.5**	**83,275**

12.

410.298	410,698	420,698	41.0698
41.0698	**410.298**	**410,698**	**420,698**

13.

52.01	5.201	5,201	520.1
5.201	**52.01**	**520.1**	**5,201**

Complete the fact.

14. 8)64 = ?)64 **8**
15. 9)? = 9)? **81**
16. ?)54 = 6)54 **9**
17. 6)42 = ?)42 **7**
18. 5)? = 9)? **45**
19. ?)56 = 7)56 **8**

h

Write an equation for the part-whole model. Solve. ***Process to solve may vary.***

1.

n				
25	25	25	25	

4 × 25 = n
n = 100

2.

15			
n	5	5	

15 − 10 = n
n = 5

3.

500	
125	*n*

500 − 125 = n
n = 375

Round to the greatest place to estimate the sum or difference. Solve.

4. 73,295 + 29,863 **100,000; 103,158**
5. 8,732 − 1,953 **7,000; 6,779**
6. 25.9 − 14.1 **20; 11.8**

Solve.

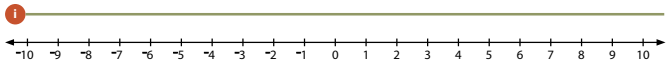
7. 14 + 8 + 6 **28**
8. 21 + 9 + 32 **62**
9. 18 + 22 + 45 **85**
10. (15 + 5) − 8 **12**
11. (4 + 16) + 105 **125**
12. 1.2 + (13 + 7) **21.2**
13. 372,541 + 895,030 = 1,267,571
14. 43,200 − 21,143 = 22,057
15. 93,457 + 23,811 = 117,268
16. 40,032 − 21,450 = 18,582

Use an addition property to complete the equation.

17. (5 + 3) + 2 = 5 + (3 + ?) **2**
18. 298 = ? + 298 **0**
19. 457 + 39 = ? + 457 **39**

Chapter 1 continued

i



Write a comparison sentence using > or <.

1. 3 > ⁻3
2. ⁻8 < 0
3. 1 < 7
4. ⁻2 < 1
5. ⁻10 < 1
6. ⁻8 > ⁻10

Use the number line to find the answer.

7. ⁻3 + ⁻1 *⁻4*
8. 4 + ⁻7 *⁻3*
9. 7 + ⁻10 *⁻3*
10. 10 + ⁻3 *7*
11. ⁻8 + 9 *1*
12. 3 + 6 *9*

Write the numbers from *least* to *greatest*.

13.

307,968	370,968	307,931	307,969

307,968 307,931 307,969 370,968

14.

24.79	2.479	247.9	2,479

2.479 24.79 247.9 2,479

Complete the fact.

15. $\begin{array}{r} 8 \\ \times\,?\,\, \\ \hline 64 \end{array}$ *8*
16. $\begin{array}{r} ?\,\, \\ \times\,6 \\ \hline 42 \end{array}$ *7*
17. $\begin{array}{r} 5 \\ \times\,4 \\ \hline ?\,\, \end{array}$ *20*
18. $9\overline{)?45}$ *5*
19. $8\overline{)4?}$ *32*
20. $?\overline{)6?0}$ *5*

DAILY 2 REVIEW

a

Use the number 281,503,764,900 to find the answer.

1. Name the greatest place. *Hundred Billions*
2. Write the value of the 5 in standard form. *500,000,000*
3. Round to the greatest place. *300,000,000,000*
4. What digit is in the Hundred Thousands place? *7*
5. What digit is in the One Billions place? *1*
6. What is the value of 6 in standard form? *60,000*

Write a comparison sentence using > or <.

7. 2.473 < 2,479
8. 34.95 > 3.495
9. 0.34 < 0.345
10. 309,276,501 < 309,276,510
11. 400,000,000,000 + 10,000,000,000 + 9,000,000,000 > forty-three billion, two hundred five thousand, six hundred twenty-seven

Round to the greatest place.

12. 832,763 *800,000*
13. 491,076,305 *500,000,000*
14. 75,860 *80,000*
15. 3.9 *4*
16. 2.15 *2*
17. 0.89 *0.9*

b

Round the addends to the greatest place to estimate the sum.

1. 27,241,560 + 31,497,301 *30,000,000 + 30,000,000 = 60,000,000*
2. 89,304 + 120,745 *90,000 + 100,000 = 190,000*
3. 39.68 + 2.09 *40 + 2 = 42*
4. 0.94 + 4.5 *0.9 + 5 = 5.9*

Add.

5. 249,683 + 504,391 *754,074*
6. 83.45 + 21.3 *104.75*
7. $1.59 + $4.83 *$6.42*
8. 94,371 + 413,820 *508,191*
9. 1.89 + 12.3 *14.19*
10. $76.13 + $123.09 *$199.22*

11. $\begin{array}{r} 346{,}143 \\ +\,204{,}129 \\ \hline 550{,}272 \end{array}$
12. $\begin{array}{r} \$75.32 \\ +\,\$25.91 \\ \hline \$101.23 \end{array}$
13. $\begin{array}{r} 2.570 \\ +\,1.039 \\ \hline 3.609 \end{array}$
14. $\begin{array}{r} 1{,}437 \\ 2{,}891 \\ +\,5{,}040 \\ \hline 9{,}368 \end{array}$

15. (3 + 4) + 20 *27*
16. 9 + (3 + 7) *19*
17. (8 + 8) + 8 *24*

c

Solve.

1. 341,720 − 190,813 *150,907*
2. 12.09 − 4.2 *7.89*
3. $25.00 − $1.45 *$23.55*
4. $\begin{array}{r} \$3.45 \\ -\,\$1.92 \\ \hline \$1.53 \end{array}$
5. $\begin{array}{r} 728{,}341 \\ -\,32{,}906 \\ \hline 695{,}435 \end{array}$
6. $\begin{array}{r} 29{,}500 \\ -\,1{,}241 \\ \hline 28{,}259 \end{array}$
7. $\begin{array}{r} 8{,}000 \\ -\,2{,}315 \\ \hline 5{,}685 \end{array}$

Solve. Write a related addition equation.

8. 12 − 8 *4* *4 + 8 = 12*
9. 15 − 9 *6* *6 + 9 = 15*
10. 13 − 7 *6* *6 + 7 = 13*
11. 14 − 7 *7* *7 + 7 = 14*
12. 32 − 12 *20* *20 + 12 = 32*
13. 100 − 98 *2* *2 + 98 = 100*
14. 50 − 25 *25* *25 + 25 = 50*
15. 75 − 50 *25* *25 + 50 = 75*

Round the numbers to the greatest place to estimate the difference.

16. 39.407 − 25.394 *40 − 30 = 10*
17. $29.54 − $19.85 *$30 − $20 = $10*

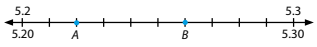
Chapter 2 continued

d

Write the value in standard form.

1. $\frac{347}{1{,}000}$ *0.347*
2. 7 + 0.3 + 0.9 *8.2*
3. (3 × 1) + (2 × 0.1) + (6 × 0.01) *3.26*
4. thirty-four hundredths *0.34*

Write the decimals represented by point *A* and point *B* on the number line.

5. 

A: 5.22; B: 5.26

Write the value of 7 in word form.

6. 734.2 *seven hundred*
7. 6.07 *seven hundredths*
8. 0.704 *seven tenths*
9. 8.917 *seven thousandths*

Write the numbers from *least* to *greatest*.

10.

107.5	1.075	10.75	0.1075

0.1075 1.075 10.75 107.5

11.

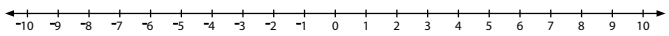
2.4	2.53	2.45	2.451

2.4 2.45 2.451 2.53

Round to the greatest place.

12. 2.45 *2*
13. 3.89 *4*
14. 28.01 *30*
15. 0.39 *0.4*

e



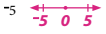
Write a comparison sentence using > or <.

1. 0 > ⁻1
2. 1 > ⁻5
3. ⁻3 < 3
4. 7 > ⁻10

Use the number line to find the sum.

5. ⁻3 + ⁻5 *⁻8*
6. 4 + ⁻7 *⁻3*
7. ⁻8 + 3 *⁻5*
8. ⁻8 + ⁻2 *⁻10*

Draw a number line to show the given number and its opposite.

9. ⁻5 

10. 3 

11. ⁻4 

Solve.

12. $\begin{array}{r} 8 \\ \times\,7 \\ \hline 56 \end{array}$
13. $\begin{array}{r} 9 \\ \times\,4 \\ \hline 36 \end{array}$
14. $\begin{array}{r} 6 \\ \times\,8 \\ \hline 48 \end{array}$
15. $\begin{array}{r} 7 \\ \times\,9 \\ \hline 63 \end{array}$
16. $\begin{array}{r} 6 \\ \times\,3 \\ \hline 18 \end{array}$
17. 9 × 8 *72*
18. 7 × 6 *42*
19. 6 × 9 *54*
20. 8 × 5 *40*

f

Use the data from the stem-and-leaf plot to find the answer.

Mrs. Barbrow's sixth-grade class practiced curl-ups for the Presidential Physical Fitness Test. Mrs. Barbrow recorded the number of curl-ups on a stem-and-leaf plot.

Number of Curl-ups per Minute

Stem	Leaf
2	9 9
3	5 6 9 9 9
4	0 1 1 1 2 3 5 5 7 8 8 8 8
5	2 5 5 7
6	0

Key: 3|5 = 35 curl-ups

1. According to the key what does 3|5 represent? *35 curl-ups*
2. What was the range, the difference between the lowest and highest number of curl-ups, that was plotted? *60 − 29 = 31*
3. How long did each student have to do the curl-ups? *1 minute*
4. Were the most curl-ups recorded in the 30s, 40s, or 50s? *40s*
5. What number of curl-ups was recorded by the most students? *48*
6. How many students completed 55 curl-ups? *2*
7. How many students completed only 32 curl-ups? *0*

g

Write a division equation for the phrase. Solve.

1. 35 pages divided among 5 students *35 ÷ 5 = 7*
2. 20 cookies given to 10 children *20 ÷ 10 = 2*
3. 32 stickers for 4 girls *32 ÷ 4 = 8*

Write the quotient.

4. $4\overline{)20}$ *5*
5. $6\overline{)36}$ *6*
6. $9\overline{)45}$ *5*
7. $7\overline{)49}$ *7*
8. $3\overline{)24}$ *8*
9. $\frac{15}{3}$ *5*
10. $\frac{18}{9}$ *2*
11. $\frac{16}{4}$ *4*
12. $\frac{21}{7}$ *3*
13. $\frac{18}{2}$ *9*

Write a related multiplication equation.

14. 18 ÷ 6 = 3 *3 × 6 = 18*
15. 28 ÷ 4 = 7 *7 × 4 = 28*
16. 81 ÷ 9 = 9 *9 × 9 = 81*
17. 72 ÷ 8 = 9 *9 × 8 = 72*

DAILY 3 REVIEW

a

Identify the parts of the multiplication equation: factor or product.

1. 435 *product*
2. 5 *factor*
3. 87 *factor*

$$\begin{array}{r} 87 \\ \times\ 5 \\ \hline 435 \end{array}$$

Use a multiplication property to complete the equation.

4. $86 \times \_\_ = 86$ *1*
5. $19 \times 3 = 3 \times \_\_$ *19*
6. $9 \times (4 \times \_\_) = (9 \times 4) \times 3$ *3*
7. $6{,}754 \times \_\_ = 6{,}754$ *1*
8. $(6 \times 2) \times 8 = 6 \times (\_\_ \times 8)$ *2*
9. $47 \times \_\_ = 0$ *0*
10. $35 \times \_\_ = 35$ *1*
11. $84 \times 13 = \_\_ \times 84$ *13*

Solve.

12.	13.	14.	15.	16.	17.	18.
547 × 315	231 × 103	854 × 671	790 × 436	2,543 × 174	984 × 617	4,328 × 754
172,305	*23,793*	*573,034*	*344,440*	*442,482*	*607,128*	*3,263,312*

b

Identify the parts of the fraction: numerator and denominator.

1. 8 *denominator*
2. 5 *numerator*

$\frac{5}{8}$

Write the missing fraction on the number line.

3. 0 to 1: $\frac{0}{6}$, *$\frac{1}{6}$*, $\frac{2}{6}$, $\frac{3}{6}$, $\frac{4}{6}$, $\frac{5}{6}$, $\frac{6}{6}$
4. 0 to 1: *$\frac{1}{2}$*

Write the fraction for the part that is colored.

5. *$\frac{2}{3}$*
6. *$\frac{1}{2}$*
7. *$\frac{11}{20}$*
8. *$\frac{4}{8}$ or $\frac{1}{2}$*

Write a comparison sentence using >, <, or =.

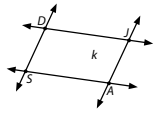
9. $\frac{8}{8} >$ *>* $\frac{2}{4}$
10. $\frac{2}{3} >$ *>* $\frac{1}{4}$
11. $\frac{5}{10} =$ *=* $\frac{1}{2}$
12. $\frac{1}{9} <$ *<* $\frac{4}{7}$
13. $\frac{3}{12} =$ *=* $\frac{1}{4}$
14. $\frac{2}{6} <$ *<* $\frac{9}{10}$
15. $\frac{1}{3} <$ *<* $\frac{1}{2}$
16. $\frac{7}{9} >$ *>* $\frac{1}{4}$

c

Identify the figure as line, line segment, or ray.

1. *line segment*
2. *ray*
3. *line*

Use plane *k* to find the answer.
Use symbols to name the lines and line segments.



4. Name 4 points on plane *k*. *D, J, A, S*
5. Name 2 lines on plane *k*. *$\overleftrightarrow{DJ}$, $\overleftrightarrow{JA}$, $\overleftrightarrow{AS}$, or $\overleftrightarrow{SD}$*

Write parallel, perpendicular, or intersecting to complete the sentence.
Use the map to find the answer.

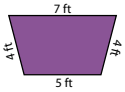
6. Carnation and Maple are __ streets. *perpendicular*
7. Dogwood and Oak are __ streets. *intersecting*
8. Maple and Oak are __ streets. *parallel*
9. Carnation and Primrose are __ streets. *parallel*
10. Primrose and Maple are __ streets. *perpendicular*

d

Write an addition equation to find the perimeter of the figure.

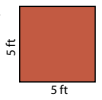
1. 

2 in. + 2 in. + 2 in. = 6 in.

2. 

7 ft + 4 ft + 5 ft + 4 ft = 20 ft

Multiply *length* × *width* to find the area of the figure.
Label the answer as square feet.

3. 

5 ft × 5 ft = 25 square feet

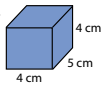
4. 

4 ft × 6 ft = 24 square feet

Find the volume of the figure by multiplying *length* × *width* × *height*.

5. 

5 cm × *3* cm × *2* cm = *30* cm³

6. 

4 cm × *5* cm × *4* cm = *80* cm³

e

Write the measurement of the line segment.

1. *4 $\frac{1}{2}$ in.*
2. *2 $\frac{1}{2}$ in.*

Complete the fact.

3. 1 ft = *12* in.
4. 1 yd = *36* in.
5. 1 yd = *3* ft
6. 1 mi = __ ft *5,280*
7. 1 mi = __ yd *1,760*

Write the equivalent measurement.

8. 2 ft *24 in.*
9. 48 in. *4 ft*
10. 9 ft *3 yd*
11. 2 yd *72 in.*

4 ft
3 yd
24 in.
72 in.

Write the unit of measurement.

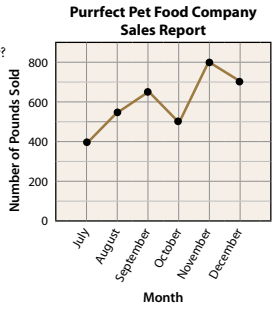
12. the height of a man *6 ft*
13. the width of a house *26 ft*
14. the length of a desk *4 ft 2 in.*
15. the width of a cell phone *2 in.*

4 ft 2 in.
2 in.
26 ft
6 ft

f

Use the data from the line graph to answer the question.

1. What data is shown on this graph? *the amount of pet food sold from July to December*
2. Which kind of pet does this company probably make food for? *cats*
3. Did sales increase or decrease from September to October? *decrease*
4. Where is the greatest increase in sales shown? *from October to November*
5. Do sales seem to be generally increasing or decreasing for this company? *increasing*
6. Which month shows the highest sales? *November*
7. Which month had the lowest sales? *July*
8. What is the range (difference between the greatest and least amount) of sales? *800 − 400 = 400 lb*



g

Use the data from the chart to find the answer.

Katy and her cousins are keeping track of the number of pages they read during the library's summer reading contest.

Pages read during the week of 7/14–7/20

Katy—1,400 pages	Lydia—800 pages
Joshua—975 pages	Jonathan—1,005 pages

1. How many more pages did Katy read than Joshua? *425 pages*
2. How many pages did the cousins read altogether? *4,180 pages*
3. What was the average number of pages read the week of July 14–20? *1,045 pages*
4. Each book that Lydia read had 200 pages. How many books did she read? *4 books*

Solve.

Tim, Dave, and John are selling tickets to the school play, *Cheaper by the Dozen*. A student ticket costs $3.75, and an adult ticket costs $5.50.

5. John sold 7 adult tickets to his neighbors. How much money should he collect? *$38.50*
6. John's neighbors gave him $50 for the tickets. How much change should John give back to them? *$11.50*
7. Dave sold 3 student tickets and 2 adult tickets. What is the total cost? *$22.25*
8. Tim sold 8 student tickets and 3 adult tickets. What is the total cost? *$46.50*

h

Solve.

1. $375 + 14 + 72 + 7$ *468*
2. $9{,}432 + 108 + 17 + 64$ *9,621*
3. $3.5 + 0.87 + 21.46$ *25.83*

4.	5.	6.	7.
6,475 + 1,328	768 + 314	43.89 + 7.21	$84.00 + $62.58
7,803	*1,082*	*51.10*	*$146.58*

8.	9.	10.	11.
907 − 368	453 − 372	102 − 84	843 − 518
539	*81*	*18*	*325*

12.	13.	14.	15.
75 × 16	843 × 37	6,452 × 108	375 × 218
1,200	*31,191*	*696,816*	*81,750*

16. $4\overline{)184}$ → *46*; −16, 24, −24, *0*
17. $42\overline{)336}$ → *8*; −336, *0*
18. $60\overline{)1{,}200}$ → *20*; −120, *00*, −0, *0*
19. $35\overline{)175}$ → *5*; −175, *0*

DAILY 4 REVIEW

a

Write factor pairs for numbers that are composite.
Write prime if there are no other factors.

1. 18 — 1 × 18; 2 × 9; 3 × 6
2. 27 — 1 × 27; 3 × 9
3. 37 — 1 × 37; prime
4. 10 — 1 × 10; 2 × 5

Write the expression in exponent form. Solve.

5. 3 × 3 × 3 × 3 — 3^4; 81
6. 7 × 7 × 7 — 7^3; 343
7. 2 × 2 × 2 × 2 × 2 — 2^5; 32
8. 4 × 4 × 4 — 4^3; 64

Solve.

9. 375 × 786 = 294,750
10. 135 × 107 = 14,445
11. 451 × 202 = 91,102
12. 784 × 601 = 471,184
13. 422 × 219 = 92,418
14. 507 × 260 = 131,820
15. 946 × 834 = 788,964
16. 5,187 × 918 = 4,761,666

b

Write the divisor that the number is divisible by.

1. 375 is divisible by 5. (2 5 10)
2. 824 is divisible by 4. (4 6 10)
3. 4,512 is divisible by 3. (3 5 9)

Use the statement to write an equation. Solve.

Mrs. Elliot has 240 toy coins.

4. Mrs. Elliot used 24 coins to decorate the party invitations. How many coins are left? 240 − 24 = 216 coins
5. Mrs. Elliot will divide the remaining coins among 12 party bags. How many coins will each guest receive? 216 ÷ 12 = 18 coins

Follow the Order of Operations to solve.

6. 18 − 2 × 3 + 7 = 19
7. 54 ÷ 6 + 2 − 7 = 4
8. (6 × 3) + 7 − 5 × 2 = 15
9. (7 × 8) − 3^3 + 5 = 34

Solve.

10. 16)128 = 8
11. 35)7,035 = 201
12. 14)350 = 25
13. 55)1,045 = 19
14. 8)2,752 = 344
15. 21)1,365 = 65

c

Use the picture to write the value of *n*.

1. $\frac{3}{n}$; n = 6
2. $\frac{1}{n}$; n = 3
3. $\frac{n}{5}$; n = 3
4. $\frac{n}{9}$; n = 5

Solve for *n*.

5. $\frac{1}{2} = \frac{n}{6}$; n = 3
6. $\frac{1}{2} = \frac{6}{n}$; n = 12
7. $\frac{1}{2} = \frac{n}{8}$; n = 4

Draw a picture for the sentence. Pictures may vary.

8. $\frac{1}{3}$ of the square is blue.
9. $\frac{4}{9}$ of the triangles are red.
10. $\frac{3}{4}$ of the circle is orange.

Write a comparison sentence using >, <, or =.

11. $\frac{4}{8} < \frac{6}{7}$
12. $\frac{3}{4} > \frac{2}{10}$
13. $\frac{3}{6} = \frac{5}{10}$
14. $\frac{1}{9} < \frac{1}{2}$
15. $\frac{7}{8} > \frac{7}{10}$
16. $\frac{6}{12} = \frac{2}{4}$

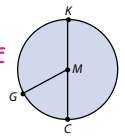
d

Write the letter of the triangle that is the right triangle.

1. B

A: 60°, 60°, 60°
B: 45°, 90°, 45°
C: 40°, 100°, 40°

Use the line segment symbol to write the answer.



2. One radius of circle *M* is ___. MG, MK, or MC
3. The diameter of circle *M* is ___. KC

Write the name of the shape.

(hexagon, octagon, pentagon, quadrilateral, triangle)

4. quadrilateral
5. pentagon
6. triangle
7. octagon
8. quadrilateral
9. hexagon

Section c

8.
9.
10.

Chapter 4 continued

e

Write the number to match the expression.

1. value of 8 is 8,000 — 347,918,256
2. 392 millions, 415 thousands, 786 ones — 392,415,786
3. six hundred seventy-eight million, four hundred fifty-one thousand, nine hundred thirty-two — 678,451,932
4. 700,000,000 + 60,000,000 + 8,000,000 + 300,000 + 20,000 + 9,000 + 100 + 50 + 4 — 768,329,154

(678,451,932 768,329,154 392,415,786 347,918,256)

Write the number to match the statement.

5. One of the Northwest Brook Falls in New York is 8 feet high. 8
6. The shark swam lazily in circles about 5 feet below the surface. −5
7. Dad was 5 strokes over par during his golf game. 5
8. New Orleans, Louisiana, is 8 feet below sea level. −8

(−8 5 −5 8)

Choose the answer.

9. What is true about the set of numbers 1, 3, 15, and 45?
   - Only 3 is a prime number.
   - All are factors of 45.
   - Both 15 and 45 are composite numbers.
   - (All of the above are true.)

10. Which is not a name for 302?
   - 300 + 2
   - (3,000 + 2)
   - three hundred two
   - three hundreds, zero tens, two ones

f

Identify the equation as the area or the perimeter of the shape. Solve.

1. 6 m, 2 m, 4 m, 3 m, 2 m, 3 m

2 m + 6 m + 4 m + 3 m + 2 m + 3 m = 20 m — perimeter

2. 32 in., 9 in.

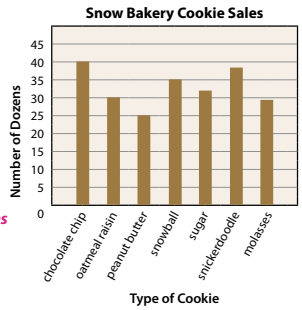
9 in. × 32 in. = 288 in.² — area

Solve.

3. 32)384 = 12
4. 25)500 = 20
5. 4)636 = 159
6. 85)7,055 = 83

g

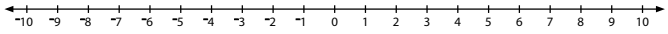
Use the data from the bar graph to find the answer.



1. Emily recorded how many cookies her bakery sold last month. Which type of cookie sold most? chocolate chip
2. Which types of cookies sold more than 35 dozen? chocolate chip and snickerdoodle
3. Write an equation that tells how many individual peanut butter cookies were sold. 25 × 12 = 300 cookies
4. How many dozen more snowball cookies were sold than peanut butter cookies? 10 dozen
5. Which type of cookie had 29 dozen sales? molasses
6. How many dozen sugar cookies were sold? 32 dozen
7. Which sold more, the oatmeal raisin cookies or the molasses cookies? oatmeal raisin
8. If 229 dozen cookies were sold, how many individual cookies were sold altogether? 229 × 12 = 2,748 cookies

h

Use the number line to solve.



1. 7 + −7 = 0
2. 1 + −3 = −2
3. 4 + −7 = −3
4. −6 + −2 = −8
5. −6 + −4 = −10
6. 8 + −3 = 5
7. −2 + 9 = 7
8. 7 + −2 = 5
9. 10 + −3 = 7

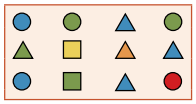
Follow the Order of Operations to solve.

10. 24 ÷ 6 + 2 − 1 = 5
11. (25 + 5) ÷ 6 − 2 = 3
12. (6 − 3)² × 7 = 63
13. 5 + 10 × 12 = 125
14. 8 + 3 + 5² = 36
15. (5 − 3)⁴ ÷ 4 = 4
16. 6 × (5 + 3) = 48
17. 48 ÷ (4 + 6 − 2) = 6
18. (25 − 15) × 7 = 70

DAILY 5 REVIEW

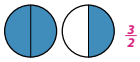
a

Write a fraction to answer the question.



1. What part of the set is triangles? $\frac{5}{12}$
2. What part of the set is circles? $\frac{5}{12}$
3. What part of the set is yellow? $\frac{1}{12}$

Write the improper fraction for the picture.

4.  $\frac{9}{4}$
5.  $\frac{3}{2}$
6.  $\frac{11}{8}$

Use the picture to find the value for *n*.

7.  $\frac{1}{2} = \frac{n}{8}$ n = 4
8.  $\frac{2}{3} = \frac{n}{12}$ n = 8
9.  $\frac{3}{4} = \frac{6}{n}$ n = 8

Rename the mixed number as an improper fraction.
Rename the improper fraction as a mixed number.

10. $3\frac{1}{4}$ $\frac{13}{4}$
11. $\frac{17}{8}$ $2\frac{1}{8}$
12. $6\frac{4}{9}$ $\frac{58}{9}$
13. $\frac{22}{4}$ $5\frac{2}{4}$

Write the fraction in lowest terms. Identify the GCF.

14. $\frac{18}{60}$ $\frac{3}{10}$; GCF = 6
15. $\frac{48}{56}$ $\frac{6}{7}$; GCF = 8
16. $\frac{6}{12}$ $\frac{1}{2}$; GCF = 6
17. $\frac{12}{16}$ $\frac{3}{4}$; GCF = 4

b

Follow the Order of Operations to solve.

1. $(6 + 4) \times 5 - 3$ 47
2. $(65 - 5) \div 5 + 4$ 16
3. $64 \div (4 \times 2)$ 8
4. $6 \times 3 + 9$ 27

Solve.

5. 7,432 + 379 = 7,811
6. 1,492 + 1,074 = 2,566
7. 75,612 + 4,987 = 80,599
8. 654,312 + 579,488 = 1,233,800
9. \$54.17 − \$ 6.75 = \$47.42
10. 674 − 329 = 345
11. 9,114 − 7,857 = 1,257
12. 45 − 16 = 29
13. 17 • 8 136
14. 65 × 32 2,080
15. 6,924 × 375 2,596,500
16. 391 × 25 9,775
17. 120 ÷ 6 20
18. 1,300 ÷ 20 65
19. 425 ÷ 17 25
20. 5,748 ÷ 12 479

c

Name the shape.

cone cylinder cube sphere

1.  cone
2.  sphere
3.  cube
4.  cylinder

Use the figures above to complete the sentence.

5. A ___ has a curved surface and 2 circular bases. cylinder
6. A ___ has 6 identical faces. cube
7. A ___ has a vertex, one circular face, and a curved surface. cone
8. A ___ has no faces, no edges, and no vertices. sphere

Solve.

9. 67 × 14 = 938
10. 5,134 × 375 = 1,925,250
11. 9,421 × 77 = 725,417
12. 16,425 × 812 = 13,337,100
13. 4,064 ÷ 16 254
14. 31,378 ÷ 541 58
15. 44,856 ÷ 712 63
16. 20,139 ÷ 21 959

d

Write the value of the 7.

1. 34.72 0.7
2. 196.347 0.007
3. 73.985 70

Solve.

4. \$16.84 + \$12.75 = \$29.59
5. \$20.00 − \$17.74 = \$2.26
6. \$42.16 × 12 = \$505.92
7. 3)\$67.38 = \$22.46
8. 9.6 + 8.4 = 18.0
9. \$35.00 − \$32.98 = \$2.02
10. 16.8 × 3 = 50.4
11. 3)9.078 = 3.026
12. 57.14 + 31.98 = 89.12
13. 16.359 − 5.142 = 11.217
14. \$5.50 × 14 = \$77.00
15. 8)\$107.92 = \$13.49
16. 16.354 + 2.039 = 18.393
17. 2.82 − 1.59 = 1.23
18. 4.009 × 27 = 108.243
19. 5)5.035 = 1.007

e

Measure the length of the pencil in inches.

1.  $3\frac{1}{2}$ in.

Complete the fact.

2. 1 ft = ___ in. 12
   1 yd = ___ in. 36
   1 mi = ___ ft 5,280
3. 1 pt = ___ c 2
   1 gal = ___ qt 4
4. 1 lb = ___ oz 16
   1 tn = ___ lb 2,000

Write the best unit of measurement.

cups feet inches miles ounces tons

5. the length of a nail inches
6. the distance across a room feet
7. the width of Texas miles
8. milk to drink with lunch cups
9. an elephant's weight tons
10. a bag of jellybeans ounces

Rename the unit of measurement.

11. 6 ft = ___ yd 2
12. 4 pt = ___ gal $\frac{1}{2}$
13. 32 oz = ___ lb 2

f

Follow the Order of Operations to solve.

1. 5×2^3 40
2. $(7 + 4) \times 3 - 8$ 25
3. $(24 - 8) \times 2 \div 4$ 8
4. $8 - 2 + 5^2$ 31

Use the Associative Property and the Commutative Property to solve. Grouping in equations will vary.

5. 4 + 7 + 2 + 6 = (4 + 6) + (7 + 2) = 19
6. 8 + 9 + 7 + 1 = (8 + 7) + (9 + 1) = 25
7. 3 + 4 + 12 + 7 = (3 + 7) + (4 + 12) = 26

Use the Distributive Property to solve.

8. 8 × 12 = 8 × (10 + 2) = 80 + 16 = 96
9. 9 × 12 = 9 × (10 + 2) = 90 + 18 = 108
10. 4 × 14 = 4 × (10 + 4) = 40 + 16 = 56

Write an equation for the part-whole model. Solve. Equations may vary.

11.

n	
754	916

754 + 916 = n
n = 1,670

12.

\$500.00	
\$250.00	n

\$500.00 − \$250.00 = n
n = \$250.00

Write a fraction to show the probability.

Jamie has a bag of 18 jellybeans. Six jellybeans are purple. She also has 3 green, 7 black, and 2 pink jellybeans.

13. What is the probability that Jamie will pull a pink jellybean out of the bag? $\frac{2}{18}$
14. What is the probability that she will pull out a purple jellybean? $\frac{6}{18}$
15. What is the probability that she will pull out a green one? $\frac{3}{18}$

DAILY 6 REVIEW

a

Solve.

1. 1,247 + 3,809 + 5,921 = 10,977
2. \$52.00 − \$39.84 = \$12.16
3. 249,731 + 860,572 = 1,110,303
4. 70,000 − 14,975 = 55,025
5. 243 × 150 = 36,450
6. \$30.75 × 24 = \$738.00
7. 24)8,424 = 351
8. 121)42,592 = 352
9. $16 - (4 \times 3) \div 2$ 10
10. $7 + (5 \times 3) + 2^3$ 30
11. $8 \times 3 - (6 \div 3)$ 22
12. $4 + 15 \div 5 - 2$ 5

Car Wash

Trucks	\$8.00
Vans	\$5.00
Cars	\$7.00

The sixth-grade class had a car wash to raise money to help a needy family. They spent \$28.79 on washing supplies. The students washed 20 trucks, 34 vans, and 19 cars. Many folks gave the family donations, which amounted to \$59.

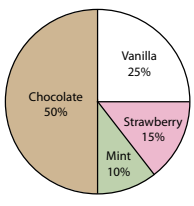
13. What was the total amount of money taken in by the students? \$522.00
14. What amount of money was left after the cost of the supplies was subtracted? \$522.00 − \$28.79 = \$493.21

b

Use the data from the circle graph to find the answer.

Mr. Sanford took a survey of 100 people to find the most popular ice-cream flavors. He put the results in a circle graph.

Popular Ice-Cream Flavors



1. What fraction of the people chose chocolate? $\frac{1}{2}$
2. What fraction of the people chose vanilla? $\frac{1}{4}$
3. What fraction of the people chose strawberry and mint? $\frac{1}{4}$
4. Does the circle graph compare continuous data or parts of a whole? parts of a whole

Chapter 6 continued

c

Write the answer.

1. Is 631 between 0 and 600 or between 600 and 1,000? *600 and 1,000*
2. Is 1,143 between 500 and 1,000 or between 1,000 and 1,500? *1,000 and 1,500*
3. Is 291,476 between 290,000 and 390,000 or between 390,000 and 490,000? *290,000 and 390,000*

Use the numbers in the box to write the answer.

3	2	⁻6	0	9
11	4	7	8	12

4. List the odd numbers. *3, 9, 11, 7*
5. List the even numbers. *2, ⁻6, 4, 8, 12*
6. List the prime numbers. *3, 2, 11, 7*
7. Write the product of 3 and 4. *12*
8. Write the sum of 4 and 7. *11*
9. Write a negative number. *⁻6*
10. Write the opposite of ⁻3. *3*
11. Write the numbers from *least* to *greatest*. *⁻6, 0, 2, 3, 4, 7, 8, 9, 11, 12*

Round the number to the greatest place.

12. 468 *500*
13. 1.9 *2*
14. 82.75 *80*
15. 184,320 *200,000*

Solve.

16. 3,746 × 25 = *93,650*
17. $18.75 × 40 = *$750.00*
18. 7,280 ÷ 20 *364*
19. 41,652 ÷ 18 *2,314*

d

Write the equivalent unit of time.

1. 1 day = __ hours *24*
2. 1 year = __ days *365*
3. 1 month = __ days *30 or 31*
4. 1 minute = __ seconds *60*
5. 1 week = __ days *7*
6. 1 year = __ weeks *52*

Use the calendar to answer the questions.

April

S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

7. On what day of the week is April 30th? *Saturday*
8. What is the date of the second Sunday? *April 10*
9. What does *Th* mean? *Thursday*
10. Is April the second month or the fourth month of the year? *fourth*

Write the equivalent unit of measurement.

11. 1 pound = __ ounces *16*
12. 1 ton = __ pounds *2,000*
13. 1 gallon = __ quarts *4*
14. 1 cup = __ ounces *8*
15. 1 quart = __ pints *2*
16. 1 pint = __ cups *2*

Complete the table.

17.

pounds	2	*3*	5	*10*
ounces	32	48	*80*	160

18.

gallons	3	*5*	7	10
quarts	12	20	*28*	*40*

e

Add or subtract. Write the answer in lowest terms.

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

f

Find the perimeter of the figure.

1. 16 ft, 2 ft, 8 ft, 6 ft, 8 ft. $P =$ __ *48 ft*
2. 10 in., 3 in., 3 in., 7 in. $P =$ __ *23 in.*
3. 4 m, 4 m, 4 m. $P =$ __ *12 m*

Write a multiplication equation to find the area of the figure.

4. 10 yd, 10 yd. $A =$ __ yd² *10 × 10 = 100 yd²*
5. 3 cm, 8 cm. $A =$ __ cm² *3 × 8 = 24 cm²*
6. 2 ft, 3 ft. $A =$ __ ft² *2 × 3 = 6 ft²*

Find the volume of the figure.

7. 7 in., 4 in., 3 in. *7* in. × *3* in. × *4* in. = *84* in.³ (*l* × *w* × *h*)
8. 2 yd, 6 yd, 2 yd. *2* yd × *2* yd × *6* yd = *24* yd³ (*l* × *w* × *h*)

Chapter 6 continued

g

Use the number line to solve.

1. 3 + ⁻5 *⁻2*
2. ⁻4 + ⁻4 *⁻8*
3. ⁻6 + 4 *⁻2*
4. ⁻7 + 7 *0*
5. ⁻4 + 0 *⁻4*

Solve. Write the answer in lowest terms.

6. $\frac{1}{2}+\frac{3}{4}=\frac{2}{4}+\frac{3}{4}=\frac{5}{4}=1\frac{1}{4}$
7. $\frac{5}{8}-\frac{2}{8}=\frac{3}{8}$
8. $\frac{2}{3}+\frac{1}{3}=\frac{3}{3}=1$
9. $\frac{5}{6}-\frac{1}{2}=\frac{5}{6}-\frac{3}{6}=\frac{2}{6}=\frac{1}{3}$
10. $\frac{4}{5}-\frac{1}{5}=\frac{3}{5}$
11. $2\frac{1}{5}=2\frac{2}{10}=1\frac{12}{10}$, $-\,1\frac{1}{2}=1\frac{5}{10}$, $\frac{7}{10}$
12. $7\frac{5}{6}=7\frac{5}{6}$, $-\,4\frac{1}{3}=4\frac{2}{6}$, $3\frac{3}{6}=3\frac{1}{2}$
13. $3\,3\frac{4}{4}$, $-\,2\frac{3}{4}$, $\frac{1}{4}$
14. $3\,4\frac{1}{3}=4\frac{1}{3}$, $-\,1\frac{2}{3}$, $2\frac{2}{3}$
15. $6\frac{3}{8}=6\frac{3}{8}=5\frac{11}{8}$, $-\,4\frac{1}{2}=4\frac{4}{8}$, $1\frac{7}{8}$

Write the product or the quotient.

16. $4.58 × 5 = *$22.90*
17. 21.9 × 31 = *678.9*
18. 1,568 × 42 = *65,856*
19. 9,476 ÷ 23 *412*
20. 21,702 ÷ 35 *620 r2*

h

Determine whether the fraction is closest to 0, $\frac{1}{2}$, or 1.

1. $\frac{1}{8}$ *0*
2. $\frac{3}{6}$ *$\frac{1}{2}$*
3. $\frac{10}{12}$ *1*
4. $\frac{5}{6}$ *1*
5. $\frac{2}{12}$ *0*
6. $\frac{7}{12}$ *$\frac{1}{2}$*

Write a comparison sentence using >, <, or =.

7. $\frac{3}{4} < \frac{5}{6}$
8. $\frac{1}{3} > \frac{1}{10}$
9. $\frac{1}{2} = \frac{4}{8}$
10. $\frac{10}{15} < \frac{9}{10}$

Solve. Write the answer in lowest terms.

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

i

Solve.

1. $147.53 + $289.49 = *$437.02*
2. 27.983 − 19.345 = *8.638*
3. 24.50 + 193.47 + 82.09 = *300.06*
4. 5.039 − 0.928 = *4.111*
5. 2.014 × 5 *10.07*
6. 81.53 × 2 *163.06*
7. 18.54 ÷ 3 *6.18*
8. 4.624 ÷ 2 *2.312*
9. 2.4 + 0.7 + 3.9 *7*
10. 12.8 + 1.09 + 0.321 *14.211*
11. 85.913 − 7.41 *78.503*
12. 3 − 2.5 *0.5*

13. Anna bought three shirts on sale for $7.89 each. The original cost of each shirt was $12.00. How much did Anna spend on the three shirts? How much money did she save? *3 × $7.89 = $23.67; 3 × $12.00 = $36.00; $36.00 − $23.67 = $12.33 saved*
14. Tyler needed 4 sections of tubing, each measuring 1.8 inches. The tube that he bought was 1 foot long. What was the total amount of tubing that he needed? How much was left over? *4 × 1.8 in. = 7.2 in.; 12 in. − 7.2 in. = 4.8 in. left*

j

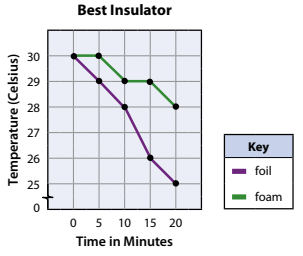
Use the data to answer the questions.

Jona wants to make an A in math. He recorded his grades on a chart. The range for an A is 90 to 100.

Week	1	2	3	4	5	6	7	8	9
Score	85	94	92	98	89				

1. What is Jona's average at Week 5? Is Jona's average in the A range? *85 + 94 + 92 + 98 + 89 = 458; 458 ÷ 5 = 91.6; yes*
2. What are Jona's lowest and highest scores? What is the difference between Jona's lowest score and his highest score? *85 and 98; 98 − 85 = 13 points*
3. List the scores from *least* to *greatest*. Circle the middle score to find the median. *85, 89, (92), 94, 98*

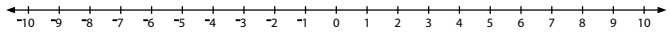
Aaron wanted to find out what material was the best insulator of hot water. He wrapped 2 plastic cups with different insulating materials and filled them with water. Then he measured the temperature of the water at different times. He recorded the results on a line graph.



4. According to the line graph, which material keeps the water hotter longer? *foam*
5. What is the title of the graph? *Best Insulator*
6. What are the labels on the graph? *Temperature (Celsius), Time in Minutes*

k

Use the number line to find the answer.



1. −3 + −2 = −5
2. −5 + 2 = −3
3. −3 + 0 = −3
4. 1 + −3 = −2
5. 0 + −8 = −8
6. −4 + −5 = −9
7. −1 + −7 = −8
8. 4 + −7 = −3

Write the numbers from *least* to *greatest*.

9. 2 −3 1 0 → −3 0 1 2
10. −7 8 0 −5 → −7 −5 0 8
11. 4 3 −4 2 → −4 2 3 4
12. 6 5 −9 −10 → −10 −9 5 6

Write a positive or negative number to match the phrase.

13. three degrees below zero −3
14. earned ten points 10
15. lost five pounds −5
16. behind six points −6
17. negative eight −8
18. seven degrees above zero 7
19. the temperature rose four degrees 4
20. ten feet below sea level −10

DAILY 7 REVIEW

a

Solve.

1. 7 + ___ = 11 → 4
2. 5 + 9 = ___ → 14
3. 16 − ___ = 8 → 8
4. 4 × 6 = ___ → 24
5. 36 ÷ 6 = ___ → 6
6. 4 + ___ = 13 → 9
7. 10 − 8 = ___ → 2
8. 15 − ___ = 6 → 9
9. 3 × ___ = 21 → 7
10. 48 ÷ 8 = ___ → 6
11. ___ + 9 = 16 → 7
12. 17 − 8 = ___ → 9
13. 12 × 6 = ___ → 72
14. 2 × 7 = ___ → 14
15. 108 ÷ 9 = ___ → 12
16. ___ + 8 = 14 → 6
17. 13 − 7 = ___ → 6
18. 6 × 8 = ___ → 48
19. 32 ÷ 4 = ___ → 8
20. 81 ÷ 9 = ___ → 9

Complete the table.

21. × 7

Input	Output
20	140
80	560
400	2,800
600	4,200
5,000	35,000

22. + 8

Input	Output
40	48
90	98
700	708
1,000	1,008
6,000	6,008

23. − 6

Input	Output
30	24
70	64
300	294
700	694
9,000	8,994

24. ÷ 3

Input	Output
60	20
90	30
300	100
2,100	700
3,600	1,200

b

Write the factors from *least* to *greatest* for each number pair. Circle the GCF.

1. 16, 24 → 16: 1, 2, 4, (8), 16; 24: 1, 2, 3, 4, 6, (8), 12, 24
2. 12, 36 → 12: 1, 2, 3, 4, 6, (12); 36: 1, 2, 3, 4, 6, 9, (12), 18, 36
3. 8, 10 → 8: 1, (2), 4, 8; 10: 1, (2), 5, 10

Write the LCM for each number pair.

4. 6, 8 → 24
5. 3, 4 → 12
6. 9, 5 → 45

Rename the fraction to its lowest terms. Rename an improper fraction as a mixed number.

7. $\frac{24}{36} = \frac{2}{3}$
8. $\frac{16}{14} = 1\frac{2}{14} = 1\frac{1}{7}$
9. $\frac{36}{45} = \frac{4}{5}$
10. $\frac{6}{12} = \frac{1}{2}$
11. $\frac{28}{16} = 1\frac{12}{16} = 1\frac{3}{4}$
12. $\frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$

Solve. Write the answer in lowest terms.

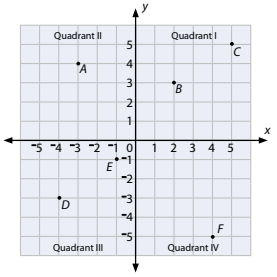
13. $\frac{2}{8} + \frac{1}{4} = \frac{1}{2}$
14. $\frac{3}{7} + \frac{5}{8} = \frac{59}{56}$ or $1\frac{3}{56}$
15. $\frac{7}{9} - \frac{5}{9} = \frac{2}{9}$
16. $\frac{2}{3} - \frac{1}{4} = \frac{5}{12}$

Answer the questions.

After the museum tour, Mrs. Jay's sixth graders could visit whichever exhibits they were most interested in. $\frac{3}{20}$ of the students went to the train history exhibit. $\frac{1}{4}$ of them went to the weapons hall. $\frac{3}{10}$ of them went to see the habitats section, $\frac{1}{5}$ went to the art gallery, and $\frac{1}{10}$ went to the dinosaur exhibit.

17. How many students were in the museum? → 20
18. Which exhibit did the most students go to see? → habitats
19. Did more students go to the art gallery or the train history exhibit? → art gallery
20. Which exhibit did 5 of the students go to see? → weapons hall

c



Name the quadrant in which the point is located.

1. A → Quadrant II
2. C → Quadrant I
3. E → Quadrant III
4. B → Quadrant I
5. D → Quadrant III
6. F → Quadrant IV

Write the coordinates for the point.

7. A → (−3, 4)
8. C → (5, 5)
9. E → (−1, −1)
10. B → (2, 3)
11. D → (−4, −3)
12. F → (4, −5)

Solve.

13. 165 × 46 → 7,590
14. 786 × 451 → 354,486
15. 953 × 412 → 392,636
16. 1,795 × 302 → 542,090
17. 21)336 → 16
18. 43)516 → 12
19. 17)553 → 32 r9
20. 94)1,598 → 17

d

Write the best unit of measure for the object.

°C cm g mL

1.  → mL
2.  → cm
3.  → °C
4.  → g

Write the best measure for the object.

1 g 2 L 1 m

5. baseball bat → 1 m
6. paper clip → 1 g

Write the measurement of the line.

7. red line: ___ cm → 8
8. green line: ___ cm → 3

Write the Celsius temperature.

9.  → 24°C
10.  → 15°C
11.  → 37°C

Solve.

12. 400 g − 200 g = 200 g
13. 97 cm − 15 cm = 82 cm
14. 543 m − 232 m = 311 m
15. 184 cm + 712 cm = 896 cm
16. 3241 m + 1536 m = 4777 m
17. 543 g + 326 g = 869 g

e

Use the numbers in the box to answer the question.

Jeremy and Holly counted the pets that live in their neighborhood. They found 8 dogs, 9 cats, 7 goldfish, 2 birds, and 4 rabbits being kept as pets.

$\frac{2}{4}$ | 8:9 | 30 to 7 | 30

1. How many pets are in their neighborhood? → 30
2. What ratio compares dogs to cats in ratio form? → 8:9
3. What ratio compares pets to goldfish in word form? → 30 to 7
4. What ratio compares birds to rabbits in fraction form? → $\frac{2}{4}$

Use the picture to write the ratio.

5. What is the ratio of purple triangles to green triangles? ___:___ → 6:6
6. What is the ratio of the red hexagon to purple triangles? ___:___ → 1:6

f

Write the fraction in decimal form.

1.  $\frac{17}{100} = 0.17$
2.  $\frac{25}{100} = 0.25$
3.  $\frac{3}{100} = 0.03$
4.  $\frac{40}{100} = 0.40$
5.  $\frac{76}{100} = 0.76$
6.  $\frac{9}{100} = 0.09$

Write the percent in fraction form. Write the fraction in lowest terms.

7. 25% = $\frac{25}{100} = \frac{1}{4}$
8. 30% = $\frac{30}{100} = \frac{3}{10}$
9. 75% = $\frac{75}{100} = \frac{3}{4}$
10. 80% = $\frac{80}{100} = \frac{4}{5}$

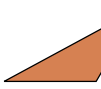
Use the numbers in the box to answer the questions. 50% 75% 100%

11. Ryan answered all the test questions correctly. What percentage grade did he receive? → 100%
12. Katie scored $\frac{1}{2}$ of the game points. What percentage of the points did she score? → 50%

DAILY 8 REVIEW

a

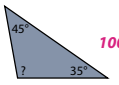
Classify the triangle according to the measure of its angles. acute obtuse right

1.  → right
2.  → acute
3.  → obtuse

Classify the triangle according to the length of its sides. equilateral isosceles scalene

4.  → equilateral
5.  → scalene
6.  → isosceles

Find the measure of the unknown angle.

7.  → 60°
8.  → 40°
9.  → 100°

b

Write the answer.

1. Estimate the product of 679 and 432. ***280,000***
2. Estimate the quotient for 2,314 divided into 30 groups. ***70 or 80***
3. What is the sum of 37,402 and 16,943? ***54,345***
4. Solve the expression: $(6 \times 10) + 3$. ***63***
5. Solve the expression: $2 + 1\frac{1}{4}$. ***$3\frac{1}{4}$***
6. What is the sum of $\frac{6}{8}$ and $\frac{5}{6}$? ***$1\frac{7}{12}$***

Solve.

7. $(7 \bullet x) + 3 = 45$ ***x = 6***
8. $\frac{1}{8}$ of 16 ***2***
9. 2.5×4 ***10 or 10.00***
10. $\frac{3}{7} = \frac{n}{28}$ ***n = 12***
11. $\frac{6}{n} = \frac{36}{54}$ ***n = 9***
12. 4.8×6 ***28.8***

c

Multiply. Use cancellation if possible. Write the answer in lowest terms. ***Cancellation steps may vary.***

1. $\frac{4}{10} \times \frac{3}{4}$ ***$\frac{3}{10}$***
2. $\frac{6}{8} \times 5$ ***$\frac{6}{8} \times \frac{5}{1} = \frac{30}{8} = 3\frac{3}{4}$***
3. $\frac{1}{2} \times \frac{2}{6}$ ***$\frac{1}{6}$***
4. $\frac{7}{8} \times 1\frac{1}{3}$ ***$\frac{7}{8} \times \frac{4}{3} = \frac{7}{2} \times \frac{1}{3} = \frac{7}{6} = 1\frac{1}{6}$***

Use the Distributive Property to solve. ***Steps used to solve may vary.***

5. $2\frac{3}{4} \times 6$
6. $4\frac{1}{4} \times 5$
7. $2\frac{1}{9} \times 4$ ***$(2 \times 4) + (\frac{1}{9} \times 4) = 8 + (\frac{1}{9} \times \frac{4}{1}) = 8\frac{4}{9}$***
8. $1\frac{2}{3} \times 3$ ***$(1 \times 3) + (\frac{2}{3} \times 3) = 3 + (\frac{2}{3} \times \frac{3}{1}) = 3 + \frac{2}{1} = 5$***

Solve. Write the answer in lowest terms.

9. A lemon stir-fry sauce recipe calls for $\frac{1}{4}$ of a cup of lemon juice and 2 tablespoons of sugar. Kevin is making stir fry for several people and needs more sauce. How much lemon juice does he need if he doubles the recipe? How much sugar? ***$\frac{1}{2}$ c of lemon juice; 4 tbsp of sugar***
10. Julie is making 5 gift baskets. She needs $2\frac{1}{2}$ yards of ribbon for each basket. How much ribbon does she need altogether? ***$5 \times 2\frac{1}{2}$ yd = $\frac{5}{1} \times \frac{5}{2}$ yd = $\frac{25}{2}$ yd = $12\frac{1}{2}$ yd***
11. Kylie ran $2\frac{1}{4}$ miles. Joshua ran $1\frac{7}{8}$ miles. How many miles did the two friends run altogether? ***$2\frac{1}{4}$ mi + $1\frac{7}{8}$ mi = $2\frac{2}{8}$ mi + $1\frac{7}{8}$ mi = $3\frac{9}{8}$ mi = $4\frac{1}{8}$ mi***

5. $(2 \times 6) + (\frac{3}{4} \times 6) = 12 + (\frac{3}{2} \times \frac{6}{1}) = 12 + \frac{9}{2} = 16\frac{1}{2}$
6. $(4 \times 5) + (\frac{1}{4} \times 5) = 20 + (\frac{1}{4} \times \frac{5}{1}) = 20 + \frac{5}{4} = 21\frac{1}{4}$

d

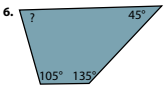
Write the name of the quadrilateral. parallelogram rectangle rhombus square trapezoid

1.  ***square***
2.  ***rhombus***
3.  ***parallelogram***
4.  ***trapezoid***

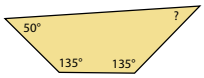
Find the measure of the unknown angle. ***Equations may vary.***

5. 

110 + 110 + 70 = 290; 360 – 290 = 70°

6. 

105 + 135 + 45 = 285; 360 – 285 = 75°

7. 

50 + 135 + 135 = 320; 360 – 320 = 40°

Write true or false.

8. The sum of the angles in any quadrilateral is 360°. ***true***
9. A rectangle is never a parallelogram. ***false***
10. A square is always a rectangle. ***true***

e

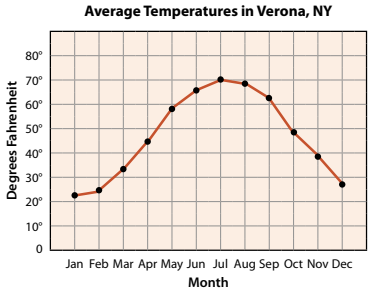
Use the data from the chart to find the answer.

Baby Mammals	
Animal	**Average Mass at Birth**
American Bison	20,000 g
Eastern Cottontail	40 g
Golden Hamster	2 g
Gray Whale	500,000 g
Leopard Seal	30,000 g
Okapi	16 kg
Porcupine	500 g
Raccoon	80 g
White-tailed Deer	3 kg

1. Which of these animals has the most mass at birth? ***gray whale***
2. Which animal has a mass of 3 kg? ***white-tailed deer***
3. What is the mass of a baby golden hamster? ***2 g***
4. What is the mass of a baby porcupine? ***500 g***
5. What is the difference in mass of a baby bison and a baby leopard seal? ***10,000 g***
6. What is the mass of a baby okapi? ***16 kg***
7. Is the mass of a gray whale *greater than* or *less than* the total mass of an American bison and a leopard seal? ***greater***
8. What is the sum of the masses of a baby porcupine, a raccoon, and a hamster? ***582 g***
9. Which animal has a mass that is half a baby raccoon's mass? ***eastern cottontail***
10. Which animal's mass is 14,000 g less than a leopard seal's? ***okapi***

f

Use the data from the line graph to find the answer.



1. What data is this graph showing? ***average temperatures for Verona, New York***
2. Which month of the year is the coldest in Verona? ***January***
3. What is the highest average temperature for the year? ***70°F***
4. Which months of the year have temperatures that are usually above 60°F? ***June, July, August, September***
5. Which month has an average temperature of 45°F? ***April***
6. Which month is colder, March or November? ***March***
7. In what three months would the average temperature be around 68°? ***June, July, and August***
8. Which months have temperatures in the 20s? ***January, February, December***
9. In which months could you possibly go ice skating outside on a nearby lake? ***January, February, December***

g

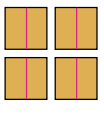
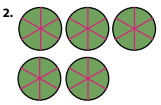
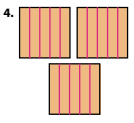
Solve.

1. $37.16 + $14.24 = ***$51.40***
2. 157.04 + 98.16 = ***255.20***
3. 784.32 + 512.75 = ***1,297.07***
4. 6.075 − 2.194 = ***3.881***
5. 23.60 − 14.28 = ***9.32***
6. 94.16 − 8.02 = ***86.14***
7. 6.75 × 4.21 = ***28.4175***
8. $31.15 × 5 = ***$155.75***
9. 58.04 × 16 = ***928.64***
10. $150.25 × 3 = ***$450.75***
11. $9.26 \div 4$ ***2.315***
12. $246.2 \div 8$ ***30.775***
13. $556.8 \div 58$ ***9.6***
14. Jonathan and Joshua together earned $68.00 mowing yards. Jonathan wants to give all of his half of the money to a mission program that buys blankets for children who do not have any. How much can he donate? ***$68 ÷ 2 = $34.00***
15. Joshua wants to give half of his money for the blankets and put the other half in his church offering. How much can he give to each? ***$34.00 ÷ 2 = $17.00***
16. Anne has saved $55.17. She wants to buy a CD that costs $14.98 and a book that costs $12.00. If she buys those items, will she have enough left to buy a $30.00 computer game? ***no; $14.98 + $12.00 = $26.98; $55.17 – 26.98 = $28.19***

DAILY 9 REVIEW

a

Partition the figures to help you find the quotient.

1.  $4 \div \frac{1}{2}$ ***8***
2.  $5 \div \frac{5}{6}$ ***6***
3.  $1 \div \frac{2}{4}$ ***2***
4.  $3 \div \frac{3}{5}$ ***5***
5.  $\frac{1}{2} \div \frac{1}{8}$ ***4***
6.  $\frac{1}{3} \div \frac{1}{6}$ ***2***
7.  $\frac{3}{4} \div \frac{3}{4}$ ***1***
8.  $2 \div \frac{1}{3}$ ***6***

Solve by multiplying by the reciprocal.

9. $\frac{3}{4} \div \frac{1}{2}$ ***$\frac{3}{4} \times \frac{2}{1} = \frac{3}{2} = 1\frac{1}{2}$***
10. $2\frac{1}{2} \div \frac{2}{3}$ ***$\frac{5}{2} \times \frac{3}{2} = \frac{15}{4} = 3\frac{3}{4}$***
11. $3\frac{1}{5} \div \frac{2}{10}$ ***$\frac{16}{5} \times \frac{10}{2} = \frac{16}{1} = 16$***
12. $10 \div 2\frac{1}{2}$ ***$\frac{10}{1} \times \frac{2}{5} = \frac{4}{1} = 4$***
13. $4\frac{1}{2} \div 1\frac{3}{4}$ ***$\frac{9}{2} \times \frac{4}{7} = \frac{18}{7} = 2\frac{4}{7}$***
14. $2\frac{1}{2} \div 1\frac{1}{4}$ ***$\frac{5}{2} \times \frac{4}{5} = \frac{2}{1} = 2$***

b

Simplify.

1. $(4 + 5) \times 3 - 2$ ***25***
2. $5^2 + 3 - 8$ ***20***
3. $(35 \div 7) \times 4 + 6$ ***26***
4. $89 - 10 + (4 \times 2)$ ***87***
5. $24 \div (6 \times 2) + 8$ ***10***
6. $8 \times (8 + 2) + 5$ ***85***

Solve.

7.

n		
25	25	25

75

8.

120		
30	30	n

60

9.

150			
25	n	50	50

25

Solve. Draw a part-whole model for the equation.

10. $12 + 12 + n = 36$ ***n = 12***

36		
12	12	n

11. $100 - 75 = n$ ***n = 25***

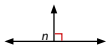
100	
75	n

12. $n - 5 = 20$ ***n = 25***

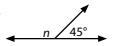
n	
5	20

13. $n \times 25 = 200$ ***n = 8***
14. $n \div 4 = 25$ ***n = 100***
15. $\frac{150}{n} = 6$ ***n = 25***

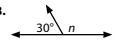
Find the measure of the unknown angle.

16. 

$n + 90° = 180°$ ***n = 90°***

17. 

$n + 45° = 180°$ ***n = 135°***

18. 

$30° + n = 180°$ ***n = 150°***

c

Write a comparison sentence using >, <, or =.

1. 0.075 < 0.75
2. 3.19 < 31.9
3. 1.7 > 0.17
4. 2.3 = 2.30

Solve.

5. 2.50 + 3.81 = 6.31
6. 1.46 + 0.79 = 2.25
7. 0.84 − 0.30 = 0.54
8. 7.95 − 2.38 = 5.57
9. 15.11 + 26.98 = 42.09
10. 2.45 + 1.79 *4.24*
11. 13.01 − 8.7 *4.31*
12. 5.08 − 0.39 *4.69*
13. $5.00 − $2.34 *$2.66*
14. $15.38 × 3 = *$46.14*
15. 2.59 × 5 = *12.95*
16. 18.401 × 2 = *36.802*
17. 0.952 × 4 = *3.808*
18. 7.01 × 6 = *42.06*

19. Kalee earned $10.00 taking care of her neighbor's puppy. She bought a top for $8.49 with the money. How much change did she receive?
$10.00 − $8.49 = $1.51

20. Kirk cut a rope into four 7.5-inch sections. He had 6 inches left over. What was the length of the original piece of rope?
(4 × 7.5) + 6 = 30 + 6 = 36 in.

d

Write an equation. Solve.

1. 6 in., 8 in., 4 in.

What is the perimeter of the box lid?
$P =$ *28* in.
(2 × 6) + (2 × 8) = 28 in.

2. 24 in., 16 in., 12 in.

What is the volume of the tank?
$V =$ ___ in.^{3}
24 × *16* × *12* = *4,608* in.^{3}
l *w* *h*

3. 24 in., 18 in.

Multiply to find the area of the cage floor.
$A =$ ___ in.^{2} *432*
24 × 18 = 432 in.²

4. Wes is preparing to take his dogs to the dog show. He has two cages for the dogs. The floor of the one cage is 20 inches by 18 inches. The floor of the other cage is 48 inches by 24 inches. The van has a 4-foot opening, and the length without the seat is 6 feet. Will both cages fit into the back of the van? *Yes, both cages will fit.*

5. The dog show is held at the Morgan Arena. The arena is 150 feet by 300 feet. The dog-agility show needs a space of 100 feet by 100 feet. Can two shows go on at the same time in the Morgan Arena? *Yes, two shows can go on at the same time.*

e

Identify the shapes as congruent or similar.

1. *congruent*
2. *similar*
3. *congruent*
4. *similar*
5. *congruent*
6. *similar*

Write the percent of the circle that is shaded.

7. *50%*
8. *25%*
9. *100%*
10. *75%*

Write certain, equally likely, or impossible to predict the probability of choosing a red counter.

11. *equally likely*
12. *impossible*
13. *certain*

f

Use the data from the pictograph to answer the questions.

Favorite Theme Parks	
Cedar Point	
Islands of Adventure	
Holiday World	
Knoebels	
Magic Mountain	

Key: = 100 people

1. What is the numerical value of ? *100*
2. What is the numerical value of ? *150*
3. How many people favor Cedar Point? *600 people*
4. Which theme park was the favorite of 300 people? *Magic Mountain*
5. Which two theme parks were favorites of the same number of people? *Holiday World and Knoebels*

Solve.

6. $124.79 + $734.36 = *$859.15*
7. $100.00 − $85.72 = *$14.28*
8. $15.25 × 8 = *$122.00*
9. 25)$200.75 = *$8.03*

g

Find the measure of the unknown angle. *Equations may vary.*

1. 40°, ?
180 − 40 = 140°
2. ?, 80°
180 − 80 = 100°
3. 115°, ?
180 − 115 = 65°
4. ?, 30°, 50°
180 − (30 + 50) = 100°
5. 125°, 30°, ?
180 − (125 + 30) = 25°
6. 70°, 50°, ?
180 − (70 + 50) = 60°
7. 110°, ?, 70°, 110°
360 − (110 + 110 + 70) = 70°
8. ?, ?
360 − (90 + 90 + 90) = 90°
9. 105°, 105°, 75°, ?
360 − (105 + 105 + 75) = 75°

DAILY 10 REVIEW

a

Use mental math to solve.

1. 34.7 ÷ 10 *3.47*
2. 67.83 ÷ 100 *0.6783*
3. 821.3 ÷ 1000 *0.8213*

Rename the denominator as a power of 10. Write the fraction as a decimal.

4. $\frac{3}{4} = \frac{75}{100}$; *0.75*
5. $\frac{1}{2} = \frac{5}{10}$; *0.5*
6. $\frac{1}{4} = \frac{25}{100}$; *0.25*
7. $\frac{1}{5} = \frac{2}{10}$; *0.2*

Solve.

8. 5)16.25 = *3.25*
9. 1.5)5.79 = *3.86*
10. 0.21)4.641 = *22.1*
11. 6)$39.54 = *$6.59*
12. $4,128.45 + $2,397.15 = *$6,525.60*
13. 395.1 × 4 = *1,580.4*
14. 158 × 25 = *3,950*
15. 2.5 − 1.860 *0.64*
16. 54.3 ÷ 6 *9.05*

b

Make a factor tree for the number.
Write the prime factorization for the number in exponent form. *Factorization may vary.*

1. 81 = 3^4; *3 • 3 • 3 • 3*
2. 56 = $2^3 \cdot 7$; *7 • 2 • 2 • 2*
3. 64 = 2^6; *2 • 2 • 2 • 2 • 2 • 2*
4. 75 = $3 \cdot 5^2$; *5 • 5 • 3*

Find the greatest common factor (GCF) by listing the factors of each number.

5. 12 and 18 *GCF: 6*
12: 1, 2, 3, 4, 6, 12
18: 1, 2, 3, 6, 9, 18
6. 21 and 35 *GCF: 7*
21: 1, 3, 7, 21
35: 1, 5, 7, 35
7. 36 and 48 *GCF: 12*
36: 1, 2, 3, 4, 6, 9, 12, 18, 36
48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

Use the Venn diagram to list the factors. Find the GCF.

8. Factors of 30 and 45
30: 2, 3, 5, 6, 10, 15
45: 3, 5, 9, 15
GCF: 15

30: 2, 6, 10, 30 — 3, 5, 15 — 45: 9, 45

9. Factors of 24 and 32
24: 2, 3, 4, 6, 8, 12
32: 2, 4, 8, 16
GCF: 8

24: 3, 6, 12, 24 — 2, 4, 8 — 32: 16, 32

Use the GCF to rename the fractions in lowest terms.

10. $\frac{12}{18} = \frac{2}{3}$
11. $\frac{21}{35} = \frac{3}{5}$
12. $\frac{36}{48} = \frac{3}{4}$
13. $\frac{30}{45} = \frac{2}{3}$
14. $\frac{24}{32} = \frac{3}{4}$

c

Use mental math to solve.

1. 3 × 40 *120*
2. 30 × 40 *1,200*
3. 300 × 40 *12,000*
4. 10 × 32.1 *321*
5. 100 × 5.76 *576*
6. 1,000 × 3.187 *3,187*
7. 217 ÷ 10 *21.7*
8. 385 ÷ 100 *3.85*
9. 85 ÷ 100 *0.85*
10. 29.7 ÷ 10 *2.97*
11. 0.835 ÷ 10 *0.0835*
12. 87.32 ÷ 100 *0.8732*

Solve.

13. 23 + 47 + 52 + 89 = *211*
14. $20.00 − $15.37 = *$4.63*
15. 137.50 + 21.83 + 0.98 = *160.31*
16. 4.50 − 0.372 = *4.128*
17. 382 × 175 = *66,850*
18. 401 × 342 = *137,142*

Solve. Round to the nearest hundredth.

19. 178 ÷ 24 *7.416 ≈ 7.42*
20. 4,065 ÷ 31 *131.129 ≈ 131.13*

Chapter 10 continued

d

Write Ones, Thousands, Millions, or Billions to name the underlined period.

1. 237,910,845 — *Millions*
2. 819,061,243,755 — *Thousands*
3. 4,603,754,103 — *Billions*
4. 1,399,057 — *Ones*

Round to the greatest place.

5. 89,371 — *90,000*
6. 1,430,995 — *1,000,000*
7. 7,510,249,631 — *8,000,000,000*
8. 349,275,670 — *300,000,000*

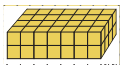
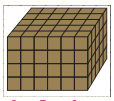
Use the numbers in the box to write the answer.

320,941,855	39,850,274	321,801,327	41,273,089

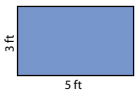
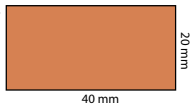
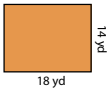
9. Write the numbers from least to greatest. *39,850,274; 41,273,089; 320,941,855; 321,801,327*
10. Which number has a 3 in the Ten Millions place? *39,850,274*
11. Which numbers have a 1 in the One Millions place? *321,801,327 and 41,273,089*
12. Which number is even? *39,850,274*
13. Which number equals 300,000,000 + 20,000,000 + 1,000,000 + 800,000 + 1,000 + 300 + 20 + 7? *321,801,327*
14. Which number equals 39 millions, 850 thousands, and 274 ones? *39,850,274*
15. Which numbers round to 300,000,000? *320,941,855 and 321,801,327*
16. Which numbers round to 40,000,000? *39,850,274 and 41,273,089*
17. Which numbers have the estimated sum of 80,000,000? *39,850,274 and 41,273,089*
18. Which number is divisible by 5? *320,941,855*

e

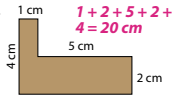
Find the volume of the figure.

1. 
   7 × *4* × *2* = ___ units³ *56*
   l × *w* × *h*
2. 
   5 × *3* × *3* = ___ units³ *45*
   l × *w* × *h*
3. 
   6 × *5* × *4* = ___ units³ *120*
   l × *w* × *h*

Write a multiplication equation to find the area of the figure.

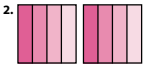
4. 
   3 × 5 = 15 ft²
5. 
   40 × 20 = 800 mm²
6. 
   18 × 14 = 252 yd²

Find the perimeter of the figure.

7. 
   3 × 4 = 12 in.
8. 
   1 + 2 + 5 + 2 + 6 + 4 = 20 cm
9. 
   10 + 12 + 3 = 25 ft

f

Solve. Shade the picture to illustrate the answer.

1. 
   $\frac{4}{6} \div \frac{1}{6}$ *4*
2. 
   $2 \div \frac{1}{4}$ *8*
3. 
   $1 \div \frac{2}{4}$ *2*

Solve. Write the answer in lowest terms. *Answer is shown using cancellation.*

4. $8 \div \frac{1}{2} \frac{8}{1} \times \frac{2}{1} = 16$
5. $2\frac{1}{9} \div 3 \frac{19}{9} \times \frac{1}{3} = \frac{19}{27}$
6. $\frac{4}{6} \div \frac{1}{3} \frac{4}{6} \times \frac{3}{1} = \frac{4}{2} = 2$
7. $\frac{6}{12} \div \frac{2}{3} \frac{6}{12} \times \frac{3}{2} = \frac{3}{4}$
8. $\frac{3}{4} \div \frac{1}{8} \frac{3}{4} \times \frac{8}{1} = \frac{6}{1} = 6$
9. $\frac{4}{5} \div \frac{1}{5} \frac{4}{5} \times \frac{5}{1} = \frac{4}{1} = 4$
10. $\frac{5}{6} \div \frac{2}{8} \frac{5}{6} \times \frac{8}{2} = \frac{20}{6} = 3\frac{2}{6} = 3\frac{1}{3}$
11. $\frac{3}{4} \div 8 \frac{3}{4} \times \frac{1}{8} = \frac{3}{32}$

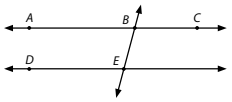
Use the chart to answer the question.

Trail Mix Recipe
3 c of cereal
$1\frac{1}{2}$ c of raisins
$2\frac{1}{4}$ c of candy

12. Noah prepared half of the trail mix recipe. How many cups of mix did he make?
    $1\frac{1}{2}$ c + $\frac{3}{4}$ c + $1\frac{1}{8}$ c = $3\frac{3}{8}$ c
    cereal raisins candy total
13. Mom doubled the trail mix recipe to take to the church fellowship. How many cups of mix did she make?
    6 c + *3* c + $4\frac{1}{2}$ c = $13\frac{1}{2}$ c
    cereal raisins candy total

g

Use the diagram to name the geometric figure.

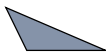


1. two collinear points *Answers may vary but may include A and C; B and E; D and E*
2. three noncollinear points *Answers may vary but may include D, B, and A; B, E, and C*
3. three lines *$\overleftrightarrow{AC}$, $\overleftrightarrow{BE}$, and $\overleftrightarrow{DE}$*
4. a point shared by two lines *E or B*
5. two different names for $\overleftrightarrow{AC}$ *$\overleftrightarrow{CA}$, $\overleftrightarrow{AB}$, $\overleftrightarrow{BC}$*

Write hexagon, octagon, pentagon, quadrilateral, or triangle to classify the polygon.

6.  *octagon*
7.  *triangle*
8.  *quadrilateral*
9.  *pentagon*
10.  *hexagon*

Write equilateral, isosceles, or scalene to classify the triangle.

11.  *scalene*
12.  *equilateral*
13.  *isosceles*

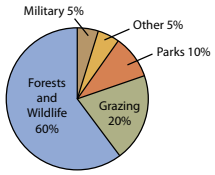
Chapter 10 continued

h

Use the data from the circle graph to answer the question.

1. What is the sum of the percents shown on this graph? *100%*
2. Which category shows the greatest percentage of land owned by the federal government? *forests and wildlife*
3. What percentage of land owned by the government is used for grazing and parks? *20% + 10% = 30%*
4. Which two categories together make up about one-fourth of federal land? *military (or other) and grazing*

Land Owned by the U.S. Government



Solve.

5. 8,374 + 6,985 + 4,876 — *20,235*
6. 45,799 + 86,964 — *132,763*
7. 900,000 − 318,974 — *581,026*
8. 60,005 − 32,057 — *27,948*

Solve. Round the decimal quotient to the nearest hundredth.

9. $84\overline{)420}$ — *5*
10. $56\overline{)1{,}975}$ — *35.267 ≈ 35.27*

DAILY 11 REVIEW

a

Write the numerical expression for the word phrase. Solve.

1. 15 take away 2 — *15 − 2 = 13*
2. 1 more than a dozen — *12 + 1 = 13*
3. the product of 4 and 5 — *4 × 5 = 20*
4. 6 to the second power — *$6^2 = 36$*
5. the sum of 14 and 16 — *14 + 16 = 30*
6. one-half of ten — *$\frac{1}{2} \times \frac{10}{1} = \frac{5}{1} = 5$*
7. seven times three — *7 × 3 = 21*
8. the difference between 3 and 8 — *8 − 3 = 5*

Write an algebraic expression for the word phrase.

9. 4 times a number — *4n*
10. $\frac{1}{2}$ of a number — *$\frac{1}{2}$n*
11. 6 less than a number — *n − 6*
12. a number divided by 10 — *n ÷ 10 or $\frac{n}{10}$*
13. 20 more than a number — *n + 20*
14. a number to the second power — *n^2*

Evaluate the expression. Let *n* = 2. Write a comparison sentence using >, <, or =.

15. 7 + 5 *>* *n* • 5
16. $\frac{18}{n}$ *<* 9 + 9
17. 3*n* *=* 4 + 2

Complete the table using the given values to evaluate the expressions.

18.

x	*x* + 3
7	*10*
11	*14*

19.

a	*a* • 4
3	*12*
6	*24*

20.

n	12 ÷ *n*
3	*4*
6	*2*

b

Solve.

1. $3.47 + $1.62 — *$5.09*
2. 45,816 + 21,437 — *67,253*
3. 86,045 + 19,057 — *105,102*
4. 832 + 659 — *1,491*
5. 371 + 422 + 870 — *1,663*
6. 419 + 27 + 132 — *578*
7. 15 + 32 + 18 + 604 — *669*
8. 38 + 44 — *82*
9. $0.78 + $2.52 + $0.07 + $1.18 — *$4.55*
10. 517,053 + 13,267 — *530,320*
11. 60,984 + 321,786 — *382,770*
12. 417,035 + 562,809 — *979,844*
13. 2.135 + 41.03 — *43.165*
14. $39.76 + $124.01 — *$163.77*
15. 0.278 + 1.93 — *2.208*
16. $2\frac{1}{2} + 1\frac{3}{4}$ — *$2\frac{2}{4} + 1\frac{3}{4} = 3\frac{5}{4} = 4\frac{1}{4}$*

c

Solve.

1. $67.48 − $17.70 — *$49.78*
2. 37,604 − 28,442 — *9,162*
3. 525,004 − 317,423 — *207,581*
4. 719,604 − 385,260 — *334,344*
5. 8,042 − 5,609 — *2,433*
6. 45,697 − 13,806 — *31,891*
7. 200,345 − 124,670 — *75,675*
8. 63,089 − 20,428 — *42,661*
9. 6,839 − 3,860 — *2,979*
10. 747,222 − 648,203 — *99,019*
11. 832,587 − 604,388 — *228,199*
12. 783,054 − 332,867 — *450,187*
13. $5.00 − $1.32 — *$3.68*
14. 14.03 − 2.5 — *11.53*
15. $6\frac{1}{8} - 3\frac{1}{2}$ — *$6\frac{1}{8} - 3\frac{4}{8} = 5\frac{9}{8} - 3\frac{4}{8} = 2\frac{5}{8}$*
16. 89 − 15.75 — *73.25*
17. 2,000 − 1,947 — *53*
18. $13 − $1.98 — *$11.02*

Chapter 11 continued

d

Write the missing number or variable. Name the property used.

1. $(5 \cdot 3) \cdot 4 = 5 \cdot (\underline{3} \cdot 4)$ *Associative Property*
2. $a + b = \underline{b} + a$ *Commutative Property*
3. $3 + 2a = 2a + \underline{3}$ *Commutative Property*

Simplify the expression.

4. $x + 5x$ *6x*
5. $x + 8 + x$ *8 + 2x*
6. $x \cdot 4 \cdot 5$ *20x*

Solve the equation using the inverse operation.

7. $a + 10 = 25$; $a =$ ___ *15*
8. $3 \cdot n = 18$; $n =$ ___ *6*
9. $12 - x = 7$; $x =$ ___ *5*
10. $\frac{x}{3} = 9$; $x =$ ___ *27*
11. $8n = 32$; $n =$ ___ *4*
12. $15 \div c = 3$; $c =$ ___ *5*

Complete the table.

13.

x	$4x$
5	*20*
7	*28*
10	*40*

14.

x	x^2
2	*4*
4	*16*
6	*36*

15.

x	$3x - 1$
3	*8*
5	*14*
7	*20*

e

Solve.

1. 324 × 12 = *3,888*
2. 450 × 312 = *140,400*
3. 12,475 × 20 = *249,500*
4. $3 \times \$1.75$ = *$5.25*
5. 835 × 15 = *12,525*
6. 513 × 142 = *72,846*
7. $15.75 × 4 = *$63.00*
8. 2.4×3.7 = *8.88*
9. 1,280 × 21 = *26,880*
10. 831 × 123 = *102,213*
11. 0.03 × 0.21 = *0.0063*
12. $8\frac{1}{2} \times 2\frac{1}{3}$ = *$19\frac{5}{6}$*
13. 238 × 34 = *8,092*
14. 452 × 171 = *77,292*
15. 2.53 × 0.04 = *0.1012*
16. $\frac{3}{5} \cdot 3 \frac{9}{5} = 1\frac{4}{5}$
17. 507 × 42 = *21,294*
18. 324 × 214 = *69,336*
19. $21.48 × 5 = *$107.40*
20. $\frac{3}{4} \cdot \frac{2}{3} \frac{6}{12} = \frac{1}{2}$

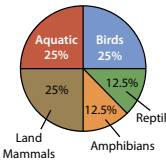
f

Use the data from the chart and the graphs to answer the questions.

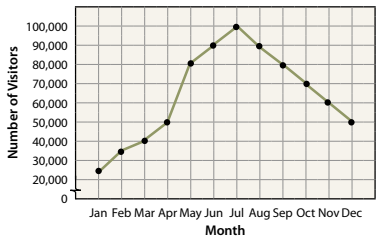
Zoo Admission

Adults	$11.00
Children 6–18 years	$8.00
Senior Citizens	$8.00
Family Yearly Pass	$50.00
Children 5 and under	Free

Zoo Exhibits



Visitors in 2011



1. Which graph shows a change in the number of visitors over time? *the Visitors in 2011 line graph*
2. Which graph tells how many people visited the zoo in 2011? *the Visitors in 2011 line graph*
3. Which graph compares parts to a whole? *the Zoo Exhibits circle graph*
4. The Zoo Exhibits circle graph represents 800 zoo animals. How many animals are land mammals? How many are reptiles? *200 land mammals; 100 reptiles*
5. Which graph gives basic information about zoo admission costs? *the Zoo Admission chart*
6. The Anderson family bought tickets to spend a day at the zoo. How much money did they spend on tickets for Mr. and Mrs. Anderson, 3 school-age boys, and Grandma Larson? *(2 × $11.00) + (4 × $8.00) = $54.00*

g

Solve. Annex zeros if needed. Round decimal answers to the nearest hundredth.

1. $8\overline{)72}$ = *9*
2. $9\overline{)54}$ = *6*
3. $7\overline{)56}$ = *8*
4. $8\overline{)64}$ = *8*
5. $6\overline{)42}$ = *7*
6. $5\overline{)60}$ = *12*
7. $21 \div 7$ = *3*
8. $32 \div 8$ = *4*
9. $81 \div 9$ = *9*
10. $50 \div 10$ = *5*
11. $49 \div 7$ = *7*
12. $36 \div 12$ = *3*
13. $7\overline{)154}$ = *22*
14. $9\overline{)8,362}$ = *929.111 ≈ 929.11*
15. $6\overline{)4,032}$ = *672*
16. $5\overline{)\$15.35}$ = *$3.07*
17. $4\overline{)4.2}$ = *1.05*
18. $21\overline{)3,407}$ = *162.238 ≈ 162.24*
19. $132\overline{)13,465}$ = *102.007 ≈ 102.01*
20. $4.1\overline{)1,484.2}$ = *362*
21. $231\overline{)23,573}$ = *102.047 ≈ 102.05*

Chapter 11 continued

h

Solve.

1. Michelle purchased a 5.07-ounce tube of oil paint for $5.10. What was the cost per ounce? (Round to the nearest cent.) *$1.01 per ounce*
2. A large bottle of soft drink holds 67.6 ounces and costs $1.39. What is the price per ounce? (Round to the nearest cent.) *$0.02 per ounce*
3. A car traveled 158.75 miles in 2.5 hours. What was the average speed in miles per hour? *63.5 mph*
4. Mrs. Patton purchased 12.5 pounds of chicken on sale. She spent $11.13. What was the cost per pound? (Round to the nearest cent.) *$0.89 per pound*

Use the prices of the books to solve.

5. Which book costs the most? *The Big Book of Brain Games*
6. Which two different books could you buy with twenty-five dollars? *The Challenge Sudoku and The Quest Word Games books; $13.98 + $9.95 = $23.93*
7. How much money would you need to purchase the puzzle and riddle book and the word game book? *$19.99 + $9.95 = $29.94*
8. What is the cost of three brain game books? *3 × $22.95 = $68.85*
9. You want to buy the brain game book and two other books. You have $50.00. Which two other books can you purchase? *The Challenge Sudoku and The Quest Word Games; $22.95 + $13.98 + $9.95 = $46.88*

DAILY 12 REVIEW

a

Evaluate the expression. Let $n = 6$.

1. $(1.3 \cdot n) - 4$ *(1.3 • 6) – 4 = 7.8 – 4 = 3.8*
2. $75 - 7n$ *75 – (7 • 6) = 75 – 42 = 33*
3. $5n \div 2$ *(5 • 6) ÷ 2 = 30 ÷ 2 = 15*

Simplify the expression.

4. $4(3x)$ *12x*
5. $7(n + 4)$ *7n + 28*
6. $8y + (3y + 4)$ *11y + 4*

Write the algebraic expression for the sentence.

7. The fence is 7 times longer than the gate. *7g*
8. Sarah ran 2 miles more than Abby. *m + 2*
9. David popped 5 balloons. *b – 5*
10. Josh is 3 years older than Aaron. *a + 3*

Solve.

11. $4a = 64$ *a = 16*
12. $k + 7 = 48$ *k = 41*
13. $\frac{x}{7} = 56$ *x = 392*
14. $b - 6.4 = 1.8$ *b = 8.2*
15. $a \div 16 = 4$ *a = 64*
16. $20r = 400$ *r = 20*

b

Complete the table.

1.

meter	millimeter
1	1000
4	*4000*
2	2000
9	*9000*

2.

gram	kilogram
1000	1
3000	3
4000	4
5000	*5*

3.

milliliter	liter
1000	1
5000	*5*
7000	7
8000	*8*

Write a comparison sentence using >, <, or =.

4. 3 m > 300 mm
5. 8000 g = 8 kg
6. 2859 mL < 4 L

Write the best unit of measurement.

7.

Capacity	
a bottle of water	
10 mL	(1 L)
a mug of cocoa	
(250 mL)	25 L
water in a bathtub	
150 mL	(150 L)

8.

Mass	
a dog	
(20 kg)	20 g
four jellybeans	
4 kg	(4 g)
a chocolate chip cookie	
1 kg	(10 g)

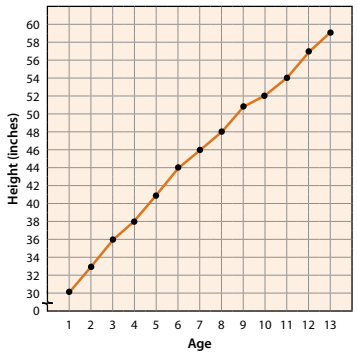
9.

Temperature	
swimming in the ocean	
(30°C)	70°C
normal body temperature	
37°C	98°C
boiling water	
0°C	(100°C)

c

Use the data from the graph to answer the questions.

Claire's Height



Mrs. West recorded Claire's height on each birthday. Claire took the measurements and put them in a graph form.

1. What kind of graph did Claire make? *a line graph*
2. Why does the line increase rather than decrease? *because Claire grew taller each year*
3. How tall was Claire at age 1? *30 in.*
4. How many inches taller was Claire at age 5 than at age 1? *41 – 30 = 11 in.*
5. Between which two years did Claire grow only 1 inch taller? *9–10*
6. How tall was Claire at age 13? *59 in.*
7. How many inches did Claire gain between ages 6 and 7? *2 in.*

Chapter 12 continued

d

Solve.

1. 4.5 × 6.7 = *30.15*
2. 7.18 × 2.9 = *20.822*
3. 442 × 71 = *31,382*
4. 975 × 48 = *46,800*
5. $5\overline{)\$23.40}$ = *\$4.68*
6. $47\overline{)5,076}$ = *108*
7. $31\overline{)7,626}$ = *246*
8. $206\overline{)5,150}$ = *25*
9. \$6,932.37 − \$5,331.97 = *\$1,600.40*
10. 20,320 − 14,410 = *5,910*
11. \$9,875 − \$5,769 = *\$4,106*
12. 469.549 − 203.895 = *265.654*
13. 38.472 + 5.391 + 2.0 = *45.863*
14. \$169.95 + \$139.49 + \$ 39.99 = *\$349.43*
15. 31,998 + 543,477 = *575,475*
16. 6,003 + 6,422 = *12,425*

DAILY 13 REVIEW

a

Equations may vary.

Find the perimeter of the figure.

1. 6 cm, 14 cm, 12 cm — *14 cm + 6 cm + 12 cm = 32 cm*
2. 3 cm, 3 cm, 5 cm, 4 cm, 4 cm, 6 cm — *3 cm + 3 cm + 5 cm + 4 cm + 4 cm + 6 cm = 25 cm*
3. 25 cm, 20 cm, 25 cm, 20 cm — *25 cm + 20 cm + 25 cm + 20 cm = 90 cm*

Find the area of the figure.

4. 9 cm, 9 cm — *9 cm × 9 cm = 81 cm²*
5. 7 cm, 16 cm — *7 cm × 16 cm = 112 cm²*
6. 3 cm, 21 cm — *3 cm × 21 cm = 63 cm²*

Find the volume of the figure.

7. 2 cm, 4 cm, 3 cm — *4 cm × 3 cm × 2 cm = 24 cm³*
8. 9 cm, 7 cm, 3 cm — *7 cm × 3 cm × 9 cm = 189 cm³*

Solve.

9. Jerry made a square raised flower bed for his mother using 20-foot boards. What is the area of the flower bed? *20 ft × 20 ft = 400 ft²*
10. Amy built a rectangular birdhouse for bluebirds. It is 13 inches high, 5.5 inches wide, and 5 inches long. What is the volume of the birdhouse? *13 in. × 5.5 in. × 5 in. = 357.5 in.³*
11. Sammy and Sally have a rectangular pool that is 6 feet long and 3 feet wide. What is its perimeter? *(2 × 6 ft) + (2 × 3 ft) = 18 ft*

b

Write a comparison sentence using >, <, or =.

1. 1.70 < 1.71
2. 0.8 = 0.80
3. 8.465 < 8.645
4. 0.051 < 0.052
5. 1.60 > 0.16
6. 0.653 < 0.66
7. 1.874 < 18.74
8. 3.09 > 3.009

Solve. *Equations may vary.*

9. What is the cost of 6 pounds of chicken if chicken is \$2.89 per pound? *6 × \$2.89 = \$17.34*
10. Kerri bought a two-cheeseburger meal including a drink and fries for \$3.79. Cheeseburgers normally cost \$0.99, and drinks are \$1.39. Fries are \$0.79. How much money did she save by buying the meal instead of buying the two burgers, the fries, and the drink separately? *(2 × \$0.99) + \$1.39 + \$0.79 = \$4.16; \$4.16 − \$3.79 = \$0.37*

Write an equation. Solve.

11. Dad used \$10.00 to purchase a drink that cost \$2.89. *\$10.00 − \$2.89 = \$7.11*
12. five tenths less than three and twenty-five hundredths *3.25 − 0.5 = 2.75*
13. thirteen hundredths more than thirteen thousandths *0.013 + 0.13 = 0.143*
14. the price of 1 can of beets when the price for five cans is \$2.00 *\$2.00 ÷ 5 = \$0.40 each*
15. Estimate the product of 57 and 236. *60 × 200 = 12,000*

c

Solve. Rename to lowest terms. *Answer is shown using cancellation.*

1. $4 \times \frac{4}{5}$ *$\frac{16}{5} = 3\frac{1}{5}$*
2. $6 \times \frac{2}{3}$ *$\frac{4}{1} = 4$*
3. $2 \times \frac{5}{12}$ *$\frac{5}{6}$*
4. $\frac{1}{4} \times \frac{2}{3}$ *$\frac{1}{6}$*
5. $\frac{3}{5} \times \frac{1}{3}$ *$\frac{1}{5}$*
6. $9 \times \frac{5}{7}$ *$\frac{45}{7} = 6\frac{3}{7}$*
7. $\frac{4}{9} \times \frac{3}{8}$ *$\frac{1}{6}$*
8. $4 \times 2\frac{5}{6}$ *$\frac{4}{1} \times \frac{17}{6} = \frac{34}{3} = 11\frac{1}{3}$*
9. $3 \times 2\frac{1}{10}$ *$\frac{63}{10} = 6\frac{3}{10}$*
10. $7 \times 1\frac{3}{10}$ *$\frac{91}{10} = 9\frac{1}{10}$*
11. $2 \div \frac{1}{6}$ *$\frac{2}{1} \times \frac{6}{1} = \frac{12}{1} = 12$*
12. $1 \div \frac{3}{12}$ *$\frac{1}{1} \times \frac{12}{3} = \frac{12}{3} = 4$*
13. $4 \div \frac{2}{3}$ *$\frac{4}{1} \times \frac{3}{2} = 6$*
14. $3 \div \frac{1}{2}$ *$\frac{3}{1} \times \frac{2}{1} = \frac{6}{1} = 6$*
15. $\frac{5}{7} \div \frac{1}{6}$ *$\frac{5}{7} \times \frac{6}{1} = \frac{30}{7} = 4\frac{2}{7}$*
16. $\frac{3}{4} \div \frac{3}{8}$ *$\frac{3}{4} \times \frac{8}{3} = 2$*
17. $\frac{8}{12} \div \frac{2}{12}$ *$\frac{8}{12} \times \frac{12}{2} = 4$*
18. $\frac{3}{8} \div \frac{1}{2}$ *$\frac{3}{8} \times \frac{2}{1} = \frac{3}{4}$*
19. $\frac{1}{4} \div \frac{3}{5}$ *$\frac{1}{4} \times \frac{5}{3} = \frac{5}{12}$*
20. $\frac{4}{6} \div 4$ *$\frac{4}{6} \times \frac{1}{4} = \frac{1}{6}$*
21. $2 \div \frac{1}{2}$ *$\frac{2}{1} \times \frac{2}{1} = 4$*

Chapter 13 continued

d

Classify the triangle according to its angles: acute, right, or obtuse.
Classify the triangle according to the length of its sides: equilateral, isosceles, or scalene.

1. *right; scalene*
2. *acute; equilateral*
3. *acute; isosceles*

Find the unknown angle. *Equations may vary.*

4. 40°, 70°, ? — *180° − (70° + 40°) = 70°*
5. 63°, ?, 117°, 63° — *360° − (63° + 63° + 117°) = 117°*
6. 136°, ?, 44°, 44° — *360° − (44° + 44° + 136°) = 136°*

Find the measure of the complementary or supplementary angle. *Equations may vary.*

7. ∠JKD = *25°* — *90° − 65° = 25°*
8. ∠TNP = *135°* — *180° − 45° = 135°*
9. ∠BAC = *50°* — *90° − 40° = 50°*

Use the circle to answer the questions.

10. Name the circle. *circle M*
11. Name the diameter. *$\overline{RT}$*
12. Name a chord that is not a diameter. *$\overline{RS}$ or $\overline{SR}$*
13. Name a radius. *$\overline{MD}$, $\overline{MT}$, or $\overline{MR}$*

e

Rename the denominator as a power of 10. Write the fraction as a decimal.

1. $\frac{3}{5}$ *$\frac{6}{10}$; 0.6*
2. $\frac{1}{4}$ *$\frac{25}{100}$; 0.25*
3. $\frac{1}{2}$ *$\frac{5}{10}$; 0.5*
4. $\frac{12}{25}$ *$\frac{48}{100}$; 0.48*

Solve. Use a bar to mark the repeating digits.

5. $3\overline{)2}$ = *0.6*
6. $6\overline{)139.50}$ = *23.25*
7. $6\overline{)550}$ = *$91.\overline{6}$*
8. $0.12\overline{)1.58}$ = *$13.1\overline{6}$*

Solve. *Equations may vary.*

9. Karen's family vacationed at the beach. The first two days the motel charged them \$89.95 each night. The rates went up to \$107.55 on Friday and Saturday nights. How much did her family spend on the motel for four nights? *(2 × \$89.95) + (2 × \$107.55) = \$395.00*
10. On Friday, Karen's family went to a fish fry on the beach. Her dad and mom bought 2 adult plates for \$7.95 each and 3 child plates for \$4.95 each. How much did her family spend on that meal? *(2 × \$7.95) + (3 × \$4.95) = \$30.75*

f

Complete the table using the given values to evaluate the expressions.

1.

b	$5b + 8$
6	*38*
12	*68*
29	*153*
45	*233*

2.

x	$\frac{x}{4} - 2$
8	*0*
24	*4*
48	*10*
64	*14*

3.

n	$6 + n^2$
4	*22*
12	*150*
16	*262*
20	*406*

Evaluate the expression. Let $m = 4$.

4. $5m - 7$ *13*
5. $(6 + 2m) - 3$ *11*
6. $3 + m + 6$ *13*
7. $\frac{m}{2} + 7$ *9*
8. $m + 7 - 6$ *5*
9. $105 - 12m$ *57*

Simplify the expression.

10. $4(8x)$ *32x*
11. $9 + (6 + 2x)$ *15 + 2x*
12. $8x + (2 + 4x)$ *12x + 2*
13. $6(n + 2)$ *6n + 12*
14. $5(4x + 3.1)$ *20x + 15.5*
15. $9b + 3b + 12b$ *24b*

g

Write the time.

1. *10:46*
2. *2:37*
3. *6:09*

Write the temperature in °F.

4. *4°F*
5. *28°F*
6. freezing point of water *32°F*
7. normal body temperature *98.6°F*
8. boiling point of water *212°F*

Complete the table.

9.

pound	ounce
1	16
4	64
7	*112*
10	*160*

10.

inch	feet
12	1
48	*4*
72	6
108	9

11.

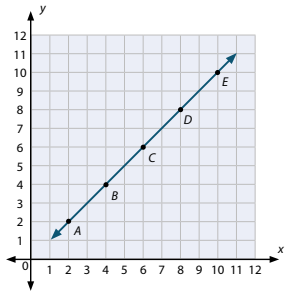
ton	pound
1	2,000
2	*4,000*
6	*12,000*
8	*16,000*

12.

yard	inch
1	36
4	*144*
6	*216*
7	*252*

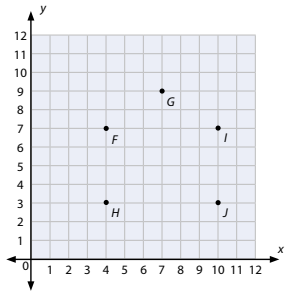
h

Write the ordered pair for the point.



1. A *(2, 2)*
2. B *(4, 4)*
3. C *(6, 6)*
4. D *(8, 8)*
5. E *(10, 10)*

Name the point on the graph represented by the ordered pair.



6. (4, 7) F
7. (7, 9) G
8. (4, 3) H
9. (10, 7) I
10. (10, 3) J

i

Solve.

1. 971 + 136 + 538 + 818 + 881 *3,344*
2. 766 + 245 + 952 + 446 + 312 *2,721*
3. 228 + 347 + 474 + 146 + 359 *1,554*
4. 873 + 721 + 979 + 619 + 648 *3,840*

5. $95{,}939 - 59{,}962 = 35{,}977$
6. $62{,}884 - 10{,}611 = 52{,}273$
7. $91{,}315 - 87{,}795 = 3{,}520$
8. $47{,}386 - 25{,}668 = 21{,}718$

9. $358 \times 711 = 254{,}538$
10. $471 \times 512 = 241{,}152$
11. $948 \times 343 = 325{,}164$
12. $324 \times 460 = 149{,}040$

Solve. Round the quotient to the nearest tenth.

13. $69\overline{)854}$ *12.37 ≈ 12.4*
14. $21\overline{)389}$ *18.52 ≈ 18.5*
15. $25\overline{)514}$ *20.56 ≈ 20.6*
16. $13\overline{)624}$ *48*

a

Write the ratio as a fraction in lowest terms.

1. 10 peppermints to 6 lemon drops $\frac{10}{6} = \frac{5}{3}$
2. 2 cups sugar to 10 cups water $\frac{2}{10} = \frac{1}{5}$
3. 8 elephants to 7 giraffes $\frac{8}{7}$
4. 54 cookies to 6 students $\frac{54}{6} = \frac{9}{1}$

Use the data from the table to write the ratio. *Ratio form may vary.*

5. cats to dogs *6:4*
6. lizards to birds $\frac{3}{12}$
7. fish to total animals *50:93*
8. dogs to hamsters *4 to 7*
9. animals with fur to animals without fur $\frac{20}{73}$
10. reptiles to fish *11:50*

Andrew's Pet Store			
cats	6	fish	50
dogs	4	hamsters	7
lizards	3	gerbils	3
turtles	8	birds	12

Complete the ratio table.

11.

cars	10	*20*	40	*80*
trucks	6	12	*24*	48

12.

students	19	*57*	95	*171*
girls	10	30	*50*	90

b

Write a comparison sentence using = or ≠.

1. $\frac{3}{5} \neq \frac{1}{3}$
2. $\frac{4}{5} = \frac{16}{20}$
3. $\frac{40}{80} \neq \frac{1}{4}$
4. $\frac{12}{27} \neq \frac{4}{7}$

Find the unit rate.

5. 15 gal of gas to drive 450 mi *30 mi/gal*
6. 135 pages read in 45 min *3 pg/min*
7. 4 lbs meat for $8.76 *$2.19/lb*
8. $84 earned in 7 hr *$12/hr*
9. 5 cans of peas for $2.00 *$0.40/can*
10. 12 pencils for $6.00 *$0.50/pencil*

Write the missing term that completes the equivalent ratio.

11. $\frac{1}{7} = \frac{n}{49}$ *n = 7*
12. $\frac{2}{7} = \frac{10}{n}$ *n = 35*
13. $\frac{36}{42} = \frac{6}{n}$ *n = 7*
14. $\frac{5}{9} = \frac{n}{36}$ *n = 20*
15. $\frac{3}{4} = \frac{18}{n}$ *n = 24*
16. $\frac{30}{16} = \frac{n}{8}$ *n = 15*

c

Write the percent in decimal form.

1. 52% *0.52*
2. 17% *0.17*
3. 19% *0.19*
4. 2% *0.02*
5. 75% *0.75*

Write the decimal in percent form.

6. 0.58 *58%*
7. 0.8 *80%*
8. 0.09 *9%*
9. 0.27 *27%*
10. 0.93 *93%*

Write the percent in fraction form in lowest terms.

11. 60% $\frac{3}{5}$
12. 20% $\frac{1}{5}$
13. 50% $\frac{1}{2}$
14. 25% $\frac{1}{4}$
15. 75% $\frac{3}{4}$

Find the percent of the number.

16. 20% of 100 *20*
17. 50% of 8 *4*
18. 50% of 90 *45*
19. 10% of 30 *3*
20. 25% of 100 *25*

d

Find the volume of a prism with the given dimensions. *Equations may vary.*

1. rectangular prism: $l = 3$ cm, $w = 2$ cm, $h = 6$ cm *3 cm • 2 cm • 6 cm = 36 cm³*
2. square prism: $s = 7$ m *(7 m)³ = 343 m³*
3. rectangular prism: $l = 7$ m, $w = 8$ m, $h = 6$ m *7 m • 8 m • 6 m = 336 m³*

Find the volume of a cylinder with the given dimensions.

4. cylinder: $r = 2$ m, $h = 7$ m *3.14 • (2 m)² • 7 m = 87.92 m³*
5. cylinder: $r = 4$ m, $h = 9$ m *3.14 • (4 m)² • 9 m = 452.16 m³*
6. cylinder: $r = 5$ m, $h = 10$ m *3.14 • (5 m)² • 10 m = 785 m³*

Solve.

7. Jason filled a rectangular planter with potting soil. His planter is 4 feet long, 2 feet wide, and 0.5 feet high. How much potting soil did it take to fill his planter? *4 ft • 2 ft • 0.5 ft = 4 ft³*
8. Sarah made a vanilla cake in a pan that is 13 inches by 9 inches by 2 inches. What is the volume of half of her pan? *13 ft • 9 ft • 2 ft = 234 in.³; $\frac{234 \text{ in.}^3}{2} = 117 \text{ in.}^3$*
9. The fish tank in Dr. Goforth's office is cube shaped with equal dimensions of 3.3 feet. What is the volume of his fish tank? *(3.3 ft)³ = 35.937 ft³*

e

Answer the questions. *Ratio form may vary.*

1. Write the ratio of blue balls to total balls. *4:18*
2. Write the ratio of red balls to total balls. *5:18*
3. Which color ball is most likely to be chosen from the bag? *green*

4. Write the ratio that tells the probability that the spinner will land on blue. *3:8*
5. Write the ratio that tells the probability that the spinner will land on green. *4:8*
6. Which color has the lowest probability that the spinner will land on it? *red*

7. Write the ratio in fraction form to show the number of white-frosted doughnuts to total doughnuts. $\frac{5}{12}$
8. Write the ratio in word form to show the number of white-frosted doughnuts to pink-frosted doughnuts. *5 to 6*
9. Write the ratio to show the number of chocolate-frosted doughnuts to white-frosted and pink-frosted doughnuts. *1:11*
10. The box of doughnuts has 5 white-frosted donuts, 6 pink-frosted doughnuts, and 1 chocolate-frosted doughnut. If someone takes one without looking, what type of doughnut will be the least likely taken? *chocolate-frosted*

f

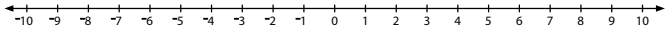
Write the numbers in order from *least* to *greatest*.

1. 4, −4, 0, 7 *−4, 0, 4, 7*
2. 8, −7, 0, −8 *−8, −7, 0, 8*
3. −7, −10, −2, 0 *−10, −7, −2, 0*
4. 0, 1, −2, −5 *−5, −2, 0, 1*

Write a comparison sentence using > or <.

5. 2 > −2
6. −3 < −2
7. −50 > −75
8. −8 < 4
9. −6 > −9
10. −12 > −16
11. 5 > 4
12. 6 < 7

Use the number line to solve.



13. −4 + −3 *−7*
14. 5 + 1 *6*
15. −3 + −6 *−9*
16. −5 + 5 *0*
17. 4 + −9 *−5*
18. 8 + −4 *4*

g

Solve.

1. Camp Silver records the number of campers that attend each year. What is the average attendance of campers for the years shown on the chart? *(200 + 350 + 400 + 425 + 450 + 473) ÷ 6 = 2,298 ÷ 6 = 383 campers*

2005	200
2006	350
2007	400
2008	425
2009	450
2010	473

2. Find the average grade for each student. Round the average to the nearest whole number.

	Test 1	Test 2	Test 3	Average
Kara	75	85	90	*83*
Jason	92	100	85	*92*
Abigail	85	95	90	*90*
Robert	100	100	97	*99*

3. Calculate Jim's average bowling score for Saturday's four games.

1	2	3	4
156	128	134	150

(156 + 128 + 134 + 150) ÷ 4 = 568 ÷ 4 = 142

4. Jessica saw 5 birds on Monday, 6 on Tuesday, 3 on Wednesday, 4 on Thursday, and 2 on Friday. What is the average number of birds she saw each day? *(5 + 6 + 3 + 4 + 2) ÷ 5 = 20 ÷ 5 = 4 birds*

5. In 2007 the Chicago Cubs won 85 baseball games. They won 97 games in 2008, 83 in 2009, and 75 in 2010. What is their average number of games won? *(85 + 97 + 83 + 75) ÷ 4 = 340 ÷ 4 = 85 games*

h

Solve. Rename in lowest terms. *Answer is shown using cancellation.*

1. $\frac{1}{3} \div \frac{1}{5} \times \frac{5}{1} = \frac{5}{3} = 1\frac{2}{3}$
2. $\frac{3}{5} \div \frac{2}{3} \times \frac{3}{2} = \frac{9}{10}$
3. $\frac{4}{8} \div \frac{1}{4} \times \frac{4}{1} = \frac{4}{2} = 2$
4. $\frac{9}{12} \div \frac{1}{6} \times \frac{6}{1} = \frac{9}{2} = 4\frac{1}{2}$
5. $\frac{3}{4} \div \frac{1}{2} \times \frac{2}{1} = \frac{3}{2} = 1\frac{1}{2}$
6. $\frac{9}{18} \div \frac{3}{6} \times \frac{6}{3} = \frac{3}{3} = 1$
7. $5\frac{1}{3} \div 2\frac{1}{6} \times \frac{6}{13} = \frac{32}{13} = 2\frac{6}{13}$
8. $9\frac{2}{4} \div 3\frac{1}{6} \times \frac{6}{19} = \frac{6}{2} = 3$
9. $2\frac{4}{7} \div \frac{3}{4} \times \frac{4}{3} = \frac{24}{7} = 3\frac{3}{7}$
10. $3\frac{3}{8} \div \frac{4}{8} \times \frac{8}{4} = \frac{27}{4} = 6\frac{3}{4}$
11. $5\frac{6}{7} \div \frac{1}{3} \times \frac{3}{1} = \frac{123}{7} = 17\frac{4}{7}$
12. $4\frac{3}{8} \div 1\frac{2}{6} \times \frac{6}{8} = \frac{105}{32} = 3\frac{9}{32}$

Solve.

13. Miss Snow teaches ice skating to beginners. Each lesson is $\frac{1}{2}$ of an hour long. How many lessons can she give in 3 hours?
$3 \div \frac{1}{2} = \frac{3}{1} \times \frac{2}{1} = \frac{6}{1} = 6$ lessons

14. David is planning to grill burgers for a cookout. He uses 1 pound of hamburger to make 4 burgers. How many burgers can he make with $4\frac{1}{2}$ pounds of meat? *$4\frac{1}{2} \times 4 = \frac{9}{2} \times \frac{4}{1} = \frac{18}{1} =$ 18 burgers*

i

Solve.

1. $9.4\overline{)0.1316}$ *0.014*
2. $5.4\overline{)3.186}$ *0.59*
3. $67\overline{)20.77}$ *0.31*
4. $1\overline{)0.05}$ *0.05*
5. $8.9\overline{)436.1}$ *49*
6. $7.5\overline{)0.375}$ *0.05*
7. $1.3\overline{)0.429}$ *0.33*
8. $27\overline{)7.83}$ *0.29*

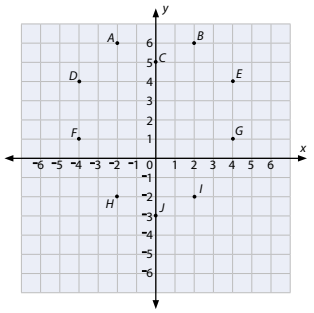
Rename the denominator as a power of 10. Write the fraction as a decimal.

9. $\frac{2}{5} = \frac{4}{10}$; *0.4*
10. $\frac{5}{25} = \frac{20}{100}$; *0.20*
11. $\frac{3}{4} = \frac{75}{100}$; *0.75*
12. $\frac{1}{2} = \frac{5}{10}$; *0.5*

Divide. Write the fraction as a decimal. Mark the repeating digits.

13. $\frac{3}{4}$ *0.75*
14. $\frac{8}{9}$ *$0.\overline{8}$*
15. $\frac{2}{3}$ *$0.\overline{6}$*
16. $\frac{1}{4}$ *0.25*

j



Name the point represented by the coordinates.

1. (2, 6) B
2. (−4, 1) F
3. (−2, −2) H
4. (4, 4) E
5. (0, 5) C

Write the coordinates for the point.

6. A *(−2, 6)*
7. D *(−4, 4)*
8. G *(4, 1)*
9. I *(2, −2)*
10. J *(0, −3)*

k

Solve.

1. $643{,}564 + 246{,}203$ *889,767*
2. $228{,}258 + 552{,}220$ *780,478*
3. $734{,}280 + 154{,}745$ *889,025*
4. $571{,}900 + 648{,}843$ *1,220,743*
5. $826{,}520 + 862{,}498$ *1,689,018*
6. $391{,}715 - 96{,}639$ *295,076*
7. $793{,}151 - 150{,}895$ *642,256*
8. $26{,}956 - 25{,}666$ *1,290*
9. $472{,}320 - 205{,}663$ *266,657*
10. $453{,}388 - 436{,}850$ *16,538*
11. 493×321 *158,253*
12. 141×998 *140,718*
13. 860×775 *666,500*
14. 106×215 *22,790*
15. 124×842 *104,408*
16. $14\overline{)994}$ *71*
17. $18\overline{)108}$ *6*
18. $21\overline{)126}$ *6*
19. $16\overline{)368}$ *23*
20. $23\overline{)920}$ *40*

DAILY 15 REVIEW

a

Write the ratio in word form, ratio form, and fraction form.

1. 1 computer for every 3 students *1 to 3, 1 : 3, $\frac{1}{3}$*
2. 2 workers for every 15 children *2 to 15, 2 : 15, $\frac{2}{15}$*
3. 4 tables for every 32 people *4 to 32, 4 : 32, $\frac{4}{32}$*
4. 6 servings for every pie *6 to 1, 6 : 1, $\frac{6}{1}$*
5. 6 cookies for every 3 lunches *6 to 3, 6 : 3, $\frac{6}{3}$*

Write the ratio as a fraction in lowest terms.

6. 2 to 8 $\frac{1}{4}$
7. 4 to 12 $\frac{1}{3}$
8. 5 to 10 $\frac{1}{2}$
9. 8 to 20 $\frac{2}{5}$
10. 10 to 100 $\frac{1}{10}$

Use equivalent ratios to find the missing term.

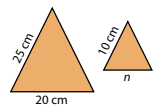
11. $\frac{4}{8} = \frac{n}{16}$ *n = 8*
12. $\frac{1}{4} = \frac{n}{100}$ *n = 25*
13. $\frac{2}{3} = \frac{4}{n}$ *n = 6*
14. $\frac{1}{5} = \frac{n}{100}$ *n = 20*

Solve.

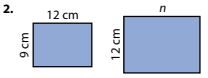
15. $249.71 + 84.09$ *333.80*
16. $\$3.75 \times 5$ *$18.75*
17. $\$20.00 - \$12.75$ *$7.25*
18. $1{,}287 \div 3$ *429*
19. $1.2 + 39.764$ *40.964*

b

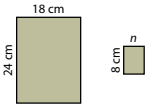
Write a proportion to find the unknown measure of the similar figure.

1. 

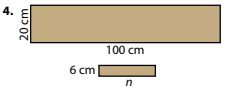
$\frac{25}{20} = \frac{10}{n}$; n = 8 cm

2. 

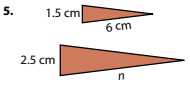
$\frac{12}{9} = \frac{n}{12}$; n = 16 cm

3. 

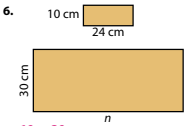
$\frac{18}{24} = \frac{n}{8}$; n = 6 cm

4. 

$\frac{20}{100} = \frac{6}{n}$; n = 30 cm

5. 

$\frac{1.5}{6} = \frac{2.5}{n}$; n = 10 cm

6. 

$\frac{10}{24} = \frac{30}{n}$; n = 72 cm

Write a proportion to solve.

7. A parking meter that is 1.5 meters tall casts a shadow of 3 meters. A light pole in the parking lot casts a shadow of 12 meters. How tall is the light pole? *$\frac{1.5}{3} = \frac{n}{12}$; n = 6 m*

8. A tree casts a shadow of 1.2 meters. A meter stick casts a shadow of 0.4 meters. What is the height of the tree? *$\frac{1}{0.4} = \frac{n}{1.2}$; n = 3 m*

c

Write the percent as a decimal and as a fraction in lowest terms.

1. 53% *0.53; $\frac{53}{100}$*
2. 8% *0.08; $\frac{2}{25}$*
3. 70% *0.70 or 0.7; $\frac{7}{10}$*

Write the ratio as a percent.

4. $\frac{8}{100}$ *8%*
5. 20 : 100 *20%*
6. 5 per 100 *5%*

Write the decimal as a percent. Annex zeros as needed.

7. 0.01 *1%*
8. 0.1 *10%*
9. 0.69 *69%*

Write the percent as a fraction with a denominator of 100 and in lowest terms.

10. 50% *$\frac{50}{100}$; $\frac{1}{2}$*
11. 6% *$\frac{6}{100}$; $\frac{3}{50}$*
12. 10% *$\frac{10}{100}$; $\frac{1}{10}$*

Solve.

As part of a class project, Daniel surveyed 40 people to find out whether they preferred basketball or baseball.

Sport	Tally	Frequency
Baseball	𝍸 𝍸 ||	12
Basketball	𝍸 𝍸 𝍸 𝍸 |||	28

13. What percent of the people preferred baseball? *30%*

d

Write the equivalent measurement.

1. 1 ft = ___ in. *12*
2. 1 mi = ___ ft *5,280*
3. 1 gal = ___ qt *4*
4. 1 tn = ___ lb *2,000*
5. 1 pt = ___ c *2*
6. 1 lb = ___ oz *16*

Rename the units.

7. 18 in. = ___ ft *1 1/2 or 1.5*
8. 12 ft = ___ yd *4*
9. 2 tn 1,280 lb = ___ lb *5,280*
10. 24 oz = ___ c *3*

Solve.

11. 1 ft 11 in. + 2 ft 16 in. = *3 ft 27 in. = 5 ft 3 in.*
12. 3 lb 12 oz − 20 oz = *2 lb 8 oz*
13. 1,760 yd + 845 yd = *2,605 yd*
14. 3 gal 1 qt − 1 gal 2 qt = *1 gal 3 qt*
15. yards in 1/2 of a mile *880 yd*
16. feet in 2/3 of a yard *2 ft*
17. inches in 1/4 of a foot *3 in.*
18. Mother used 2 1/2 pounds of hamburger to make meatloaf. How many ounces were left from the 3-pound package? *3 lb − 2 1/2 lb = 1/2 lb; 1/2 × 16 oz = 8 oz*
19. Claire placed six 18-inch pieces of ribbon across her bulletin board. How many yards of ribbon did she use? *6 × 18 in. = 108 in.; 108 in. ÷ 36 = 3 yd of ribbon*
20. Jordan cut an 8-foot board into 3 equal pieces. How many inches long were the pieces? *8 × 12 in. = 96 in.; 96 in. ÷ 3 = 32 in.*

e

Write the equivalent measurement.

1. 1 m = ___ cm *100*
2. 1 L = ___ mL *1000*
3. 1 kg = ___ g *1000*
4. 1 km = ___ m *1000*

Rename the units.

5. 3 m = ___ cm *300*
6. 7250 m = ___ km *7.250*
7. 5000 g = ___ kg *5*
8. 2 L = ___ mL *2000*

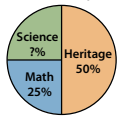
Solve.

9. 1/2 of a kilometer *500 m*
10. 1/4 of a meter *25 cm*
11. 3/4 of a liter *750 mL*
12. 2500 mL + 1500 mL = *4000 mL*
13. 3417 kg − 2750 kg = *667 kg*
14. 3 L − 2750 mL *250 mL*
15. 8341 g + 978 g *9319 g*
16. The punch recipe calls for 1 liter of orange juice, 2 liters of lemon-lime soda, 300 milliliters of lemonade concentrate, and 1.5 liters of water. How much punch does the recipe make? *4.8 L or 4800 mL of punch*
17. The nurse said Carissa's temperature was normal. What was her temperature in Celsius? *37° C*

f

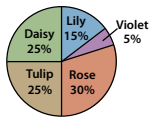
Use the data from the circle graph to find the answer.

The sixth-grade class surveyed 100 students to find their favorite subjects.



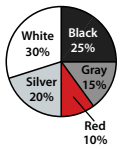
1. What percent of students surveyed liked heritage the best? *50%*
2. Of the 100 students surveyed, how many chose math? *25 students*
3. What percent of the students surveyed chose science? *25%*

Mrs. Hancock made a circle graph to show the percents of the different kinds of flowers in her garden.



4. List the kinds of flowers in order from the largest percentage to the smallest percentage. *rose, daisy/tulip, lily, violet*

The car dealership made a circle graph of the most popular car colors. They used the information to order new cars.



5. Based on the graph, what color car would the dealership order the most of? *white*
6. If they ordered 100 cars, how many cars would they order in black? *25 cars*
7. Does this graph show how many red vans to order? *no*
8. List the colors from greatest percentage to smallest percentage. *white, black, silver, gray, red*

g

Write the improper fraction as a mixed number or a whole number.

1. 4/3 *1 1/3*
2. 7/2 *3 1/2*
3. 12/4 *3*
4. 6/6 *1*
5. 9/4 *2 1/4*

Solve. Write the answer in lowest terms. *Answer is shown using cancellation.*

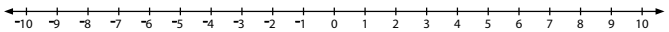
6. 2/3 + 1/3 = *3/3 = 1*
7. 4/5 = *8/10*; + 2/10 = *2/10*; *10/10 = 1*
8. 6 1/2 = *6 2/4*; − 4 1/4 = *4 1/4*; *2 1/4*
9. *4* 5 3/3 − 2 2/3 = *2 1/3*
10. 8/10 = *4/5*; − 3/15 = *1/5*; *3/5*
11. 3 × 4/5 = *12/5 = 2 2/5*
12. 1 1/2 × 2 3/6 = *3/2 × 15/6 = 15/4 = 3 3/4*
13. 4 2/8 × 3 1/5 = *34/8 × 16/5 = 68/5 = 13 3/5*
14. 3 ÷ 1/2 = *3/1 × 2/1 = 6*
15. 4 1/5 ÷ 1 1/4 = *21/5 × 4/5 = 84/25 = 3 9/25*
16. 6/8 ÷ 1/4 = *6/8 × 4/1 = 6/2 = 3*
17. Jackson filled bags with candy to give to his classmates. He filled each bag with 1/4 of a pound of candy. He had 3 pounds of candy. Would he have enough bags to give to 20 students? *3 ÷ 1/4 = 3/1 × 4/1 = 12; no*
18. Missy placed 3/4 of a yard of ribbon around a bouquet of flowers. She had 5 1/2 yards of ribbon. How many bouquets could she put ribbon around? *5 1/2 ÷ 3/4 = 11/2 × 4/3 = 22/3 = 7 1/3; 7 bouquets*

h

Solve.

1. $1,285.79 + $2,391.82 = *$3,677.61*
2. 32.105 − 15.019 = *17.086*
3. 50.12 × 3 = *150.36*
4. $150.00 − $ 79.35 = *$70.65*
5. 4 × 2.175 *8.7*
6. 3/4 × 5/6 *5/8*
7. 1,518 ÷ 6 *253*
8. 6/9 ÷ 1/3 = *6/9 × 3/1 = 6/3 = 2*
9. 3)4,560 = *1,520*
10. 25)8,175 = *327*
11. 47)16.215 = *0.345*
12. 19)116.28 = *6.12*

Use the number line to solve.



13. 3 + −1 *2*
14. −4 + −5 *−9*
15. −6 + 1 *−5*
16. −4 + 4 *0*

Solve.

17. $n + 8 = 12$ *n = 4*
18. $\frac{n}{4} = \frac{25}{100}$ *n = 1*
19. $3n = 18$ *n = 6*
20. $36 \div 9 = n$ *n = 4*

DAILY 16 REVIEW

a

Make a stem-and-leaf plot with the data. Use the data to answer the questions.

Mr. Arnold recorded the number of emergency calls that were placed over a 10-day period in March.

Calls	70	82	74	70	69	76	75	80	78	73
Day	1	2	3	4	5	6	7	8	9	10

1. What is the range of the calls? *82 − 69 = 13*
2. What is the mean? *74.7 ≈ 75*
3. What is the mode? *70*
4. What is the median? *74.5*

Emergency Calls Recorded	
stem	leaf
6	9
7	0, 0, 3, 4, 5, 6, 8
8	0, 2

Key 6|9 = 69

b

Use the picture to answer the questions.

1. What is the ratio of vegetables to tuna? *3 : 4*
2. What is the ratio of animal crackers to chips? *2 : 1*
3. What is the ratio of rice mix to animal crackers? *2 : 2*
4. What is the ratio of canned food to total food items? *7 : 12*

Write each ratio as a fraction in lowest terms.

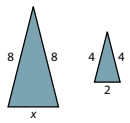
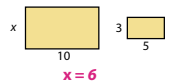
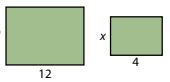
5. 6 boys to 8 girls *6/8 = 3/4*
6. 1 c brown sugar to 2 c orange juice *1/2*
7. 2 c gelatin to 5 c strawberries *2/5*
8. 3 adults to 18 children *3/18 = 1/6*
9. 15 elephants to 25 mice *15/25 = 3/5*
10. 3 piano players to 21 brass players *3/21 = 1/7*

c

Write a comparison sentence using = or ≠.

1. 1/2 = 2/4
2. 1/3 ≠ 3/7
3. 81/72 ≠ 17/26
4. 9/12 ≠ 3/5

Find the missing measurement.

5.  *x = 4*
6.  *x = 6*
7.  *x = 3*

Find the missing term that completes the equivalent ratio.

8. 3/4 = q/100 *q = 75*
9. 2/q = 4/16 *q = 8*
10. 2/3 = 6/q *q = 9*
11. 65/85 = 13/q *q = 17*
12. 84/108 = q/9 *q = 7*
13. q/56 = 6/8 *q = 42*

Chapter 16 continued

d

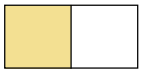
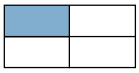
Write the fraction as a percent.

1. $\frac{1}{4}$ *25%*
2. $\frac{1}{2}$ *50%*
3. $\frac{3}{4}$ *75%*
4. $\frac{1}{5}$ *20%*

Find the percent of the number.

5. 50% of 80 *40*
6. 25% of $4.00 *$1.00*
7. 10% of $8.00 *$0.80*
8. 75% of 40 *30*

Estimate the percent shaded for the rectangle.

9.  *50%*
10.  *25%*
11.  *20%*
12.  *75%*

Write the number as a percent.

13. $\frac{50}{100}$ *50%*
14. 0.64 *64%*
15. $\frac{15}{100}$ *15%*
16. 0.09 *9%*

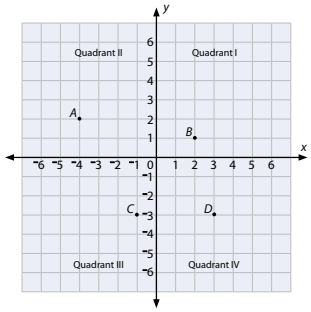
Solve.

17. John got 85% of his test correct. What percent did he miss? *15%*
18. Five out of 25 children play soccer. What percent of children play soccer? *20%*
19. Kyle earned $16.00. He wants to put 10% of it in the offering. How much money will he put in the offering? *$1.60*
20. Annie scored 25% of the game points. The total number of points was 40. How many points did she score? *10 points*

e

Write the ordered pair for the point.

1. *A* *(-4, 2)*
2. *B* *(2, 1)*
3. *C* *(-1, -3)*
4. *D* *(3, -3)*



Name the quadrant in which the point is located.

5. *A* *Quadrant II*
6. *B* *Quadrant I*
7. *C* *Quadrant III*
8. *D* *Quadrant IV*

DAILY 17 REVIEW

a

Write the answer using 647,325,689,038.

1. Write the value of the 5 in standard form. *5,000,000*
2. Write the digit in the Hundred Billions place. *6*
3. Round to the nearest one billion. *647,000,000,000*
4. Write the 3 digits in the Thousands period. *6, 8, 9*

Write a comparison sentence using >, <, or =.

5. 124 million < 1 billion
6. 21.8 > 21.09
7. twenty-one million > 9,475,389

Write the numbers from *least* to *greatest*.

8.

784,983	7,840,983	7,850,983	7,849,983
784,983	*7,840,983*	*7,849,983*	*7,850,983*

9.

3,721	3.721	372.1	37.21
3.721	*37.21*	*372.1*	*3,721*

Round the number to the greatest place.

10. 453,279 *500,000*
11. 1,982,400 *2,000,000*
12. 820,761,398 *800,000,000*
13. 4.7 *5*

Write the number in standard form.

14. five hundred thirty-two billion, one million, four hundred twenty-seven thousand, ninety-six *532,001,427,096*
15. 200,000,000 + 40,000,000 + 8,000,000 + 300,000 + 60,000 + 9,000 + 100 + 50 + 7 *248,369,157*
16. 10 billions + 427 millions + 801 thousands + 119 ones *10,427,801,119*
17. (7 × 100,000) + (4 × 10,000) + (3 × 1,000) + (9 × 100) + (5 × 10) + (2 × 1) *743,952*

b

Solve. Write the answer in lowest terms. *Answer is shown using cancellation.*

1. $\frac{5}{6} \div \frac{1}{3}$ $\frac{5}{6} \times \frac{3}{1} = \frac{5}{2} = 2\frac{1}{2}$
2. $\frac{4}{8} \div 2$ $\frac{4}{8} \times \frac{1}{2} = \frac{2}{8} = \frac{1}{4}$
3. $3\frac{1}{2} \div 1\frac{1}{4}$ $\frac{7}{2} \times \frac{4}{5} = \frac{14}{5} = 2\frac{4}{5}$
4. $\frac{6}{8} \div \frac{1}{2}$ $\frac{6}{8} \times \frac{2}{1} = \frac{6}{4} = 1\frac{1}{2}$
5. $4 \times \frac{3}{4}$ *3*
6. $\frac{3}{6} \times \frac{2}{5}$ $\frac{3}{15} = \frac{1}{5}$
7. $5\frac{1}{3} \times 2\frac{1}{4}$ $\frac{16}{3} \times \frac{9}{4} = 12$
8. $\frac{3}{5} \times \frac{4}{9}$ $\frac{4}{15}$
9. $\frac{3}{9} = \frac{1}{3}$; $+\frac{2}{3} = \frac{2}{3}$; $\frac{3}{3} = 1$
10. $6\frac{1}{2} = 6\frac{5}{10}$; $+ 2\frac{3}{5} = 2\frac{6}{10}$; $8\frac{11}{10} = 9\frac{1}{10}$
11. $9\frac{4}{5}$; $+ 2\frac{3}{5}$; $11\frac{7}{5} = 12\frac{2}{5}$
12. $8\frac{1}{5} = 8\frac{4}{20}$; $+ \frac{6}{20} = \frac{6}{20}$; $8\frac{10}{20} = 8\frac{1}{2}$
13. $\frac{9}{12}$; $-\frac{4}{12}$; $\frac{5}{12}$
14. $4\frac{7}{10} = 4\frac{7}{10}$; $- 2\frac{3}{5} = 2\frac{6}{10}$; $2\frac{1}{10}$
15. $6\ 7\frac{2}{2}$; $- 3\frac{1}{2}$; $3\frac{1}{2}$
16. $10\frac{3}{4} = 10\frac{9}{12}$; $- 5\frac{2}{3} = 5\frac{8}{12}$; $5\frac{1}{12}$

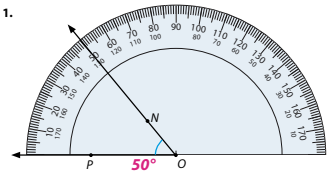
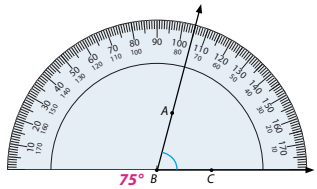
Determine whether the fraction is closest to 0, $\frac{1}{2}$, or 1.

17. $\frac{6}{10}$ $\frac{1}{2}$
18. $\frac{9}{10}$ *1*
19. $\frac{1}{10}$ *0*
20. $\frac{5}{10}$ $\frac{1}{2}$

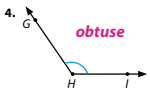
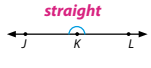
Chapter 17 continued

c

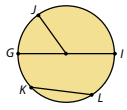
Write the measure of the angle.

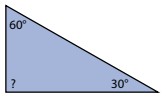
1.  *50°*
2.  *75°*

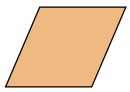
Classify the angle as acute, obtuse, right, or straight.

3.  *right*
4.  *obtuse*
5.  *acute*
6.  *straight*

Use the figure to find the answer.

7. Name the diameter.

GI or IG

8. Find the measure of the unknown angle.

90°

9. Name the shape.

parallelogram or rhombus or quadrilateral

d

Use mental math to solve.

1. 10 × 15.3 *153*
2. 100 × 0.247 *24.7*
3. 10 × 4.5 *45*
4. 100 × 23 *2,300*
5. 89.5 ÷ 10 *8.95*
6. 241.3 ÷ 100 *2.413*
7. 894 ÷ 10 *89.4*
8. 52.47 ÷ 100 *0.5247*

Solve.

9. 2.45 × 3 = *7.35*
10. 398.01 + 45.732 = *443.742*
11. 42.1 − 3.87 = *38.23*
12. 8 − 3.804 = *4.196*
13. $50\overline{)6}$ = *0.12*
14. $21\overline{)71.4}$ = *3.4*
15. $12\overline{)6.48}$ = *0.54*
16. $9\overline{)56.25}$ = *6.25*

Write the fraction as a decimal.

17. $\frac{3}{4}$ *0.75*
18. $\frac{5}{10}$ *0.5*
19. $\frac{2}{5}$ *0.4*
20. $\frac{1}{4}$ *0.25*

e

Write an algebraic expression for the word phrase.

1. seven times an unknown number *7n*
2. three more than a number *n + 3*
3. four less than five times *n* *5n − 4*
4. six more than 2 times a number *2n + 6*

Evaluate the expression if $n = 5$.

5. $3n$ *15*
6. $8 + n$ *13*
7. $\frac{15}{n}$ *3*
8. $20 - n$ *15*

Simplify the expression.

9. $a + a$ *2a*
10. $(2 + 4) + n$ *6 + n*
11. $3(4x)$ *12x*
12. $8 + y + 2$ *10 + y*

Complete the table.

13.

x	3x
2	*6*
5	*15*
7	*21*

14.

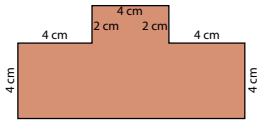
a	a^2
4	*16*
6	*36*
8	*64*

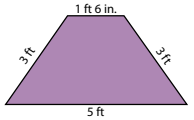
15.

n	2n + 3
7	*17*
9	*21*
10	*23*

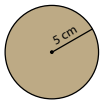
f

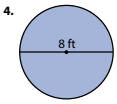
Find the perimeter of the figure. *Equations may vary.*

1. 
4 + 2 + 4 + 4 + (3 × 4) + 4 + 4 + 2 = 36 cm

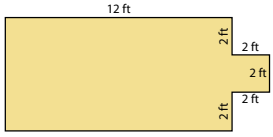
2. 
1 ft 6 in. + 3 ft + 5 ft + 3 ft = 12 ft 6 in.

Write the formula. Find the circumference of the circle.

3. 
C = 2πr
2 × 3.14 × 5 = 31.4 cm

4. 
C = πd
3.14 × 8 = 25.12 ft

Find the area of the figure.

5. 
(3 × 2 × 12) + (2 × 2) = 76 ft²

Write the formula. Find the area of the circle.

6. 
A = πr²
3.14 × (3 in.)² = 28.26 in.²

g

Find the unit rate.

1. The Laphams drove 315 miles and used 15 gallons of gas. ***21 mi/gal***
2. Marcus earned $40.00 cleaning several cars. He worked 5 hours. ***$8/hr***
3. Mrs. Bowers bought 8 pounds of bananas for $4.72. ***$0.59/lb***
4. The team traveled 1,450 miles in two days. ***725 mi/d***

Find the distance traveled in the given time.

5. 4 days at 350 mi/d ***1,400 mi***
6. 5 hours at 65 mi/hr ***325 mi***

Write a ratio. ***Ratio form may vary.***

7. 3 cans for $2.00 ***3:2***
8. 2 bags for $3.00 ***2:3***
9. one computer for every 2 students ***1:2***

Write the percent as a decimal and as a fraction in lowest terms.

10. 78% ***0.78; $\frac{39}{50}$***
11. 50% ***0.5; $\frac{1}{2}$***
12. 4% ***0.04; $\frac{1}{25}$***

Write a proportion to find an equivalent ratio. Answer the question.

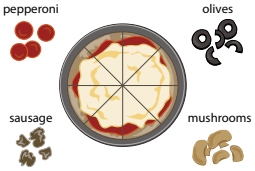
13. It takes Mrs. Snow 2 hours to grade 50 math pages. At this rate, how long would it take her to grade 100 math pages? ***$\frac{2}{50} = \frac{4}{100}$; 4 hr***
14. It takes Brian 25 minutes to complete a math page. At this rate, how long would it take him to complete 4 math pages? ***$\frac{25}{1} = \frac{100}{4}$; 100 min or 1 hr, 40 min***

h

Use the spinner to find the answer.

1. What color is the spinner most likely to land on? Write a fraction and a percent to show the probability. ***red; $\frac{4}{8}$, 50%***
2. Find the probability of the spinner landing on blue. Write a fraction and a percent. ***$\frac{3}{8}$; 37.5%***
3. Find the probability of the spinner landing on green. Write a fraction and a percent. ***$\frac{1}{8}$; 12.5%***

Answer the question.



4. What are the possible combinations for a pizza with two different toppings? ***{pm, po, ps, mo, ms, os}***
5. What is the number of possibilities? ***6***

i

Write the numbers in order from *least* to *greatest*.

1. 0 −1 −3 4 → ***−3 −1 0 4***
2. 15 0 −12 −8 → ***−12 −8 0 15***
3. −15 15 13 −12 → ***−15 −12 13 15***
4. −8 −14 8 19 → ***−14 −8 8 19***

Write a comparison sentence using >, <, or =.

5. −30 ***<*** 29
6. −21 ***<*** 0
7. 18 ***>*** −45
8. 48 ***>*** −48
9. 3 + −2 ***<*** 5
10. −2 + −5 ***<*** −4
11. −3 + 7 ***>*** −3 + 4
12. 8 − 2 ***=*** 10 + −4

Find the sum.

13. −9 + −1 ***−10***
14. −8 + 5 ***−3***
15. 7 + −4 ***3***
16. −9 + −5 ***−14***

Subtract.

17. 8 − −2 ***10***
18. −3 − 8 ***−11***
19. 9 − 15 ***−6***
20. −3 − −1 ***−2***

HANDBOOK

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Problem-Solving Plan

Read

What is the question asking you to find?

Analyze

What information is given?
- Is there enough information?
- What information is needed?

Plan

Can you write one or more equations?
If not, choose a different strategy.
- Draw a diagram or picture.
- Make a graph, list, or table.
- Use manipulatives.

Solve

Apply your plan to solve the problem.

Check

Does your answer make sense?
- What equation or strategy can you use to check your answer?
- Explain your reasoning.

Addition & Subtraction

Addends The numbers added to find the sum.

Associative Property of Addition The grouping of addends can be changed without changing the sum.
(5 + 6) + 3 = 14
5 + (6 + 3) = 14

Commutative Property of Addition The order of addends can be changed without changing the sum.
8 + 3 = 11
3 + 8 = 11

difference The answer to a subtraction problem.

fact family A group of related addition and subtraction or multiplication and division facts using the same numbers.

2	3	5

2 + 3 = 5 5 − 2 = 3
3 + 2 = 5 5 − 3 = 2

Identity Property of Addition When zero is added to an addend, the sum is the other addend.
49 + 0 = 49

minuend The number from which another number (subtrahend) is subtracted.

subtrahend The number that is subtracted from another number (minuend).

sum The answer to an addition problem.

variable A letter used to represent a number.
15 + *n* = 18
n = 3

Commutative Property
The order of addends can be changed without changing the sum.
4 + 9 = 9 + 4
a + *b* = *b* + *a*
Thinking of 9 + 4 allows me to mentally *count on* the smaller number to find the sum of 13.

Associative Property
The grouping of addends can be changed without changing the sum.
(25 + 33) + 17 = 25 + (33 + 17)
(*a* + *b*) + *c* = *a* + (*b* + *c*)
Grouping the 33 and 17 allows me to mentally make 10 in the Ones place.
25 + 50 = 75

Identity Property
When 0 is added to an addend, the sum is the other addend.
37 + 0 = 37
a + 0 = *a*
Nothing is added to 37.

Examples of Subtraction Situations

There are different kinds of real-life situations for using subtraction.

Take away—solving to find out how much is left over after some have been removed from a set
Andrew had $675.26. He gave $150.00 to a missionary. How much money does he have left?
$675.26 − $150.00 = $525.26

Comparing—solving to find out how many more (or fewer) one set has than another
Cora's camp team earned 10,364 points. Hector's team earned 7,854. How many fewer points did Hector's team have?
10,364 − 7,854 = 2,510 fewer points

Missing addend—solving to find out how many are needed
Abi has read 14 books so far. She will read a total of 50 by the end of the year to earn her new bike. How many books must she read to meet this goal?
14 + 36 = 50 books

Unknown part—solving to find the other part of a set that has been separated into parts
Coach has 75 balls in his bucket. Forty-eight of the balls are baseballs, and the rest are wiffle balls. How many wiffle balls are in the bucket?
75 − 48 = 27 wiffle balls

Missing subtrahend—solving to find out how many have been removed from a set
Eli had 875 pens to give away at the convention. There are 216 pens left. How many did he give away?
875 − 659 = 216 pens

Decimals

decimal A number expressing a part of a whole that is written with 1 or more places to the right of the decimal point. 0.15

decimal point (1) A dot that separates dollars from cents. $23.15 (2) A dot that separates the Ones place from the Tenths place. 5.7

hundredth (1) One of one hundred equal parts. (2) The place value 2 spaces to the right of the decimal point. 0.01

one thousandth (1) One of one thousand equal parts. (2) The place value 3 spaces to the right of the decimal point. 0.001

tenth (1) One of ten equal parts. (2) The place value to the right of the decimal point. 0.1

ten thousandth (1) One of ten thousand equal parts. (2) The place value 4 spaces to the right of the decimal point. 0.0001

Place Value Chart

Hundreds	Tens	Ones	Tenths	Hundredths	One Thousandths	Ten Thousandths
		4	3	5	8	6

Number Forms

Standard form	4.3586
Fraction form	$4\frac{3,586}{10,000}$
Word form	four and three thousand, five hundred eighty-six ten thousandths
Expanded form	4 + 0.3 + 0.05 + 0.008 + 0.0006
Expanded form with multiplication	(4 × 1) + (3 × 0.1) + (5 × 0.01) + (8 × 0.001) + (6 × 0.0001)

Compare Decimals

3.15	3.5	3.01	0.3

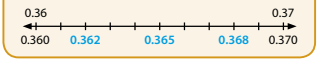
3.15
3.5 = 3.50
3.01 = 3.01
0.3 = 0.30

0.3 (least) 3.01 3.15 3.5 (greatest)

Round Decimals

Thinking of the location of a decimal on a number line can help you round the decimal.

0.362 rounds *down* to 0.36 0.368 rounds *up* to 0.37



Add & Subtract Decimals

- Align the numbers according to place value.
- Begin adding or subtracting in the place with least value and continue to the place with greatest value, renaming as needed.

4.3 + 2.9 = ?

$\begin{array}{r} {\scriptstyle 1} \\ 4.3 \\ +\ 2.9 \\ \hline 7.2 \end{array}$

4.3 − 2.9 = ?

$\begin{array}{r} {\scriptstyle 3\ 13} \\ 4.3 \\ -\ 2.9 \\ \hline 1.4 \end{array}$

15.3 + 12.75 = ?

$\begin{array}{r} {\scriptstyle 1} \\ 15.30 \\ +\ 12.75 \\ \hline 28.05 \end{array}$

15.3 − 12.75 = ?

$\begin{array}{r} {\scriptstyle 12\ 2\ 10} \\ 15.30 \\ -\ 12.75 \\ \hline 2.55 \end{array}$

Decimals continued

Multiply a Whole Number by a Decimal

2 sets of 3.46

Picture	Estimate	Add	Multiply	Distributive Property
	3 × 2 = 6	3.46 + 3.46 = 6.92	3.46 × 2 = 6.92	2 × 3.46 = 2 × (3 + 0.46) = (2 × 3) + (2 × 0.46) = 6 + 0.92 = 6.92

Multiply a Decimal by a Decimal

0.4 × 0.3 = ___ means finding 4 tenths of 3 tenths. 0.4 × 0.3 = 0.12

$\frac{4}{10} \times \frac{3}{10} = \frac{12}{100}$

0.5 × 3.46

Estimate	Multiply	Distributive Property
3 × 1 = 3	3.46 × 0.5 = 1.730	0.5 × 3.46 = 0.5 × (3 + 0.46) = (0.5 × 3) + (0.5 × 0.46) = 1.5 + 0.23 = 1.73

Read the multiplication sign as "sets of" or "of."

2.5 sets × 3.46

Estimate	Multiply	Fraction Form
3 × 3 = 9	3.46 × 2.5 = 1730 + 6920 = 8.650	$2\frac{5}{10} \times 3\frac{46}{100} = \frac{25}{10} \times \frac{346}{100} = \frac{173}{20} = 8\frac{13}{20}$ 8.65 = $8\frac{13}{20}$

Remember a decimal can be renamed as a fraction or a mixed number.

Multiply by a Power of 10

Write the digits of the decimal factor in the answer. The number of zeros in the **power of 10** or the *exponent* tells how many places to move the decimal point. Annex zeros as needed.

5.68 × 10 = 5.68	5.68 × 100 = 5.68	5.68 × 1,000 = 5.680
10 × 5.68 = 56.8	100 × 5.68 = 568	1,000 × 5.68 = 5,680
$10^1 \times 23.75$ = 10 × 23.75 = 237.5	$10^2 \times 0.956$ = 100 × 0.956 = 95.6	$10^3 \times 368.1$ = 1,000 × 368.1 = 368,100
Think 23.75	Think 0.956	Think 368.100

Divide a Decimal by a Whole Number

When **dividing decimals** by a whole number, annex zeros to continue renaming to find a more accurate answer. Decimal quotients with one or more digits that repeat endlessly are **repeating decimals**. The repeating digits are identified by the bar above them. Use the approximate symbol (≈) when writing rounded answers.

41.85 ÷ 6 = ___

Solve

$6\overline{)41.850}$ = 6.975
−36, 58, −54, 45, −42, 30, −30, 0

8 ÷ 9 = ___

$9\overline{)8.00}$ = 0.88
−72, 80, −72, 8

$8 \div 9 = 0.\overline{8}$
$8 \div 9 \approx 0.9$

20 ÷ 14 = ___

$14\overline{)20.0000}$ = 1.4285…
−14, 60, −56, 40, −28, 120, −112, 80, −70, 10

$20 \div 14 \approx 1.429$

Divide by a Decimal

Multiply decimal divisors by the power of 10 that makes the divisor a whole number. Multiply the dividend by the same power of 10.

× 10 × 10
$12.5\overline{)175.0}$

10 × 12.5 = 125 10 × 175 = 1,750

$125\overline{)1{,}750}$ = 14
−125, 500, −500, 0

175 ÷ 12.5 = 14

Divide by a Power of 10

When dividing a whole number or a decimal by a power of 10, move the decimal point one place to the left for each zero in the divisor. Annex zeros as needed.

$10\overline{)50}$ = 5 — Think 50.
50 ÷ 10 = 5

$10\overline{)41.20}$ = 4.12 — Think 50.
41.2 ÷ 10 = 4.12

$10\overline{)0.60}$ = 0.06 — Think 00.6
0.6 ÷ 10 = 0.06

375 ÷ 10 = 37.5 — Think 375.

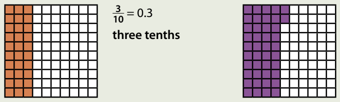
37.51 ÷ 100 = 0.3751 — Think 037.51

37.51 ÷ 1,000 = 0.03751 — Think 0037.51

Fractions as Decimals

Some fractions have an exact equivalent decimal. Other fractions result in a repeating decimal that divides endlessly. All decimals can be rounded to a given place.

If the denominator is a power of 10, the fraction names the decimal.



$\frac{3}{10} = 0.3$ three tenths

$\frac{42}{100} = 0.42$ forty-two hundredths

If the denominator is a factor of a power of 10, rename the fraction. The fraction will name the decimal.

5 is a factor of 10. $\frac{3}{5} = \frac{6}{10} = 0.6$ (× 2) six tenths

4 is a factor of 100. $\frac{3}{4} = \frac{75}{100} = 0.75$ (× 25) seventy-five hundredths

If the denominator is not a power of 10 or a factor of a power of 10, divide the numerator by the denominator. The quotient is the equivalent decimal.

$\frac{1}{6} = 1 \div 6 = 0.1\overline{6}$
$\frac{1}{6} \approx 0.17$

$6\overline{)1.000}$ = 0.166
−6, 40, −36, 40, −36, 4

$\frac{9}{23} = 9 \div 23 \approx 0.391$

$23\overline{)9.00000}$ = 0.3913…
−69, 210, −207, 30, −23, 70, −69, 10

Equations

algebraic expression A mathematical sentence which contains a variable.

equation A mathematical sentence stating that two expressions are equal.
4 × 12 = 48 7 + x = 7 + 3

expression A mathematical phrase made up of numbers, operation signs, and sometimes variables.
45 + n 27 × 6

inequality A mathematical sentence that states that two expressions are not equal.

substitution Replacing a variable with a quantity.
n = 9
15 + n n × 6
15 + 9 9 × 6

variable A letter used to represent a number.
36 ÷ x = 9
x = 4

Expressions

An **expression** is a mathematical phrase made up of numbers, operation signs, and sometimes variables. A **variable** is a letter used to represent an unknown value. An expression can be written by interpreting a word phrase.

Two added to thirty: 30 + 2 A number divided by 3: n ÷ 3

An **algebraic expression** always uses a variable. When the operation is multiplication, an algebraic expression is written using a **coefficient** (number) before the variable. A multiplication sign is *not* needed.

The product of a number and 12: 12n

12n = 12 × n
12 is the coefficient of the variable *n*.

Simplify Expressions

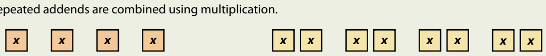
Simplify expressions by combining **like terms**. The Commutative and Associative Properties of Addition or Multiplication allow you to rewrite the expression to organize the *like terms*.

Commutative Property: Change the order of addends.
Associative Property: Group like terms.

n + 6 + n =
n + n + 6 =
2n + 6

4 + x + 3 =
x + 4 + 3 =
x + 7

Repeated addends are combined using multiplication.

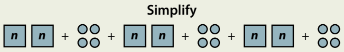


x + x + x + x =
4x

2x + 2x + 2x + 2x =
4(2x) =
8x

The Distributive Property of Multiplication over Addition can also be used to simplify expressions. Or it can be used to find an equivalent expression by finding a common factor in the terms of the equation.

Simplify



3(2n + 4) = There are 3 sets of each addend.
3(2n) + 3(4) = Multiply each addend by the multiplier, 3.
6n + 12 Write the simplified expression.

Equivalent Expression

9 + 15b

3 is a common factor of 9 and 15.

9 + 15b = 3(3 + 5b)

Addition & Subtraction Equations

An equation with a variable is solved by finding the value of the variable. The value must make the sentence true to be called a **solution**.

Solve

Isolate the variable on one side of the equal sign by using the **inverse operation**. Keep the equation **balanced** by performing the exact same operation on both sides of the equation.

Check

Substitute (replace) the variable with the solution and evaluate.

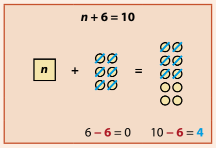
n + 6 = 10
n + 6 − 6 = 10 − 6
n = 4
4 + 6 = 10

Isolate the variable using the inverse operation.

Check using substitution.

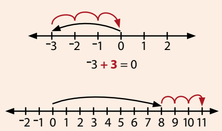
n − 3 = 8
n − 3 + 3 = 8 + 3
n = 11
11 − 3 = 8

The equation mat shows the result of subtracting 6 from both sides of the equation.



n + 6 = 10
6 − 6 = 0 10 − 6 = 4

The number lines show the result of adding 3 to both sides of the equation.



⁻3 + 3 = 0
8 + 3 = 11

Multiplication & Division Equations

Multiplication and division are inverse operations.

36 ÷ 4 × 4 = 36 8 • 2 ÷ 2 = 8

$\frac{36}{4} \times 4 = 36$ $\frac{8 \cdot 2}{2} = 8$

Isolate the variable on one side of the equal sign using the inverse operation. An equation is much like a balanced scale: when you perform an operation on the left side of the equation, you must perform the exact same operation on the right side of the equation.

The inverse of multiplying by 5 is dividing by 5.

5x = 35
$\frac{5x}{5} = \frac{35}{5}$
x = 7
5 • 7 = 35

The inverse of dividing by 8 is multiplying by 8.

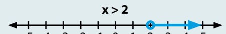
n ÷ 8 = 4
$\frac{n}{8} \cdot 8 = 4 \cdot 8$
n = 32
$\frac{32}{8} = 4$

Inequality

An **inequality** is a mathematical sentence in which two expressions are not equal. The *greater than* (>) and *less than* (<) symbols can be used to express the inequality. A number line shows all solutions for the inequality.

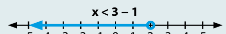
The open circle on the number line indicates that the circled number is *not* included in the solution.

x > 2



The number line shows that x is any value *greater than* 2.

x < 3 − 1



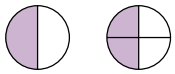
The number line shows that x is any value *less than* 2.

Fractions

composite number A composite number is a multiple of more than two factors, other than 1 and itself.

denominator The number below the fraction line; it names the equal parts of the whole.

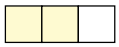
equivalent fractions Fractions that name the same part of a whole or set.



$\frac{1}{2}$ = $\frac{2}{4}$

fraction A number that names a part of a whole, a part of a set, or a part of a length expressed as a numerator and denominator.

part of a whole

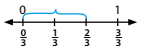


$\frac{2}{3}$

part of a set

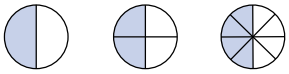
$\frac{2}{3}$

part of a length



$\frac{2}{3}$

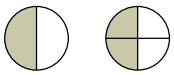
fractional terms Digits used to write a fraction.



$\frac{1}{2}$ $\frac{2}{4}$ $\frac{4}{8}$

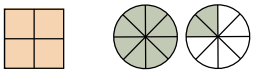
greatest common factor (GCF) The largest factor that is the same for two or more numbers.

higher terms An equivalent fraction expresses the same part with larger digits.



$\frac{1}{2}$ = $\frac{2}{4}$ ← higher terms

improper fraction A fraction that has a value equal to or greater than 1 whole. The numerator is the same as or greater than the denominator.



$\frac{4}{4} = 1$ $\frac{10}{8} > 1$

least common denominator (LCD) The lowest shared denominator of renamed fractions.

least common multiple (LCM) The lowest multiple, other than 0, that is the same for 2 or more numbers.

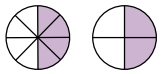
multiples of 3: 3, 6, 9, (12), 15, 18, 21, 24, 27, 30

multiples of 4: 4, 8, (12), 16, 20, 24, 28, 32, 36, 40

12 is the least common multiple of 3 and 4

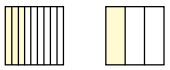
like fractions Fractions that have the same denominator. $\frac{6}{8}$ $\frac{1}{8}$

lower terms An equivalent fraction expressed with smaller digits.



$\frac{4}{8}$ = $\frac{2}{4}$ ← lower terms

lowest terms (simplest form) An equivalent fraction expressed with the least total number of parts, where the numerator and denominator have no common factor greater than 1.



$\frac{3}{9}$ = $\frac{1}{3}$ ← lowest terms

mixed number A number that is the sum of a whole number and a fraction.

one and one-third

$1\frac{1}{3}$

Fractions continued

numerator The number above the fraction line in a fraction; it is the number of parts selected.

prime number A prime number has only two factors: 1 and itself.

reciprocals Two numbers whose product equals 1.

$\frac{2}{3} \times \frac{3}{2} = 1$

reciprocals

related fractions Unlike fractions where one denominator is a multiple of the other denominator.

$\frac{2}{3}$ $\frac{3}{12}$ 12 is a multiple of 3.

unlike fractions Fractions that have different denominators.

$\frac{2}{5}$ $\frac{2}{3}$

Mathematical Properties for Fractions

Commutative Property of Addition

$\frac{1}{6} + \frac{2}{6} = \frac{2}{6} + \frac{1}{6}$

$\frac{3}{6} = \frac{3}{6}$

Commutative Property of Multiplication

$\frac{2}{3} \times \frac{2}{5} = \frac{2}{5} \times \frac{2}{3}$

$\frac{4}{15} = \frac{4}{15}$

The order of addends or factors can be changed without changing the sum or product.

Associative Property of Addition

$(\frac{2}{8} + \frac{1}{8}) + \frac{4}{8} = \frac{2}{8} + (\frac{1}{8} + \frac{4}{8})$

$\frac{7}{8} = \frac{7}{8}$

Associative Property of Multiplication

$\frac{1}{5} \times (\frac{2}{5} \times \frac{3}{5}) = (\frac{1}{5} \times \frac{2}{5}) \times \frac{3}{5}$

$\frac{6}{125} = \frac{6}{125}$

The grouping of addends or factors may be changed without changing the sum or product.

Distributive Property of Multiplication over Addition

$2 \times 1\frac{2}{3} = (2 \times 1) + (2 \times \frac{2}{3})$

$3\frac{1}{3} = 3\frac{1}{3}$

The product of any two factors can be found by separating one factor into parts, multiplying each part by the other factor, and adding the partial products.

Identity Property of Addition

$\frac{2}{7} + 0 = \frac{2}{7}$

When 0 is an addend, the sum is the other addend.

Identity Property of Multiplication

$1 \times \frac{4}{9} = \frac{4}{9}$

When 1 is a factor, the product is the other factor.

Zero Principle of Subtraction

$\frac{7}{12} - 0 = \frac{7}{12}$

When 0 is subtracted from a number (the minuend), the answer is that number.

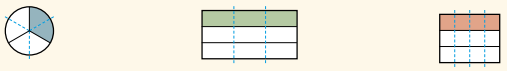
Zero Property of Multiplication

$\frac{5}{6} \times 0 = 0$

When 0 is a factor, the product is 0.

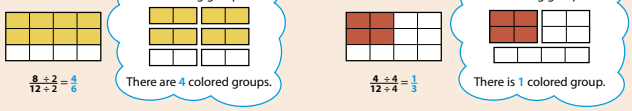
Fractions continued

Multiply by a name for 1 to rename a fraction to higher terms.



$\frac{1 \times 2}{3 \times 2} = \frac{2}{6}$ $\frac{1 \times 3}{3 \times 3} = \frac{3}{9}$ $\frac{1 \times 4}{3 \times 4} = \frac{4}{12}$

Divide by a name for 1 to rename a fraction to lower terms.



$\frac{8 \div 2}{12 \div 2} = \frac{4}{6}$ $\frac{4 \div 4}{12 \div 4} = \frac{1}{3}$

Use strategies to rename a fraction to lowest terms (simplest form).

Divide by the GCF

30: 1, 2, 3, 5, 6, 10, 15, 30
36: 1, 2, 3, 4, 6, 9, 12, 18, 36
GCF of 30 and 36: 6

$\frac{30 \div 6}{36 \div 6} = \frac{5}{6}$

Repeated division

$\frac{30 \div 2}{36 \div 2} = \frac{15 \div 3}{18 \div 3} = \frac{5}{6}$

Improper Fractions & Mixed Numbers

An **improper fraction** has a value *equal to* or *greater than* 1. $\frac{6}{6}$ $\frac{17}{6}$

A **mixed number** is the sum of a whole number and a fraction. $2\frac{5}{6} = 2 + \frac{5}{6}$

$\frac{17}{6} = 2\frac{5}{6}$

$\frac{17}{6} = \frac{6}{6} + \frac{6}{6} + \frac{5}{6} = 1 + 1 + \frac{5}{6} = 2\frac{5}{6}$

Rename mixed numbers as improper fractions.

$2\frac{3}{8} = \_\_$

1. Multiply to find the number of parts in the wholes. $2 \cdot \frac{8}{8} = \frac{16}{8}$
2. Add the additional parts. $\frac{16}{8} + \frac{3}{8} = \frac{19}{8}$

Rename improper fractions as mixed numbers.

$\frac{19}{8} = \_\_$

1. Divide the numerator by the denominator to find the number of wholes.
2. Write the remainder as a fraction to tell how many parts of the next whole there are.

$8\overline{)19}\ 2\frac{3}{8}$, -16, 3

Fractions continued

Add & Subtract Like Fractions

Fractions with like denominators can be added or subtracted. Remember to rename the answer to lowest terms. Rename an improper fraction as a mixed number.

1. Add or subtract the fractions.
2. Add or subtract the whole numbers.
3. Simplify the answer, if needed.

Add or subtract fractions.

$\frac{2}{8} + \frac{5}{8} = \frac{7}{8}$

$\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$

$\frac{5}{8} + \frac{2}{8} + \frac{3}{8} = \frac{10}{8} = 1\frac{2 \div 2}{8 \div 2} = 1\frac{1}{4}$

Add or subtract mixed numbers.

$3\frac{5}{8} + 2\frac{1}{8} = 5\frac{6 \div 2}{8 \div 2} = 5\frac{3}{4}$

$7\frac{5}{8} - 1\frac{1}{8} = 6\frac{4 \div 4}{8 \div 4} = 6\frac{1}{2}$

Rename a whole to subtract.

$4\ 5\frac{8}{8} - 1\frac{3}{8} = 3\frac{5}{8}$

$3\ 4\frac{8}{8} = 3 + \frac{8}{8} + \frac{3}{8} = 3\frac{11}{8}$

$-\ 1\frac{5}{8}$ → $-\ 1\frac{5}{8}$

$2\frac{6 \div 2}{8 \div 2} = 2\frac{3}{4}$

Add & Subtract Related Fractions

Unlike fractions are fractions with different denominators (different parts in the whole). Some unlike fractions are related fractions. **Related fractions** are fractions in which one denominator is a multiple of the other denominator. To add or subtract related fractions, **rename** one fraction so that the fractions have the same denominator. Complete the operation. Write the answer in lowest terms.

$\frac{8}{10} = \frac{8}{10}$

$+\ \frac{3}{5} \times \frac{2}{2} = \frac{6}{10}$

$\frac{14}{10} = 1\frac{4}{10} = 1\frac{2}{5}$

10 is a multiple of 5.

1. Rename. $\frac{3}{5} = \frac{6}{10}$
2. Add.
3. Write the answer in lowest terms.

$3\ \frac{1}{4} \times \frac{3}{3} = 3\frac{3}{12} = 2\frac{15}{12}$

$-\ 1\frac{11}{12} = 1\frac{11}{12}$

$1\frac{4}{12} = 1\frac{1}{3}$

12 is a multiple of 4.

1. Rename. $\frac{1}{4} = \frac{3}{12}$
2. Subtract. Rename a whole when necessary. $3\frac{3}{12} = 2\frac{15}{12}$
3. Write the answer in lowest terms.

Add & Subtract Unlike Fractions

When fractions with **unlike** denominators are *not* related, rename both fractions before adding or subtracting. Rename the fractions by finding a **common denominator**. Remember to rename the sum or difference to lowest terms.

Multiply the denominators.

$3 \times 5 = 15$

$6\frac{2}{5} \times \frac{3}{3} = 6\frac{6}{15} = 5\frac{21}{15}$

$-\ 4\frac{2}{3} \times \frac{5}{5} = 4\frac{10}{15} = 4\frac{10}{15}$

$1\frac{11}{15}$

List multiples.

4: 4, 8, 12
6: 6, 12

LCM of 4 and 6: 12

$\frac{5}{6} \times \frac{2}{2} = \frac{10}{12}$

$-\ \frac{1}{4} \times \frac{3}{3} = \frac{3}{12}$

$\frac{7}{12}$

Use prime factorization.

$\frac{5}{8} \times \frac{9}{9} = \frac{45}{72}$

$+\ \frac{7}{18} \times \frac{4}{4} = \frac{28}{72}$

$\frac{73}{72} = 1\frac{1}{72}$

8: $2 \times 2 \times 2 = 2^3$
18: $2 \times 3 \times 3 = 2 \times 3^2$

LCM of 8 and 18:
$2^3 \times 3^2 = 8 \times 9 = 72$

Find the Greatest Common Factor by Listing Factors

List the Factors

28: 1 × 28, 2 × 14, 4 × 7
40: 1 × 40, 2 × 20, 4 × 10, 5 × 8

28: 1, 2, 4, 7, 14, 28
40: 1, 2, 4, 5, 8, 10, 20, 40

common factors of **28** and **40:** 1, 2, 4
greatest common factor of **28** and **40:** 4

Find the Prime Factors Using a Factor Tree

A composite number can be expressed as the product of a set of **prime factors**.

1. Write the number to be factored at the top.
2. Choose any pair of factors.
3. Continue to factor any composite number until all factors are prime.

Ways to Factor 40

40 = 5 • 8 = 5 • 2 • 4 = 5 • 2 • 2 • 2

40 = 4 • 10 = 2 • 2 • 2 • 5

40 = 2 • 20 = 2 • 2 • 10 = 2 • 2 • 2 • 5

40 = 2 • 2 • 2 • 5

Find the Greatest Common Factor with a Factor Tree

Use **prime factorization** to find the greatest common factor (GCF) of two numbers.

1. List the prime factors of each number in ascending order.
2. Select the factors that are common to both lists.
3. Multiply the common factors.

40 = 4 • 10 = 2 • 2 • 2 • 5

60 = 6 • 10 = 2 • 3 • 2 • 5

40: 2 • 2 • 2 • 5

60: 2 • 2 • 3 • 5

GCF of 40 and 60: 2 • 2 • 5 = 20

Cancellation

A fraction can be renamed to lowest terms, or simplified, by a process called **cancellation**. For this process, use these steps to cancel out fractional names for 1.

1. Use mental math to list the prime factors of the numerator and the denominator from *least* to *greatest*.
2. Identify and cancel all the fractional names for 1.
3. The canceled numbers removed the GCF (4). Multiply the remaining factors in the numerator and in the denominator. The result is the simplified fraction.

4 × 9 = 36

8 × 5 = 40

$\frac{36}{40} = \frac{2 \cdot 2 \cdot 3 \cdot 3}{2 \cdot 2 \cdot 2 \cdot 5}$

$\frac{36}{40} = \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot 3 \cdot 3}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot 2 \cdot 5}$

$\frac{36}{40} = \frac{9}{10}$

Least Common Multiple

A common multiple of 6 and 9 is 54 because 6 × 9 = 54.
The following list shows the nonzero multiples of 6 and 9 *less than* 54.
The **least common multiple (LCM)** of 6 and 9 is **18**.

6: 6, 12, 18, 24, 30, 36, 42, 48
9: 9, 18, 27, 36, 45

Methods for Finding the Least Common Multiple

For numbers that are easy to count by, list the multiples.

20: 20, 40, 60
15: 15, 30, 45, 60
LCM of 15 and 20: 60

For numbers that are not easy to list the multiples of, write the **prime factorization with exponents**. Multiply the highest power of each prime factor listed.

24 = 4 • 6 = 2 • 2 • 2 • 3

36 = 4 • 9 = 2 • 2 • 3 • 3

24: $2^3 \cdot 3$
36: $2^2 \cdot 3^2$
LCM of 24 and 36: $2^3 \cdot 3^2 = 72$

Multiply a Whole Number by a Fraction

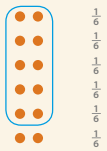
Multiplying a fraction by a whole number follows the pattern of whole number multiplication. It can be solved using repeated addition or by drawing an array. The denominator tells how many equal sets to make. The numerator tells how many sets to select to find the answer.

$6 \times \frac{1}{4}$ is 6 sets of $\frac{1}{4}$.

$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2}$

$\frac{5}{6} \times 12$ is $\frac{5}{6}$ of 12.

$\frac{5}{6} \times 12 = 10$



When a multiplication equation includes a whole number and a fraction, rename the whole number as an improper fraction. Multiply the numerators and multiply the denominators.

$6 \times \frac{1}{4} = \frac{6}{1} \times \frac{1}{4} = \frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2}$

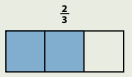
$\frac{5}{6} \times 12 = \frac{5}{6} \times \frac{12}{1} = \frac{60}{6} = 10$

The denominator of a whole number is 1.
$6 = \frac{6}{1}$ $12 = \frac{12}{1}$

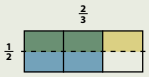
Multiply a Fraction by a Fraction

Multiplying a fraction by a fraction is finding *a part of a part*. The product will be smaller than either factor because the answer is only a part of the original unit.

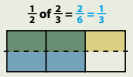
A picture can be drawn to show the product of two fractions. Find $\frac{1}{2}$ of $\frac{2}{3}$.



Draw a figure. Color two-thirds.



Draw a line the other way to show $\frac{1}{2}$ of the figure. Color one-half.



The double shaded area represents the product.

The product of two fractions can also be found by multiplying the numerators and multiplying the denominators.

$\frac{1}{2}$ of $\frac{2}{3} = \frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{1}{3}$

Simplify Fractions

Cancellation Using Prime Factorization

- List the prime factors of each term.
- Cancel fractional names for 1.
- Multiply the simplified numerators and the simplified denominators.

$\frac{3}{4} \times \frac{8}{9} = \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{2} \cdot 2}} \times \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot 2}{\underset{1}{\cancel{3}} \cdot 3} = \frac{2}{3}$

Cancellation Finding a Common Factor

- Divide a numerator and a denominator by a common factor.
- Multiply the simplified numerators and the simplified denominators.

$\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}} \times \frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{9}}} = \frac{2}{3}$

GCF of 3 and 9: 3
GCF of 4 and 8: 4

Multiply Mixed Numbers

Rename a mixed number as an improper fraction to multiply.

- Multiply the numerators and then multiply the denominators.
- Simplify the fractions using cancellation when possible.

$5 \times 9\frac{3}{10} = \frac{\overset{1}{\cancel{5}}}{1} \times \frac{93}{\underset{2}{\cancel{10}}} = \frac{93}{2} = 46\frac{1}{2}$

$2\overline{)93}$ $46\frac{1}{2}$
-8
13
-12
1

Use the Distributive Property to multiply.

- Multiply each part of the mixed number by the whole number.
- Simplify. Write the answer in lowest terms.

$5 \times 9\frac{3}{10} =$
$5 \times (9 + \frac{3}{10}) =$
$(5 \times 9) + (\frac{5}{1} \times \frac{3}{10}) =$
$45 + \frac{3}{2} =$
$45 + 1\frac{1}{2} = 46\frac{1}{2}$

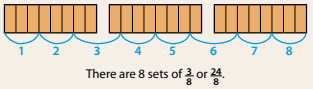
$2\overline{)3}$ $1\frac{1}{2}$
-2
1

Dividing by a fraction is finding the number of fractional units.

Divide a Whole Number by a Fraction

$3 \div \frac{3}{8}$ is finding how many $\frac{3}{8}$ units are in 3.

Partition each whole (3) into equal parts ($\frac{1}{8}$).
Count the parts.



There are 8 sets of $\frac{3}{8}$ or $\frac{24}{8}$.
Divide the 24 parts into $\frac{3}{8}$.

Solve the division equation.
$3 \div \frac{3}{8} = \frac{24}{8} \div \frac{3}{8} = 8$

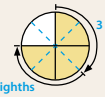
Check using multiplication.
$8 \times \frac{3}{8} = \frac{8 \times 3}{1 \times 8} = \frac{24}{8} = 3$

Divide a Fraction by a Fraction

$\frac{3}{4} \div \frac{3}{8}$ is finding how many $\frac{3}{8}$ units are in $\frac{3}{4}$.

Rename the fractions being divided using a common denominator. Divide the numerators. Rename mixed numbers as improper fractions. Then find the common denominator and divide the numerators.

Repartition the parts to show the common denominator.



$\frac{3}{4} \div \frac{3}{8} =$
$\frac{6}{8} \div \frac{3}{8} = \frac{6}{3} = 2$

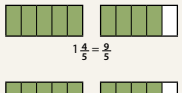
$\frac{6 \div 3}{8 \div 8} = \frac{6 \div 3}{1} = \frac{2}{1}$

Divide Fractions

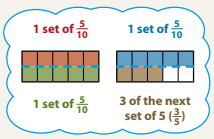
When renaming fractions using a common denominator, it is not always possible to divide the numerators evenly. If the numerators are not compatible, the quotient will be a fraction or a mixed number. Drawing a picture can help you solve the equation. Remember to write the final answer in lowest terms.

$1\frac{4}{5} \div \frac{1}{2} =$
$\frac{9}{5} \div \frac{1}{2} =$
$\frac{18}{10} \div \frac{5}{10} = \frac{18}{5} = 3\frac{3}{5}$

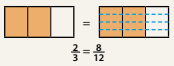
$5\overline{)18}$ $3\frac{3}{5}$
-15
3



There are $3\frac{3}{5}$ sets of $\frac{1}{2}$ in $1\frac{4}{5}$.



$\frac{2}{3} \div \frac{3}{4} =$
$\frac{8}{12} \div \frac{9}{12} = \frac{8}{9}$



There is $\frac{8}{9}$ of a set.

There are only 8 of the 9 parts needed to make 1 whole set.
There is only part of a set of $\frac{3}{4}$ in $\frac{2}{3}$.

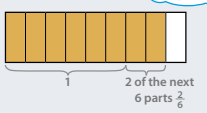
Divide: Multiply by the Reciprocal

Dividing by a fraction is the same as multiplying by the reciprocal of the divisor. The **reciprocal** of the divisor is found by **inverting** the numerator and the denominator.

$3 \div \frac{1}{2}$ is the same as $3 \times \frac{2}{1} = \frac{3 \times 2}{1} = 6$

$3 \div \frac{1}{2} = 3 \times \frac{2}{1} = \frac{3 \times 2}{1} = 6$

$\frac{8}{9} \div \frac{2}{3}$ How many sets of $\frac{2}{3}$ are in $\frac{8}{9}$?



$8\frac{1}{3} \div 1\frac{2}{3} =$
$\frac{25}{3} \div \frac{5}{3} =$
$\frac{25}{\cancel{3}} \times \frac{\cancel{3}}{5} = \frac{5}{1} = 5$

How many sets of $1\frac{2}{3}$ are in $8\frac{1}{3}$?

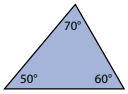
Divide
$\frac{8}{9} \div \frac{6}{9} = \frac{8}{6} = 1\frac{2}{6} = 1\frac{1}{3}$

Multiply
$\frac{4}{\cancel{8}} \times \frac{\cancel{9}}{\cancel{6}} = \frac{4}{3} = 1\frac{1}{3}$

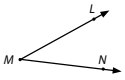
Geometry

acute angle An angle that measures less than 90°.

acute triangle A triangle with three acute angles.



angle A figure formed when 2 rays share the same endpoint.



symbol	read
$\angle M$	angle M
$\angle LMN$	angle LMN
$\angle NML$	angle NML

area The space within a figure that is measured in square units.

8 square units

base (1) Either of two congruent and parallel faces of a cylindrical figure. (2) The bottom face of a conical figure.

cylinder (2 bases)

cone (1 base)

central angle An angle with its vertex in the center of the circle.

$\angle ROS$ and $\angle ROT$ are central angles.

chord A line segment that connects any two points on a circle.

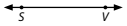
$\overline{SU}$, $\overline{VU}$, and $\overline{TS}$ are chords.

circle A closed curve where each point on the curve is the same distance from a center point.

read: circle B

circumference The distance around a circle.

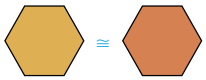
collinear A set of points when one line can be drawn through all the points.



complementary angles Two angles whose measure have a sum of 90°. When placed side by side, complementary angles form a right angle.

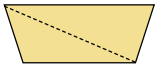
cone A three-dimensional figure with 1 circular face, 1 curved surface, and 1 vertex.

congruent figures Figures that are the same shape and the same size.



cylinder A three-dimensional figure with 2 circular bases separated by 1 curved surface.

diagonal A line segment that connects two nonadjacent vertices of a polygon. A diagonal divides a quadrilateral into 2 triangles.



Geometry continued

diameter A line segment that connects 2 points on a circle and passes through the center point.

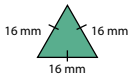
$\overline{AC}$ or $\overline{CA}$ is the diameter of circle B.

edge Where two faces meet on a three-dimensional figure.

edge

endpoint (1) A point that indicates the end of a ray. (2) One of 2 points that marks the end of a line segment.

equilateral triangle A triangle with all sides congruent in length.



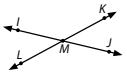
face A flat surface on a three-dimensional figure.

face

hexagon A polygon with 6 sides.

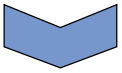
horizontal line A line that is straight across.

intersecting lines Lines that share a common point.

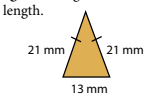


$\overleftrightarrow{KL}$ intersects $\overleftrightarrow{IJ}$.

irregular polygon A polygon with sides of different lengths and angles with different measurements.



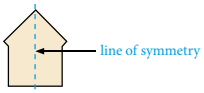
isosceles triangle A triangle with at least 2 sides congruent in length.



line A straight path that goes on without end in 2 directions.

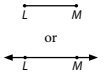
symbol	read
$\overleftrightarrow{LM}$	line LM
$\overleftrightarrow{ML}$	line ML

line of symmetry A line dividing a figure into congruent halves.



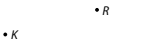
line of symmetry

line segment A part of a line having 2 endpoints.



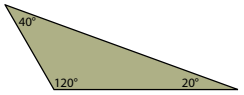
symbol	read
$\overline{LM}$	line segment LM
$\overline{ML}$	line segment ML

noncollinear A set of points when no line can be drawn through all the points.



obtuse angle An angle that measures greater than 90° and less than 180°.

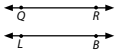
obtuse triangle A triangle with one obtuse angle.



Geometry continued

octagon A polygon with 8 sides.

parallel lines Lines in the same plane that never intersect.



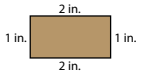
$\overleftrightarrow{QR} \parallel \overleftrightarrow{LB}$

$\parallel$ means "is parallel to"

parallelogram A quadrilateral whose opposite sides are parallel.

pentagon A polygon with 5 sides.

perimeter The distance around a figure.



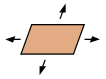
1 in. + 2 in. + 1 in. + 2 in. = 6 in.

perpendicular lines Intersecting lines that form 4 right angles.

$\overleftrightarrow{PM} \perp \overleftrightarrow{UZ}$

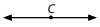
$\perp$ means "is perpendicular to"

plane A flat surface that goes on endlessly in all directions.



plane figure A flat shape; a two-dimensional figure.

point An exact location in space represented by a dot.



read: point C

polygon A closed flat shape made of 3 or more line segments.

prism A three-dimensional figure that has at least 2 faces identical and parallel to each other.

triangular prism

rectangular prism

square prism (cube)

pyramid A three-dimensional figure that has a polygon as its base and at least 3 triangular faces that meet at a common vertex.

triangular pyramid

pentagonal pyramid

rectangular pyramid

quadrilateral Any polygon with 4 sides.

radius A line segment from the center point to a point on the circle.

$\overline{BA}$, $\overline{BC}$, and $\overline{BD}$ are radii of circle B.

ray A part of a line that has 1 endpoint and goes on without end in one direction.

symbol	read
$\overrightarrow{LM}$	ray LM

rectangle A quadrilateral with opposite sides that are equal in length and 4 right angles.

Geometry continued

reflection (flip) A movement of a figure made by flipping the figure across a line of reflection.

regular polygon A polygon with sides that are the same length and angles with the same measure.

rhombus A quadrilateral with opposite sides that are parallel and 4 congruent sides.

right angle An angle that measures 90° and forms a square corner.

right triangle A triangle with one right angle.

rotation (turn) A movement of a figure to a new position by rotating the figure clockwise or counterclockwise around a specific point.

scalene triangle A triangle with no sides that are congruent.

side A line segment that is part of a polygon.

side

similar figures Figures that are the same shape but not necessarily the same size.

square A quadrilateral with 4 sides that are equal in length and 4 right angles.

square prism (cube) A three-dimensional figure with 6 square faces.

straight angle An angle that measures 180°.

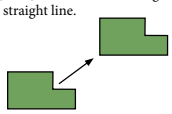
supplementary angles Two angles whose measure have a sum of 180°. When placed side by side, supplementary angles form a straight angle.

surface area The sum of all the areas of all the faces of a three-dimensional figure.

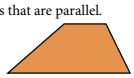
symmetrical figure A figure that, when folded along the line of symmetry, is divided into congruent halves.

three-dimensional figures Figures that have length, width, and height.

translation (slide) A movement of a figure to a new position in a straight line.

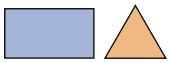


trapezoid A quadrilateral that has at least one pair of opposite sides that are parallel.

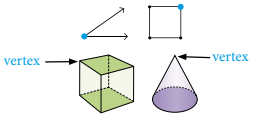


triangle A polygon with 3 sides.

two-dimensional figures Figures that have length and width.



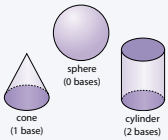
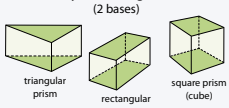
vertex (1) Where 2 rays meet and form an angle. (2) The point where 2 sides of a polygon meet. (3) The point where 3 or more edges of a prism or a pyramid meet. (4) The point formed by the curved surface of a cone.



vertical line A line that goes straight up and down.

volume The number of cubic units within a closed three-dimensional figure.

3-Dimensional Figures

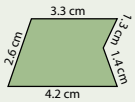
Curved-Surface Figures	Polyhedrons	
	Conical Figures (1 base)	**Cylindrical Figures** (2 bases)
		
Circular figures with curved surfaces are *not* polyhedrons.	A **pyramid** has 1 polygon as its base. All other faces are triangles.	A **prism** has 2 congruent polygons as its bases. All other faces are parallelograms.

Perimeter

Perimeter is the distance around a geometric figure and is represented by *P*.

Any Polygon

Add the lengths of the sides.



$P = a + b + c + d + e$
$P = 2.6\text{ cm} + 4.2\text{ cm} + 1.4\text{ cm} + 1.3\text{ cm} + 3.3\text{ cm}$
$P = 12.8\text{ cm}$

Regular Polygon

Multiply:
number of sides • length of side

$P = n \cdot s$
$P = 6 \cdot 20\text{ mm}$
$P = 120\text{ mm}$

Rectangle

Multiply the length by 2 and the width by 2; add the products.

$P = (2 \cdot l) + (2 \cdot w)$
$P = (2 \cdot 56\text{ mm}) + (2 \cdot 19\text{ mm})$
$P = 112\text{ mm} + 38\text{ mm}$
$P = 150\text{ mm}$

Multiply the sum of the length and the width by 2.

$P = 2(l + w)$
$P = 2(56\text{ mm} + 19\text{ mm})$
$P = 2 \cdot 75\text{ mm}$
$P = 150\text{ mm}$

Circumference

The **circumference** of a circle is a little more than 3 times its diameter. The ratio $\frac{C}{d}$ has a value of **π (pi)**. Pi is a non-repeating and non-terminating decimal with an approximate value of **3.14** or $\frac{22}{7}$. Use the approximate value of pi to find an unknown circumference or diameter.

Find the Circumference Given the Diameter

$C = \pi d$

$C = \pi d$
$C = 3.14 \times 10$
$C = 31.4\text{ cm}$

$C = \pi d$
$C = \frac{22}{7} \times 7$
$C = \frac{22}{7} \times \frac{7}{1}$
$C = 22\text{ in.}$

Find the Circumference Given the Radius

$C = 2\pi r$

$C = 2\pi r$
$C = 2 \times 3.14 \times 5$
$C = 31.4\text{ m}$

$C = 2\pi r$
$C = 2 \times \frac{22}{7} \times 3\frac{1}{2}$
$C = 2 \times \frac{22}{7} \times \frac{7}{2}$
$C = 22\text{ in.}$

Find the Diameter Given the Circumference

Since $C = \pi d$, then $\frac{C}{\pi} = d$.

$\frac{C}{\pi} = d$
$C = 28.26$
$\frac{28.26}{3.14} = d$
$d = 9\text{ cm}$

Area

Area is the space within a region. The area of a region is the number of square units needed to cover its surface.

Area of a Rectangle

$A = l \cdot w$
$A = 8 \cdot 5$
$A = 40\text{ units}^2$

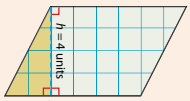
Area of a Square

$A = l \cdot w$ or $A = s^2$
$A = 6 \times 6$ or 6^2
$A = 36\text{ units}^2$

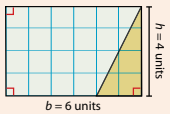
Area of a Parallelogram

$A = b \cdot h$

To change a parallelogram to a rectangle, you can remove a triangle from one side of the parallelogram and connect it to the other side.

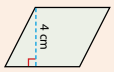


$A = b \cdot h$
$A = 6 \cdot 4$
$A = 24\text{ units}^2$

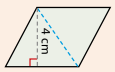


Area of a Triangle

A diagonal divides a parallelogram into two congruent triangles. The area of each triangle is $\frac{1}{2}$ of the area of the parallelogram.



$A = b \cdot h$
$A = 5 \cdot 4$
$A = 20\text{ cm}^2$



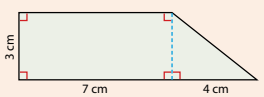
$A = \frac{1}{2}(b \cdot h)$
$A = \frac{1}{2}(5 \cdot 4)$
$A = \frac{1}{2}(20)$
$A = 10\text{ cm}^2$
Each triangle has an area of 10 cm².

$A = l \cdot w$
$A = 6 \cdot 4$
$A = 24\text{ cm}^2$

$A = \frac{1}{2}(b \cdot h)$
$A = \frac{1}{2}(6 \cdot 4)$
$A = \frac{1}{2}(24)$
$A = 12\text{ cm}^2$
Each triangle has an area of 12 cm².

Area of a Complex Figure

The area of an irregular polygon is determined by finding the area of each smaller region in the figure and then adding the areas.



$A = (7 \cdot 3) + \frac{1}{2}(4 \cdot 3)$
$A = 21 + \frac{1}{2}(12)$
$A = 21 + 6$
$A = 27\text{ cm}^2$

Area of Circles

The area of a circle is π times the radius squared: $A = \pi r^2$.

Substitute the length of the radius for *r* and 3.14 for π.

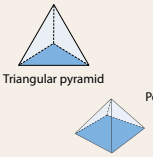
$r = 7\text{ ft}$
$A = \pi r^2$
$A = 3.14(7^2)$
$A = 3.14(49)$
$A = 153.86\text{ ft}^2$

Remember that the radius is half the length of the diameter.

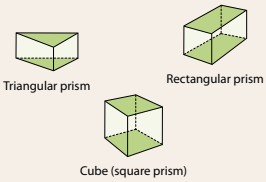
If $d = 10$ m, then $r = 5$ m.
$A = \pi r^2$
$A = 3.14(5^2)$
$A = 3.14(25)$
$A = 78.5\text{ m}^2$

Surface Area of Prisms

A **pyramid** is a cone with a polygon instead of a circle as a base. A pyramid is named for the shape of its base. All other faces of a pyramid are triangles.



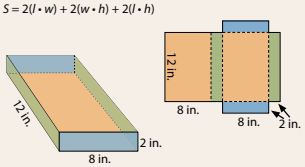
A **prism** is a type of cylinder with 2 congruent polygon bases that are parallel. A prism is named for the shape of its bases. All other faces of a prism are parallelograms.



The **surface area** of a 3-dimensional figure is the sum of the areas of all its surfaces.

A **rectangular prism** has 3 sets of congruent faces.

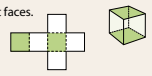
$S = 2(l \cdot w) + 2(w \cdot h) + 2(l \cdot h)$



top and bottom	2(12 • 8) =	192 in.²
front and back	2(12 • 2) =	48 in.²
sides	2(8 • 2) =	32 in.²
	Total Surface Area =	272 in.²

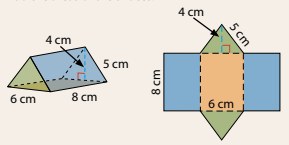
A **cube** has 6 congruent faces.

$S = 6(l \cdot w)$ or $S = 6s^2$



A **triangular prism** has 5 faces.

Calculate the area of the 3 rectangular faces.
$A = l \cdot w$
Calculate the area of the 2 triangular bases.
$A = \frac{1}{2}(b \cdot h)$
Add the areas of the 5 faces.



bottom face	8 • 6 =	48 cm²
slanted sides	2(8 • 5) =	80 cm²
triangular bases	2[½(4 • 6)] =	24 cm²
	Total Surface Area =	152 cm²

Volume of Rectangular Prisms

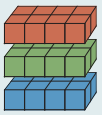
The area of a figure is the number of square units a flat space covers. **Volume** builds on the area of a figure. Multiply the area of the **base** ($B = l \times w$) by the number of cubic unit layers (**height**) of the three-dimensional figure. Volume is the number of cubic units a figure contains. The formula is $V = Bh$.

Area is measured using square units. (units²)

1 square cm or cm²

1 cm × 1 cm = 1 cm²

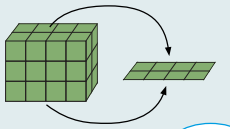
Volume is measured using cubic units. (units³)



1 cubic cm or cm³

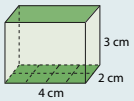
1 cm × 1 cm × 1 cm = 1 cm³

The volume of any prism can be found using the volume formula. Because prism bases are parallel and congruent, opposite bases will have the same area.



$V = Bh$
$V = (l \times w) \times h$
$V = (4 \text{ rows of } 2 \text{ cubes}) \times 3 \text{ layers}$
$V = 8 \text{ cubes} \times 3 \text{ layers}$
$V = 24 \text{ cubes or } 24 \text{ cubic units}$

B (base) is found using the area formula **$l \times w$**.



$V = Bh$
$V = (l \times w) \times h$
$V = (4 \times 2) \times 3$
$V = 8 \times 3$
$V = 24 \text{ cm}^3$

Volume of Cubes

A cube or square prism is a special rectangular prism where all six faces are congruent squares and all sides measure the same.

The formula for volume, $V = Bh$, can be modified for a cube.

Volume of a cube = (Base) (height)
$= (\text{side} \times \text{side}) \times \text{side}$
$V = s^3$

$V = (s \times s) \times s$
$V = (5 \times 5) \times 5$
$V = 25 \times 5$
$V = 125 \text{ cm}^3$

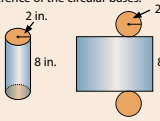
or

$V = s^3$
$V = 5^3$
$V = 5 \times 5 \times 5$
$V = 125 \text{ cm}^3$

Surface Area of Cylinders

A **cylinder** has 2 congruent circular bases and 1 curved surface.

- Calculate the area of one circle using **$A = \pi r^2$**. Multiply by 2 to find the area of both circular bases.
- Calculate the area of the curved surface. The curved surface is a rectangle when lying flat. Use **$A = l \cdot w$**. The width of the rectangle is the height of the cylinder. The length of the rectangle is the circumference of the circular bases.



circular bases $2(3.14 \cdot 2^2) =$ **25.12 in.²**
curved surface $(3.14 \cdot 4)8 =$ **100.48 in.²**
Total Surface Area = 125.60 in.²

Find an Unknown Measurement

The formula for volume of a prism is **$V = Bh$**. Since the bases of the figure are rectangles, use **$V = (l \cdot w) \cdot h$**.

When the volume is given and any two of the volume dimensions are known, you can find the unknown third dimension of a figure.

$V = Bh$
$V = (l \cdot w) \cdot h$
$V = 84 \text{ in.}^3$
$l = 4 \text{ in.}$
$w = 3 \text{ in.}$
$h = \_\_ \text{ in.}$

$84 \text{ in.}^3 = (4 \cdot 3) \cdot h$
$84 \text{ in.}^3 = 12 \cdot h$
$\frac{84 \text{ in.}^2}{12} = \frac{12h}{12}$
$7 \text{ in.} = h$

$V = Bh$
$V = (l \cdot w) \cdot h$
$V = 84 \text{ in.}^3$
$l = 4 \text{ in.}$
$w = \_\_ \text{ in.}$
$h = 7 \text{ in.}$

$84 \text{ in.}^3 = (4 \cdot w) \cdot 7$
$84 \text{ in.}^3 = 4 \cdot w \cdot 7$
$84 \text{ in.}^3 = 4 \cdot 7 \cdot w$
$84 \text{ in.}^3 = 28 \cdot w$
$\frac{84 \text{ in.}^2}{28} = \frac{28w}{28}$
$3 \text{ in.} = w$

What is the measure of the length, the width, and the height of a cube whose volume is 27 units?

V (of a cube) $= s^3$
$27 = s \cdot s \cdot s$

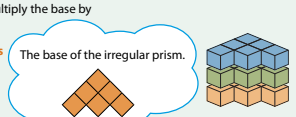
If $s = 2$: $2 \cdot 2 \cdot 2 = 8$
If $s = 3$: $3 \cdot 3 \cdot 3 = 27$
Each side is 3 units.

Volume of an Irregular Prism

Count the square units to find the area of an irregular base. Multiply the base by the height to find the volume of the irregular prism.

1. Count the square units in the base. **$B = 6$ square units**
2. Substitute the area of the base for B in the volume formula. **$V = Bh$**, $V = (6)(3)$, **$V = 18 \text{ units}^3$**

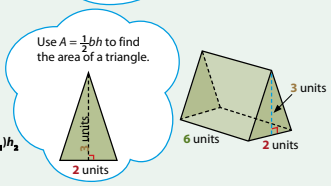
The base of the irregular prism.



Volume of a Triangular Prism

1. Find the area of the triangular base. **$B = \frac{1}{2}bh$**, $B = \frac{1}{2}(2 \cdot 3)$, $B = \frac{1}{2}(6)$, **$B = 3 \text{ units}^2$**
2. Substitute the area of the base for B in the volume formula. **$V = Bh$ or $(\frac{1}{2}bh_1)h_2$**, $V = (3)(6)$, **$V = 18 \text{ units}^3$**

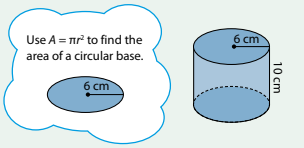
Use $A = \frac{1}{2}bh$ to find the area of a triangle.



Volume of a Cylinder

1. Find the area of the circular base given the radius. (Remember that $r = \frac{1}{2}d$ if a diameter is given.) **$B = \pi r^2$**, $B = (3.14)(6^2)$, $B = (3.14)(36)$, **$B = 113.04 \text{ cm}^2$**
2. Substitute the area of the circular base for B in the volume formula. **$V = Bh$ or $(\pi r^2)h$**, $V = 113.04 \cdot 10$, **$V = 1130.4 \text{ cm}^3$**

Use $A = \pi r^2$ to find the area of a circular base.



Integers

absolute value The distance of a number from 0 on a number line. (See below.)

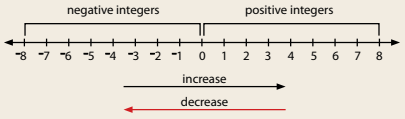
integer A whole number or its opposites. (. . . −2, −1, 0, 1, 2, . . .)

negative number A number whose value is less than 0.

positive number A number whose value is greater than 0.

Positive & Negative Numbers

Integers consist of the whole numbers and their opposites.
{. . . −3, −2, −1, 0, 1, 2, 3 . . .}



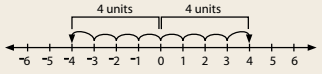
The values of negative numbers continue to *decrease* as you move left on a number line.

The value of a negative number will always be *less than* the value of a positive number.

$-6 < -3$ $\quad -8 < -7$ $\quad -2 > -4$ $\quad 1 > -5$ $\quad -3 < 2$ $\quad 7 > -7$

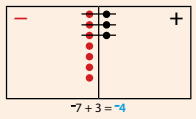
The numbers 4 and −4 are **opposites** because they are the same distance from zero in opposite directions. **Absolute value** is the distance from zero. Distance is expressed as a positive value. It is indicated by the symbol $|n|$ and is read "the absolute value of n."

$|4|$ The *absolute value of 4* is 4.
$|-4|$ The *absolute value of negative 4* is 4.

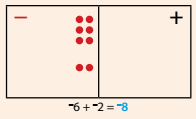


Add Integers Using an Algebra Mat

1. Draw the first addend on the mat.
2. Draw the second addend on the mat.
3. A positive counter and a negative counter cancel each other out to make zero. $1 + -1 = 0$
4. The answer is the number of counters that have *not* been cancelled out.

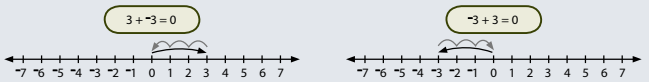


$-7 + 3 = -4$

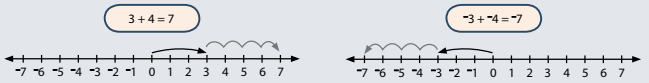


$-6 + -2 = -8$

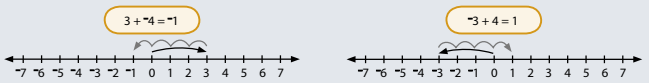
When combining *opposites*, the sum is always zero.



These addition equations combine numbers with *like* signs.

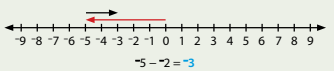


These addition equations combine numbers with *unlike* signs.

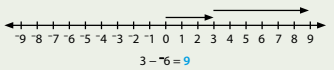


Subtract Integers Using a Number Line

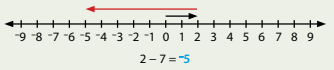
1. Begin at 0 and draw an arrow to the minuend (the total).
2. Draw a second arrow from the minuend. Draw the arrow *left* of the minuend to subtract a positive number or *right* of the minuend to subtract a negative number.
3. The final stopping place is the difference.



$-5 - -2 = -3$



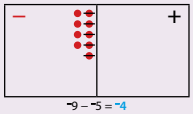
$3 - -6 = 9$



$2 - 7 = -5$

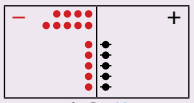
Subtract Integers Using an Algebra Mat

1. Put the minuend (the total) on the mat.
2. Cross out the subtrahend counters (the number being subtracted).
3. If there are *not* enough counters to subtract, draw pairs of positive and negative counters on the mat until the subtrahend can be subtracted (the Zero Principle).
4. The answer is the number of counters that have *not* been cancelled out.



−9 − −5 = −4

Zero Principle
A number may be renamed by adding or subtracting 0 without changing the value of that number.



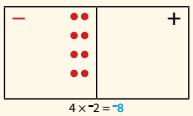
−9 − 5 = −14

Multiply Integers

−2 × 4 = −8

Commutative Property of Multiplication
The order of factors may be changed without changing the product. 4 × −2 = −2 × 4

−2 sets of 4 counters cannot be shown on the algebra mat, but the Commutative Property states that the product for −2 × 4 is the same as 4 × −2.



4 × −2 = −8

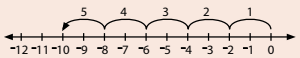
4 sets of 2 negative counters can be shown on an algebra mat.

Rules for Multiplying Integers

When two factors have the same sign, the product is positive.
positive factor × positive factor = positive product
negative factor × negative factor = positive product

When two factors have different signs, the product is negative.
positive factor × negative factor = negative product
negative factor × positive factor = negative product

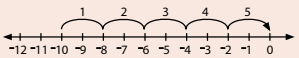
Multiply and Divide Integers



5 × −2 = −10

1. Begin at 0.
2. Add five sets of −2.

5 × −2 = −10;
therefore, −10 ÷ −2 = 5 and −10 ÷ 5 = −2.



−10 ÷ −2 = 5

3. Begin at −10.
4. Subtract sets of −2 until you reach 0.

−10 ÷ −2 = 5
Check: 5 × −2 = −10

Customary Measurement

Linear Equivalents

12 inches (in.) = 1 foot (ft) | 36 inches = 1 yard (yd), 3 feet = 1 yard | 5,280 feet = 1 mile (mi), 1,760 yards = 1 mile

Weight Equivalents

1 pound (lb) = 16 ounces (oz)
1 ton (tn) = 2,000 pounds

Capacity Equivalents

1 cup (c) = 8 fluid ounces (fl oz)
1 pint (pt) = 2 cups
1 quart (qt) = 2 pints
1 gallon (gal) = 4 quarts

Rename Measurements

Rename larger units as smaller units. Determine the equivalency and then *multiply*.

30 lb = ___ oz
1 lb = 16 oz
30 × 16 = 480
30 lb = 480 oz

30 × 16 = 480

Rename smaller units as larger units. Determine the equivalency and then *divide*.

19 qt = ___ gal
4 qt = 1 gal
19 ÷ 4 = 4 r3
19 qt = $4\frac{3}{4}$ gal
or
19 qt = 4 gal 3 qt

$4\frac{3}{4}$
4)19
−16
3

Determine the equivalency and solve.

$\frac{3}{4}$ of a mile = ___ ft
1 mi = 5,280 ft
$\frac{3}{4} \times \frac{5{,}280}{1}$ ft = 3,960 ft

1,320 × 3 = 3,960

$\frac{3}{4}$ mi = 3,960 ft

Metric Measurement

The **meter** (m) is the basic unit of length in the metric system.

Metric Equivalents

1 kilometer (km) = 1000 m
1 m = 100 centimeters (cm)
1 m = 1000 millimeters (mm)

Decimal Equivalents

1 kilometer (km) = 1000 m
1 centimeter (cm) = 0.01 m
1 millimeter (mm) = 0.001 m

Mass is the amount of matter an object has. The **gram** (g) is a basic unit of mass.

1000 g = 1 kilogram (kg)
1 g = 0.001 kg
1 g = 1000 milligrams (mg)

Capacity is the amount of liquid a container will hold. The **liter** (L) is the basic unit of capacity in the metric system.

1 L = 1000 milliliters (mL)
1 mL = 0.001 L

Rename Metric Measurements

Rename larger units as smaller units. Determine the equivalency and then *multiply*.

4 km = ___ m
1 km = 1000 m
4 × 1000 = 4000
4 km = 4000 m

1000 × 4 = 4000

Rename smaller units as larger units. Determine the equivalency and then *divide*.

150 cm = ___ m
100 cm = 1 m
150 ÷ 100 = 1.5
150 cm = 1.5 m

1.5
100)150.0
−100
500
−500
0

Determine the equivalency and solve.

$\frac{3}{4}$ km = ___ m
1 km = 1000 m
$\frac{3}{4} \times \frac{1000}{1}$ = 750
$\frac{3}{4}$ km = 750 m

250 × 3 = 750

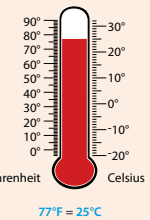
Use the facts for temperature to convert between **Fahrenheit** and **Celsius**.

Convert Temperature

Celsius to Fahrenheit

$F = (\frac{9}{5} \times C) + 32$

___°F = 25°C
$F = (\frac{9}{5} \times 25) + 32$
$F = (\frac{9}{5} \times \frac{25}{1}) + 32$
$F = 45 + 32$
$F = 77°$



77°F = 25°C

Fahrenheit to Celsius

$C = \frac{5}{9} \times (F - 32)$

___°C = 77°F
$C = \frac{5}{9} \times (77 - 32)$
$C = \frac{5}{9} \times 45$
$C = \frac{5}{9} \times \frac{45}{1}$
$C = 25°$

Standard Temperatures

Freezing Point of Water
32°F
0°C

Boiling Point of Water
212°F
100°C

Normal Body Temperature
98.6°F
37°C

Time Equivalents

1 **minute** (min) = 60 **seconds** (sec) | 1 **hour** (hr) = 60 min | 1 **day** (d) = 24 hr

Rename Time

Rename larger units as smaller units. Determine the equivalency and then *multiply*.

7 hr = ___ min
1 hr = 60 min
7 × 60 = 420
7 hr = 420 min

Rename smaller units as larger units. Determine the equivalency and then *divide*.

72 hr = ___ d
24 hr = 1 d
72 ÷ 24 = 3
72 hr = 3 d

Rename a fraction of time.

$\frac{1}{4}$ hr = ___ min
1 hr = 60 min
$\frac{1}{4} \times 60 = 15$ min

Add or Subtract Time

3 hr 25 min
+ 4 hr 50 min
7 hr 75 min =
8 hr 15 min

Add the minutes.
Add the hours.
Rename the answer if possible.

22 90
23 hr 30 min
− 16 hr 40 min
6 hr 50 min

Subtract the minutes.
Rename if needed.
Subtract the hours.

Associative Property of Multiplication The grouping of factors may be changed without changing the product.
2 × (3 × 4) = 24
(2 × 3) × 4 = 24

average (mean) The number found by adding two or more quantities in a set of numbers and then dividing the sum by the number of addends.

scores: 9, 12, 15, 8
Add the scores to find the sum.
9 + 12 + 15 + 8 = 44
Divide the sum by the number of addends.
44 ÷ 4 = 11
The average score is 11.

base The number used as a factor in exponent form.
$3^4 = (3 \times 3 \times 3 \times 3)$
base

Commutative Property of Multiplication The order of factors in a multiplication equation can be changed without changing the product.
8 × 2 = 16
2 × 8 = 16

composite number A number greater than 1 that has more than 2 factors.
1 × 6 = 6 2 × 3 = 6
6 has 4 factors: 1, 2, 3, and 6.
6 is composite.

Distributive Property of Multiplication over Addition The product of 2 factors can be found by separating 1 factor into parts, multiplying each part by the other factor, and adding the partial products.

dividend The number to be divided.
56 ÷ 7 = 8
$7\overline{)56}$ $\frac{8}{}$ $\frac{56}{7} = 8$

divisible A number that can be equally divided with a remainder of 0 (or with none remaining).

divisor The number by which another number (dividend) is divided.
56 ÷ 7 = 8
$7\overline{)56}$ $\frac{8}{}$ $\frac{56}{7} = 8$

exponent A small raised number that indicates how many times a number is to be used as a factor.
$3^4 = (3 \times 3 \times 3 \times 3)$
exponent

expression A mathematical phrase made up of numbers, operation signs, and sometimes variables.
45 + *n* 27 × 6

fact family A group of related addition and subtraction or multiplication and division facts using the same numbers.

3	4	12

3 × 4 = 12 12 ÷ 3 = 4
4 × 3 = 12 12 ÷ 4 = 3

factors The numbers multiplied to find a product.
3 × 6 = 18

greatest common factor (GCF) The greatest factor that is the same for two or more numbers.

Identity Property of Multiplication When 1 is a factor, the product is the same as the other factor.
5 × 1 = 5

least common multiple (LCM) The lowest multiple, other than 0, that is the same for 2 or more numbers.
multiples of 3: 3, 6, 9, (12), 15, 18, 21, **24**, 27, 30
multiples of 4: 4, 8, (12), 16, 20, **24**, 28, 32, 36, 40
12 is the least common multiple of 3 and 4.

long division A series of math operations used to solve a division problem.

multiple The product of two whole numbers.
The first 4 multiples of 4 are 0, 4, 8, and 12.

multiplicand The factor in a multiplication equation that tells the number in each set.
3 × 16 = 48

multiplier The first factor in a multiplication equation; it tells how many times the other factor will be multiplied.
3 × 16 = 48

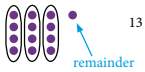
prime number A number with exactly two different factors (the number itself and 1).
1 × 5 = 5
5 has exactly 2 factors: 1 and 5.
5 is prime.

product The answer to a multiplication problem.
3 × 7 = 21

quotient The answer to a division problem.

$56 \div 7 = 8$ $\quad 7\overline{)56}\ 8 \quad \frac{56}{7} = 8$

remainder The part left over after dividing a number (dividend) by another number (divisor).



$13 \div 4 = 3$ r1

variable A letter used to represent a number.

$36 \div x = 9$

$x = 4$

Zero Property of Multiplication When 0 is a factor, the product is always 0.

$7 \times 0 = 0$

Divisibility Rules

A number is divisible by		Example
2	if the ones digit is even (0, 2, 4, 6, or 8).	134 506 2,778
3	if the sum of the digits is divisible by 3.	27 (2 + 7 = 9) 561 (5 + 6 + 1 = 12)
4	if the last two digits form a number divisible by 4.	624 (24 ÷ 4 = 6) 7,932 (32 ÷ 4 = 8)
5	if the ones digit is 0 or 5.	690 2,115
6	if the number is divisible by 2 and 3.	978 2: Ones place is even; 3: 9 + 7 + 8 = 24
9	if the sum of the digits is divisible by 9.	4,473 (4 + 4 + 7 + 3 = 18)
10	if the ones digit is 0.	990 6,000 12,630

Multiplication

Multiplication is a form of addition. It is used to find the **product** (total) when equal sets are joined. The first **factor** of a multiplication equation tells the number of sets; the second **factor** tells the size of each set. When illustrating or writing an equation for a word problem or phrase, determine the number of sets and how many are in each set.

$4 \times 9 = 36$
(4 sets of 9)

$9 \times 4 = 36$
(9 sets of 4)

A **multiple** is the product of a whole number and any given number.

- The first four nonzero multiples of 3 are 3, 6, 9, and 12.
- The first four nonzero multiples of 4 are 4, 8, 12, and 16.
- 12 is a multiple of both 3 and 4.

A multiplication equation can be written several ways. In the following problems, 3 and 4 are known factors, a is an unknown factor, and 12 is the product.

$4 \times 3 = 12$ $\quad 3 \cdot 4 = 12$ $\quad 3a = 12$ $\quad 3(4) = 12$

Properties of Multiplication

Commutative Property
The order of factors can be changed without changing the product.

$4 \times 6 = 6 \times 4$
$24 = 24$
$a \cdot b = b \cdot a$

Identity Property
When 1 is a factor, the product is the same as the other factor.

$6 \times 1 = 6$
$a \cdot 1 = a$

Zero Property
When 0 is a factor, the product is always 0.

$4 \times 0 = 0$
$a \cdot 0 = 0$

Associative Property
The grouping of factors can be changed without changing the product.

$(6 \times 4) \times 5 = 6 \times (4 \times 5)$
$24 \times 5 = 6 \times 20$
$120 = 120$
$(a \cdot b) \cdot c = a \cdot (b \cdot c)$

Distributive Property
The product of any 2 factors can be found by separating 1 factor into parts or addends. Multiply each part or addend by the other factor and add the partial products.

$6 \times 27 =$
$6 \times (20 + 7) =$
$(6 \times 20) + (6 \times 7) =$
$120 + 42 = 162$

Multiplication

The short form of multiplication combines the steps of the **Distributive Property**.

Distributive Property	Short Form
4 × 5,280 = 4 × (5,000 + 200 + 80) = (4 × 5,000) + (4 × 200) + (4 × 80) = 20,000 + 800 + 320 = 21,120	$^{1\ 3}$ 5,280 × 4 21,120

Multiply the **ones** by 4.
Multiply the **tens** by 4.
Rename 30 of the 32 tens as 3 hundreds.
Multiply the **hundreds** by 4.
Add the renamed 3 hundreds.
Rename 10 of the 11 hundreds as 1 thousand.
Multiply the **thousands** by 4.
Add the renamed 1 thousand.

Multiplication Terms

$7 \times 3 = 21$

$\begin{array}{r} 3 \\ \times\ 7 \\ \hline 21 \end{array}$

The factors are 7 and 3.
The product is 21.

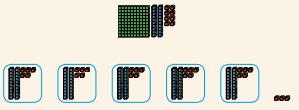
Division

Divide 128 into 5 sets.

- Rename 1 hundred as 10 tens.
- Divide 12 tens by 5.
- Rename 2 tens as 20 ones.
- Divide 28 ones by 5.

There are 25 in each of 5 sets with 3 remaining.

$\begin{array}{r} 25\ \text{r3} \\ 5\overline{)128} \\ -10 \\ \hline 28 \\ -25 \\ \hline 3 \end{array}$



$128 \div 5 = 25$ r3

Division Terms

$36 \div 4 = 9$ $\quad 4\overline{)36}\ 9 \quad \frac{36}{4} = 9$

The **dividend** is 36, the **divisor** is 4, and the **quotient** is 9.

Divide by Multiples of 10

A whole number is **divisible** by another whole number if there is no remainder. You can use **divisibility rules** to determine whether a whole number is divisible by 2, 3, 4, 5, 6, 9, or 10.

Use mental math to find the quotient when the dividend and the divisor are multiples of 10. When only the divisor is a multiple of 10, think of **compatible numbers** as you use the long division process.

1. Decide where to start.

$\begin{array}{r} xx \\ 50\overline{)4{,}500} \end{array}$

$\begin{array}{r} xx \\ 40\overline{)1{,}651} \end{array}$

2. Think of the basic fact or think of the compatible numbers.

$90 \times 50 = 4{,}500$

$40 \times 40 = 1{,}600$

3. Solve using mental math or solve using the long division process.

$\begin{array}{r} 90 \\ 50\overline{)4{,}500} \end{array}$

$\begin{array}{r} 41\ \text{r11} \\ 40\overline{)1{,}651} \\ -\ 160 \\ \hline 51 \\ -40 \\ \hline 11 \end{array}$

Order of Operations

1. Do operations in **parentheses**.
2. Find the value of **exponents**.
3. **Multiply** and **divide** from left to right.
4. **Add** and **subtract** from left to right.

This sentence can help you remember the order of operations.

Please Excuse My Dear Aunt Sally.

Parentheses **E**xponents **M**ultiplication **D**ivision **A**ddition **S**ubtraction

To simplify an expression, analyze it and use the necessary steps.

$8 - 3 \times 4 \div 4$ → Multiply.
$8 - 12 \div 4$ → Divide.
$8 - 3$ → Subtract.
5

$3^2 - (5 - 3) + 6$ → Subtract within parentheses.
$3^2 - 2 + 6$ → Find the value of the exponent.
$9 - 2 + 6$ → Subtract.
$7 + 6$ → Add.
13

Exponents

Multiplication is a short way to write a repeated addition equation. When a factor is repeated in a multiplication equation, it can be written in exponent form.

$7 + 7 + 7 + 7 + 7 + 7 + 7 = 7 \times 7$ $\quad 7 \times 7 = 7^2$

The **base** tells what number is repeated as a factor.
The **exponent** tells the number of times the base is repeated as a factor.

Standard Form	Factored Form	Exponent Form
1,000,000	10 × 10 × 10 × 10 × 10 × 10	10^6
100,000	10 × 10 × 10 × 10 × 10	10^5
10,000	10 × 10 × 10 × 10	10^4
1,000	10 × 10 × 10	10^3
100	10 × 10	10^2
10	10	10^1
1	1	10^0
$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10^1}$
$\frac{1}{100}$	$\frac{1}{10 \times 10}$	$\frac{1}{10^2}$

When 10 is the base, the exponent is the same as the number of zeros in the standard form.

Exponents can be used to express the **powers of 10** in the expanded form of a number.

$546.32 = (5 \times 100) + (4 \times 10) + (6 \times 1) + (3 \times \frac{1}{10}) + (2 \times \frac{1}{100}) =$
$(5 \times 10^2) + (4 \times 10^1) + (6 \times 10^0) + (3 \times \frac{1}{10^1}) + (2 \times \frac{1}{10^2})$

Numbers written in exponent form can be factored to find the standard form.

Exponent Form	Word Form	Factored Form	Standard Form
2^5	two to the fifth power	2 × 2 × 2 × 2 × 2	32
3^7	three to the seventh power	3 × 3 × 3 × 3 × 3 × 3 × 3	2,187
9^4	nine to the fourth power	9 × 9 × 9 × 9	6,561
4^2	four to the second power, or four squared	4 × 4	16

When a number has an exponent of 2, it is called a **squared number**. An array created for a squared number always forms a square.

$4^2 = 4 \times 4$

$7^2 = 7 \times 7$

Probability

complementary events Two events that cannot occur at the same time.

compound event A single event that cannot occur unless two or more other events have occurred.

dependent events Two events in which the outcome of the first event affects the outcome of the second event.

experimental probability The number of outcomes of an event divided by the total number of trials.

independent events Two events where the first event does not affect the outcome of the second event.

probability The chance that an event will occur.

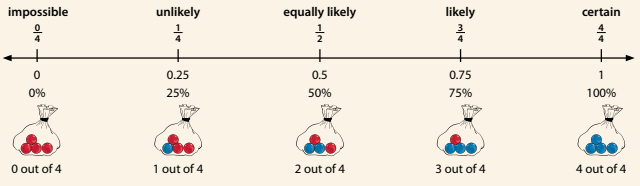
sample space The set of all possible outcomes of an event.

theoretical probability The number of favorable outcomes that an event will occur.

Probability is the likelihood that an event will occur. **Theoretical probability** is found when the total possible outcomes of an event are known and all outcomes are equally likely to occur. Probability is written as a ratio or a percent.

What is the probability of drawing a blue marble from each bag?

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$



Complementary events are two events that could happen, but both events cannot happen at the same time. The sum of the two events must equal 1 or 100%.

The complement of it snowing today is *not* snowing today.

25% + *P*(*not* snow) = 100%
25% + 75% = 100%

Think 25% + ___ = 100%

When there is a 25% chance that it will snow, there is a 75% chance that it will *not* snow.

Experimental probability is found using data collected from an experiment or a survey. The experimental probability of an event is the number of observed occurrences of an event in relation to the total number of trials (or people surveyed).

$$P(\text{event}) = \frac{\text{number of outcomes in the event}}{\text{total number of trials}}$$

Knowing the number of possible outcomes is necessary when calculating probability. The **sample space** for an event is the set of all possible outcomes. A **tree diagram** is an organized way to show all the possible outcomes.

Use the **Multiplication Counting Principle** to find the number of outcomes when choices are given.

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

The sample spaces show the outcomes of flipping 1, 2, and 3 coins. Each coin has a head (H) and a tail (T).

flipping 1 coin: 2 possible outcomes
{H, T}

flipping 2 coins: 4 possible outcomes
{HH, HT, TH, TT}

2 × 2 = 4 possible outcomes

flipping 3 coins: 8 possible outcomes
{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT}

2 × 2 × 2 = 8 possible outcomes

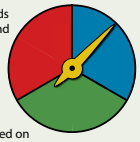
Tree Diagram

1st Coin	2nd Coin	3rd Coin	Outcome for Coins		
			1	2	3
H	H	H	H	HH	HHH
		T		HT	HHT
	T	H		TH	HTH
		T		TT	HTT
T	H	H			THH
		T			THT
	T	H			TTH
		T			TTT

A **compound event** involves two or more simple events; they can be independent or dependent. An **independent event** occurs when the sample space of one event remains the same regardless of the outcome of a previous event. A **dependent event** occurs when the outcome of one event affects the sample space of a later event. You can find the probability of a compound event by multiplying the individual theoretical probabilities.

Independent Event

Alberto spins the spinner. He lands on a red section. He spins a second time and lands on blue.



Sample space for each spin:
{r, b, g}
P(red) = $\frac{1}{3}$ *P*(blue) = $\frac{1}{3}$

Find the probability of spinning red on the first spin and blue on the second spin.

***P*(A, B) = *P*(A) × *P*(B)**
Sample space for 2 spins: {rr, rb, rg, bb, br, bg, gg, gr, gb}
P(red, blue) = $\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$

Dependent Event

Rosalie draws a marble from the bag. She keeps the red marble and passes the bag to Jolene to draw a marble. Jolene chooses a blue marble.

Sample space for the first draw: {r, b, g}
P(red) = $\frac{1}{3}$

Sample space for the second draw: {b, g}
P(blue after 1 red marble drawn) = $\frac{1}{2}$

Find the probability of drawing a red marble followed by a blue marble.

***P*(A, B) = *P*(A) × *P*(B after A)**
P(red, blue) = $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$

Ratios, Percents & Proportions

percent Per hundred; a ratio comparing a number to 100.

5 : 100 = $\frac{5}{100}$ = 0.05 = 5%
5 to 100 *5 hundredths* *5 hundredths* *5 percent*

proportion An equation stating that two ratios are equal.

$\frac{8}{12} = \frac{16}{24}$

ratio A comparison of two quantities. (See below for more information.)

rate A ratio that compares two quantities that have different measuring units.

scale A ratio comparing the size of a map, model, or drawing, and the size of the actual object.

unit rate A rate in which the second term is 1. (See below for more information.)

A **ratio** is a mathematical comparison of two quantities. The **terms** represent the items being compared. A ratio is read using the word *to*.

There are 4 girls to every 6 boys that play in the county soccer league. The ratio of girls to boys can be written three ways: 4 to 6, 4 : 6, or $\frac{4}{6}$.

Quantities can be compared differently; therefore, the order of the terms must match the order of the quantities being compared in the written statement.

Quantities	Ratio	Word Form	Ratio Form	Fraction Form
part to part	girls to boys	4 to 6	4 : 6	$\frac{4}{6}$
part to whole	girls to players	4 to 10	4 : 10	$\frac{4}{10}$
whole to part	players to girls	10 to 4	10 : 4	$\frac{10}{4}$

Equivalent ratios can be found by multiplying or dividing both terms of the ratio by the same nonzero number (a form of 1). It is similar to renaming a fraction into higher or lower terms. To simplify a ratio, rename it to lowest terms.

4 to 6 = 8 to 12 (× 2 / × 2)
4 to 6 = 2 to 3 (÷ 2 / ÷ 2)
4 : 10 = 12 : 30 (× 3 / × 3)
4 : 10 = 2 : 5 (÷ 2 / ÷ 2)
$\frac{10}{4} = \frac{40}{16}$ (× 4 / × 4)
$\frac{10}{4} = \frac{5}{2}$ (÷ 2 / ÷ 2)

A **rate** is a special ratio comparing two quantities having different measuring units. The **unit rate** tells how many of a quantity there are *per* one unit of another quantity.

To find the unit rate, rename the ratio using a denominator of 1.

$\frac{11}{4} = \frac{2.75}{1}$ (÷ 4 / ÷ 4)

Multiply the terms of the unit rate to find an equivalent ratio.

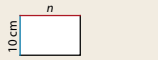
$\frac{12}{1} = \frac{48}{4}$ (× 4 / × 4)

Finding the Unknown Measure

Solve a proportion to find an unknown measure in similar figures.

Ratios Between Figures

Write a ratio for the corresponding sides of the two figures.



$\frac{6}{10} = \frac{n}{4}$ (6 · 10, 4 · n)
60 = 4n
$\frac{60}{4} = \frac{4n}{4}$
15 cm = n

Ratios Within a Figure

Write a ratio for the sides *within* the same figure.

$\frac{6}{10} = \frac{n}{4}$ (6 · 10, n · 4)
60 = 4n
$\frac{60}{4} = \frac{4n}{4}$
15 cm = n

A **proportion** is an equation stating that two ratios are equivalent. Ratios are **proportional** when they are equivalent. The terms can be compared vertically, horizontally, or diagonally to test for equivalency.

$\frac{1}{2} = \frac{3}{6}$ (× 3 / × 3)

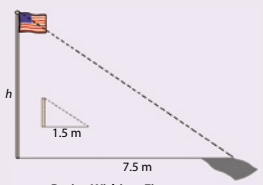
These ratios are equivalent and form a proportion.

$\frac{2}{3} \neq \frac{8}{10}$ (× 4 / × 4)

$\frac{2}{3}$ is **not proportional** to $\frac{8}{10}$.

Indirect measurement uses similar objects to find the measurement of an object difficult to measure. Solve a proportion to find the unknown measurement.

The sixth-grade class wanted to know the height of the flagpole in the schoolyard. The teacher taught them how to determine the height of the flagpole without measuring it using the length of the flagpole's shadow and the length of the shadow of a meter stick.



Ratios Between Figures

$\frac{\text{flagpole } h}{\text{meter } h} = \frac{\text{flagpole } s}{\text{meter } s}$

1.5 · h, $\frac{h}{1} = \frac{7.5}{1.5}$, 1 · 7.5

1.5h = 7.5
$\frac{1.5h}{1.5} = \frac{7.5}{1.5}$
h = 5 m

Ratios Within a Figure

$\frac{\text{flagpole } h}{\text{flagpole } s} = \frac{\text{meter } h}{\text{meter } s}$

1.5 · h, $\frac{h}{7.5} = \frac{1}{1.5}$, 7.5 · 1

1.5h = 7.5
$\frac{1.5h}{1.5} = \frac{7.5}{1.5}$
h = 5 m

A **scale** is a ratio of measurements that compares the size of a drawing, a map, or a model with the size of the actual object.

Actual Measurement

The distance between two cities on a map is 2.5 centimeters. Given a map scale of 1 cm : 100 km, what is the actual distance?

$$\frac{\text{map distance (cm)}}{\text{actual distance (km)}} = \frac{1}{100} \times \frac{2.5}{n}$$

$n = 250$ km

Drawing or Model Measurement

The length of a car is 156 inches. Find the length of a model car using the scale 1 in. : 52 in.

$$\frac{\text{model length}}{\text{actual length}} = \frac{1}{52} \times \frac{n}{156}$$

$156 = 52n$

$3 \text{ in.} = n$

Percent is a ratio in which a quantity is compared to 100. The symbol for percent is **%**. Percent means "out of 100," "per 100," or "÷ 100."

Change a Decimal to a Percent

Use mental math: move the decimal point two places to the right when multiplying by 100.

$0.71 \times 100 = 71\%$

$0.2 \times 100 = 20\%$

Change a Percent to a Decimal

Use mental math: move the decimal point two places to the left when dividing by 100.

$60\% = \frac{60}{100} = 60 \div 100 = 0.6$

$4\% = \frac{4}{100} = 4 \div 100 = 0.04$

Change a Fraction to a Percent

1. Divide. Round the answer to the nearest hundredth.
2. Change the decimal to a percent.

$\frac{3}{5} = 3 \div 5 = 0.6 = 60\%$

Change a Percent to a Fraction

1. Rename the percent as a fraction with 100 as the denominator.
2. Simplify the fraction by renaming to lowest terms.

$40\% = \frac{40}{100} = \frac{2}{5}$

Problems involving percents can be solved by setting up a proportion. An unknown in a proportion can be found by cross-multiplying or by finding the equivalent ratios.

$\frac{\text{part}}{100} = \frac{\text{part}}{\text{whole}}$

Cross-Multiply

$\frac{n}{100} = \frac{6}{23}$

$23 \cdot n = 100 \cdot 6$

$23n = 600$

$\frac{23n}{23} = \frac{600}{23}$

$n = 26.09$

About 26% of the sixth-grade class preferred Gooey Cluster bars.

Equivalent Ratios

$\frac{n}{100} = \frac{8}{25}$ (÷ 4)

$n \div 4 = 8$

$n \cdot 4 = 8 \cdot 4$

$n = 32$

32% of the fifth-grade class preferred Gooey Cluster bars.

Write an Equation

Find the unknown whole when given the percent and the part by substituting known information into the formula.

percent × whole = part

$30\% \times n = \$24$

$0.3n = \$24$

$\frac{0.3n}{0.3} = \$24 \div 0.3$

$n = \$80$

whole = part ÷ percent

$n = \$24 \div 30\%$

$n = \$24 \div 0.3$

$n = \$80$

The original amount was $80.

Write a Proportion

Find the unknown whole by solving a proportion. Solve by cross-multiplying or by finding the equivalent ratio.

$\frac{\text{part}}{100} = \frac{\text{part}}{\text{whole}}$

$\frac{30}{100} = \frac{\$24}{n}$

$30n = \$2{,}400$

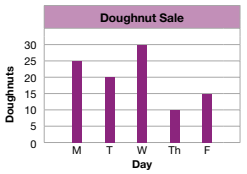
$\frac{30n}{30} = \frac{\$2{,}400}{30}$

$n = \$80$

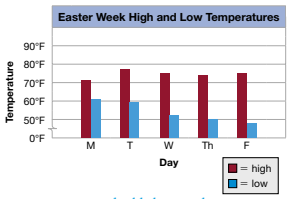
The original amount was $80.

average (mean) The number found by adding two or more quantities in a set of numbers and then dividing the sum by the number of addends.

bar graph A picture that compares data by using bars.



bar graph



double bar graph

circle graph A picture that shows data using a whole circle divided into parts.

cluster A tight grouping of data on the line plot.

coordinate plane A graph formed by two perpendicular number lines, one horizontal and one vertical. The point of intersection is zero for both number lines.

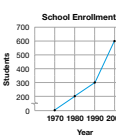
data Information or facts collected.

frequency The number of times a particular item of data occurs.

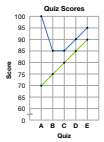
gap An empty space with no data on the line plot.

graphs Pictorial forms used to summarize data.

line graph A picture that shows changes over time by connecting points on a grid.

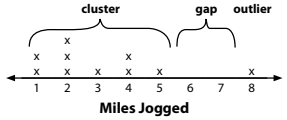


line graph



double line graph

line plot A picture that uses the range of data as its scale. Each piece of data is indicated by an *X* above the number it represents.



mean See *average*.

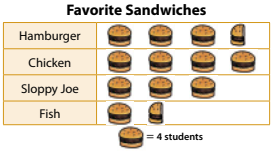
median The middle value (or an average of the two middle values) of a set of data when ordered from least to greatest.

mode The value that occurs most often or has the greatest frequency. Some sets may have more than one mode, and some sets may not have a mode.

ordered pair A pair of numbers that names the location of a point on a coordinate graph. (2, 7)

outlier A piece of data that is much greater or much less than the other data.

pictograph A picture that shows data using pictures and a key.



range The difference between the largest and smallest numbers in a set of data.

statistics The branch of mathematics that deals with the collection, organization, analysis, and interpretation of data. The data is more easily interpreted when displayed in a table, a chart, or a graph.

stem and leaf plot A picture that displays frequency of data using the tens digit of the data as its stems and the ones digit of the data as its leaves.

scores:
79, 87, 89, 89, 92, 92, 92, 94, 95, 98

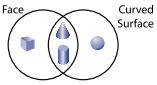
Math Test Scores	
Stem	Leaf
7	9
8	7 9 9
9	2 2 2 4 5 8

Key: 8|7 = 87

tally table A table that uses tally marks to record data.

Children Drinking Milk on Monday	
White	𝍸 ||||
Chocolate	𝍸 𝍸

Venn Diagram A diagram that uses circles or squares to show the relationship of sets.



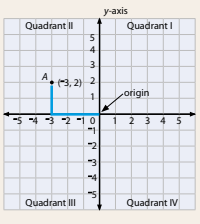
***x*-axis** The horizontal number line in a coordinate graph.

***y*-axis** The vertical number line in a coordinate graph.

A **coordinate plane** is formed by two number lines intersecting at right angles. The ***x*-axis** is the horizontal number line. The ***y*-axis** is the vertical number line. The point of intersection, called the **origin**, is 0 on both number lines. The two axes divide the coordinate plane into four sections called **quadrants**. The quadrants are numbered I, II, III, and IV.

An **ordered pair** describes the location of every point on a coordinate plane. The ***x*-coordinate** (first coordinate) tells the distance of the point along the *x*-axis—how far to move to the right or the left from the *origin*. The ***y*-coordinate** (second coordinate) tells the distance of the point along the *y*-axis—how far to move up or down from the origin.

When you move left or down from the origin, you encounter *negative* coordinates. Sometimes only Quadrant I of a coordinate plane is shown because only positive numbers are being graphed.



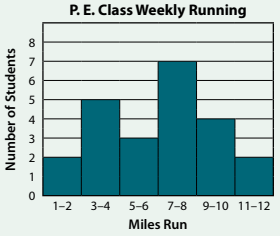
Point A (−3, 2) From the origin move 3 units to the left, since the 3 is negative. Then move 2 units up, since the 2 is positive.

Histograms

When there is a greater amount of data to graph, **histograms** are used instead of the typical bar graph. The data is separated into equal **intervals** on the horizontal axis. The vertical axis is used to show the frequency. A histogram always uses vertical bars with no spaces between them. A frequency table helps to organize the data before the histogram is constructed.

Data: 8, 7, 12, 7, 1, 5, 10, 2, 3, 10, 12, 9, 4, 6, 9, 4, 3, 7, 8, 5, 7, 4, 8

Interval	Tally	Frequency
1–2	||	2
3–4	𝍸	5
5–6	|||	3
7–8	𝍸 ||	7
9–10	||||	4
11–12	||	2



Box-and-Whisker Plot

A **box-and-whisker plot** summarizes data on a number line using a list that is organized from *least* to *greatest*.

Use the least value of the data as the beginning point of the number line and the greatest value of the data as the ending point.

Find the median of the whole set of data and plot that point on the number line. This is the **middle quartile**. The median separates the data into two sets.

Plot the **lower quartile** by finding the median for the lower half of the data.
Plot the **upper quartile** by finding the median for the upper half of the data.

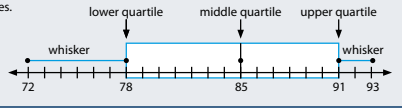
Draw a box from the lower quartile to the upper quartile. The whiskers are the lines that extend from the box to the least value and the greatest value of the data.

Remember to average the two middle numbers to find the median when there is an even number of data.

Number of points scored by the boy's basketball team: 72, 85, 91, 87, 79, 78, 93

Plot the middle, upper, and lower quartiles.

72, 78, 79, 85, 87, 91, 93
Median of data: 85
Lower quartile: 72 78 79 78
Upper quartile: 87 91 93 91



APPENDIX

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Bible Action Truths

The quality and consistency of a man's decisions reflect his character. Christian character begins with justification, but it grows throughout the lifelong process of sanctification. God's grace is sufficient for the task, and a major part of God's gracious provision is His Word. The Bible provides the very "words of life" that instruct us in salvation and Christian living. By obeying God's commands and making godly decisions based on His Word, Christians can strengthen their character.

Too often Christians live by only vague guidance—for instance, that we should "do good" to all men. While doing good is desirable, more specific guidance will lead to more consistent decisions.

Consistent decisions are made when man acts on Bible principles—or Bible Action Truths. The thirty-seven Bible Action Truths (listed under eight general principles) provide Christians with specific goals for their actions and attitudes. Study the Scriptures indicated for a fuller understanding of the principles in Bible Action Truths.

Thousands have found this format helpful in identifying and applying principles of behavior. Yet there is no "magic" in this formula. As you study the Word, you likely will find other truths that speak to you. The key is for you to study the Scriptures, look for Bible Action Truths, and be sensitive to the leading of the Holy Spirit.

1. Salvation-Separation Principle

Salvation results from God's direct action. Although man is unable to work for this "gift of God," the Christian's reaction to salvation should be to separate himself from the world unto God.

a. **Understanding Jesus Christ** (Matthew 3:17; 16:16; 1 Corinthians 15:3–4; Philippians 2:9–11) Jesus is the Son of God. He was sent to earth to die on the cross for our sins. He was buried but rose from the dead after three days.

b. **Repentance and faith** (Luke 13:3; Isaiah 55:7; Acts 5:30–31; Hebrews 11:6; Acts 16:31) If we believe that Jesus died for our sins, we can accept Him as our Savior. We must be sorry for our sins, turn from them, confess them to God, and believe that He will forgive us.

c. **Separation from the world** (John 17:6, 11, 14, 18; 2 Corin--thians 6:14–18; 1 John 2:15–16; James 4:4; Romans 16:17–18; 2 John 10–11) After we are saved, we should live a different life. We should try to be like Christ and not live like those who are unsaved.

2. Sonship-Servant Principle

Only by an act of God the Father could sinful man become a son of God. As a son of God, however, the Christian must realize that he has been "bought with a price"; he is now Christ's servant.

a. **Authority** (Romans 13:1–7; 1 Peter 2:13–19; 1 Timothy 6:1–5; Hebrews 13:17; Matthew 22:21; 1 Thessalonians 5:12–13) We should respect, honor, and obey those in authority over us. (attentiveness, obedience)

b. **Servanthood** (Philippians 2:7–8; Ephesians 6:5–8) Just as Christ was a humble servant while He was on earth, we should also be humble and obedient. (attentiveness, helpfulness, promptness, teamwork)

c. **Faithfulness** (1 Corinthians 4:2; Matthew 25:23; Luke 9:62) We should do our work so that God and others can depend on us. (endurance, responsibility)

d. **Goal setting** (Proverbs 13:12, 19; Philippians 3:13; Colossians 3:2; 1 Corinthians 9:24) To be faithful servants, we must set goals for our work. We should look forward to finishing a job and going on to something more. (dedication, determination, perseverance)

e. **Work** (Ephesians 4:28; 2 Thessalonians 3:10–12) God never honors a lazy servant. He wants us to be busy and dependable workers. (cooperativeness, diligence, initiative, industriousness, thoroughness)

f. **Enthusiasm** (Colossians 3:23; Romans 12:11) We should do all tasks with energy and with a happy, willing spirit. (cheerfulness)

3. Uniqueness-Unity Principle

No one is a mere person; God has created each individual a unique being. But because God has an overall plan for His creation, each unique member must contribute to the unity of the entire body.

a. **Self-concept** (Psalms 8:3–8; 139; 2 Corinthians 5:17; Ephesians 2:10; 4:1–3, 11–13; 2 Peter 1:10) We are special creatures in God's plan. He has given each of us special abilities to use in our lives for Him.

b. **Mind** (Philippians 2:5; 4:8; 2 Corinthians 10:5; Proverbs 23:7; Luke 6:45; Proverbs 4:23; Romans 7:23, 25; Daniel 1:8; James 1:8) We should give our hearts and minds to God. What we do and say really begins in our minds. We should try to think of ourselves humbly as Christ did when He lived on earth. (orderliness)

c. **Emotional control** (Galatians 5:24; Proverbs 16:32; 25:28; 2 Timothy 1:7; Acts 20:24) With the help of God and the power of the Holy Spirit, we should have control over our feelings. We must be careful not to act out of anger. (flexibility, self-control)

d. **Body as a temple** (1 Corinthians 3:16–17; 6:19–20) We should remember that our bodies are the dwelling place of God's Holy Spirit. We should keep ourselves pure, honest, and dedicated to God's will.

e. **Unity of Christ and the church** (John 17:21; Ephesians 2:19–22; 5:23–32; 2 Thessalonians 3:6, 14–15) Since we are saved, we are now part of God's family and should unite ourselves with others to worship and grow as Christians. Christ is the head of His church, which includes all believers. He wants us to work together as His church in carrying out His plans, but He forbids us to work in fellowship with disobedient brethren.

4. Holiness-Habit Principle

Believers are declared holy as a result of Christ's finished action on the cross. Daily holiness of life, however, comes from forming godly habits. A Christian must consciously establish godly patterns of action; he must develop habits of holiness.

a. **Sowing and reaping** (Galatians 6:7–8; Hosea 8:7; Matthew 6:1–8) We must remember that we will be rewarded according to the kind of work we have done. If we are faithful, we will be rewarded. If we are unfaithful, we will not be rewarded. We cannot fool God. (thriftiness)

b. **Purity** (1 Thessalonians 4:1–7; 1 Peter 1:22) We should try to live lives that are free from sin. We should keep our minds, words, and deeds clean and pure.

c. **Honesty** (2 Corinthians 8:21; Romans 12:17; Proverbs 16:8; Ephesians 4:25) We should not lie. We should be honest in every way. Even if we could gain more by being dishonest, we should still be honest. God sees all things. (fairness)

d. **Victory** (1 Corinthians 10:13; Romans 8:37; 1 John 5:4; John 16:33; 1 Corinthians 15:57–58) If we constantly try to be pure, honest, and Christlike, with God's help we will be able to overcome temptations.

5. Love-Life Principle

We love God because He first loved us. God's action of manifesting His love to us through His Son demonstrates the truth that love must be exercised. Since God acted in love toward us, believers must act likewise by showing godly love to others.

a. **Love** (1 John 3:11, 16–18; 4:7–21; Ephesians 5:2; 1 Corinthians 13; John 15:17) God's love to us was the greatest love possible. We should, in turn, show our love for others by our words and actions. (courtesy, compassion, hospitality, kindness, thankfulness to men, thoughtfulness)

b. **Giving** (2 Corinthians 9:6–8; Proverbs 3:9–10; Luke 6:38) We should give cheerfully to God the first part of all we earn. We should also give to others unselfishly. (hospitality, generosity, sharing, unselfishness)

c. **Evangelism and missions** (Psalm 126:5–6; Matthew 28:18–20; Romans 1:16–17; 2 Corinthians 5:11–21) We should be busy telling others about the love of God and His plan of salvation. We should share in the work of foreign missionaries by our giving and prayers.

d. **Communication** (Ephesians 4:22–29; Colossians 4:6; James 3:2–13; Isaiah 50:4) We should have control of our tongues so that we will not say things displeasing to God. We should encourage others and be kind and helpful in what we say.

e. **Friendliness** (Proverbs 18:24; 17:17; Psalm 119:63) We should be friendly to others, and we should be loyal to those who love and serve God. (loyalty)

6. Communion-Consecration Principle

Because sin separates man from God, any communion between man and God must be achieved by God's direct action of removing sin. Once communion is established, the believer's reaction should be to maintain a consciousness of this fellowship by living a consecrated life.

a. **Bible study** (1 Peter 2:2–3; 2 Timothy 2:15; Psalm 119) To grow as Christians, we must spend time with God daily by reading His Word. (reverence for the Bible)

b. **Prayer** (1 Chronicles 16:11; 1 Thessalonians 5:17; John 15:7, 16; 16:24; Psalm 145:18; Romans 8:26–27) We should bring all our requests to God, trusting Him to answer them in His own way.

c. **Spirit-filled** (Ephesians 5:18–19; Galatians 5:16, 22–23; Romans 8:13–14; 1 John 1:7–9) We should let the Holy Spirit rule in our hearts and show us what to say and do. We should not say and do just what we want to do, for those things are often wrong and harmful to others. (gentleness, joyfulness, patience)

d. **Clear conscience** (1 Timothy 1:19; Acts 24:16) To be good Christians, we cannot have wrong acts or thoughts or words bothering our consciences. We must confess them to God and to those people against whom we have sinned. We cannot live lives close to God if we have guilty consciences.

e. **Forgiveness** (Ephesians 4:30–32; Luke 17:3–4; Colossians 3:13; Matthew 18:15–17; Mark 11:25–26) We must ask forgiveness of God when we have done wrong. Just as God forgives our sins freely, we should forgive others when they do wrong things to us.

7. Grace-Gratitude Principle

Grace is unmerited favor. Man does not deserve God's grace. However, after God bestows His grace, believers should react with an overflow of gratitude.

a. **Grace** (1 Corinthians 15:10; Ephesians 2:8–9) Without God's grace we would be sinners on our way to hell. He loved us when we did not deserve His love and provided for us a way to escape sin's punishment by the death of His Son on the cross.

b. **Exaltation of Christ** (Colossians 1:12–21; Ephesians 1:17–23; Philippians 2:9–11; Galatians 6:14; Hebrews 1:2–3; John 1:1–4, 14; 5:23) We should realize and remember at all times the power, holiness, majesty, and perfection of Christ, and we should give Him the praise and glory for everything that is accomplished through us.

c. **Praise** (Psalm 107:8; Hebrews 13:15; 1 Peter 2:9; Ephesians 1:6; 1 Chronicles 16:23–36; 29:11–13) Remembering God's great love and goodness toward us, we should continually praise His name. (thankfulness to God)

d. **Contentment** (Philippians 4:11; 1 Timothy 6:6–8; Psalm 77:3; Proverbs 15:16; Hebrews 13:5) Money, houses, cars, and all things on earth will last only for a little while. God has given us just what He meant for us to have. We should be happy and content with what we have, knowing that God will provide for us all that we need. We should also be happy wherever God places us.

e. **Humility** (1 Peter 5:5–6; Philippians 2:3–4) We should not be proud and boastful but should be willing to be quiet and in the background. Our reward will come from God on Judgment Day, and men's praise to us here on earth will not matter at all. Christ was humble when He lived on earth, and we should be like Him.

8. Power-Prevailing Principle

Believers can prevail only as God gives the power. "I can do all things through Christ." God is the source of our power used in fighting the good fight of faith.

a. **Faith in God's promises** (2 Peter 1:4; Philippians 4:6; Romans 4:16–21; 1 Thessalonians 5:18; Romans 8:28; 1 Peter 5:7; Hebrews 3:18; 4:11) God always remains true to His promises. Believing that He will keep all the promises in His Word, we should be determined fighters for Him.

b. **Faith in the power of the Word of God** (Hebrews 4:12; Jeremiah 23:29; Psalm 119; 1 Peter 1:23–25) God's Word is powerful and endures forever. All other things will pass away, but God's Word shall never pass away because it is written to us from God, and God is eternal.

c. **Fight** (Ephesians 6:11–17; 2 Timothy 4:7–8; 1 Timothy 6:12; 1 Peter 5:8–9) God does not have any use for lazy or cowardly fighters. We must work and fight against sin, using the Word of God as our weapon against the Devil. What we do for God now will determine how much He will reward us in heaven.

d. **Courage** (1 Chronicles 28:20; Joshua 1:9; Hebrews 13:6; Ephesians 3:11–12; Acts 4:13, 31) God has promised us that He will not forsake us; therefore, we should not be afraid to speak out against sin. We should remember that we are armed with God's strength.

Bible Promises

A. **Liberty from Sin**—Born into God's spiritual kingdom, a Christian is enabled to live right and gain victory over sin through faith in Christ. (Romans 8:3–4—"For what the law could not do, in that it was weak through the flesh, God sending his own Son in the likeness of sinful flesh, and for sin, condemned sin in the flesh: that the righteousness of the law might be fulfilled in us, who walk not after the flesh, but after the Spirit.")

B. **Guiltless by the Blood**—Cleansed by the blood of Christ, the Christian is pardoned from the guilt of his sins. He does not have to brood or fret over his past because the Lord has declared him righteous. (Romans 8:33—"Who shall lay any thing to the charge of God's elect? It is God that justifieth." Isaiah 45:24—"Surely, shall one say, in the Lord have I righteousness and strength: even to him shall men come; and all that are incensed against him shall be ashamed.")

C. **Basis for Prayer**—Knowing that his righteousness comes entirely from Christ and not from himself, the Christian is free to plead the blood of Christ and to come before God in prayer at any time. (Romans 5:1–2—"Therefore being justified by faith, we have peace with God through our Lord Jesus Christ: by whom also we have access by faith into this grace wherein we stand, and rejoice in hope of the glory of God.")

D. **Identified in Christ**—The Christian has the assurance that God sees him as a son of God, perfectly united with Christ. He also knows that he has access to the strength and the grace of Christ in his daily living. (Galatians 2:20—"I am crucified with Christ: nevertheless I live; yet not I, but Christ liveth in me: and the life which I now live in the flesh I live by the faith of the Son of God, who loved me, and gave himself for me." Ephesians 1:3—"Blessed be the God and Father of our Lord Jesus Christ, who hath blessed us with all spiritual blessings in heavenly places in Christ.")

E. **Christ as Sacrifice**—Christ was a willing sacrifice for the sins of the world. His blood covers every sin of the believer and pardons the Christian for eternity. The purpose of His death and resurrection was to redeem a people to Himself. (Isaiah 53:4–5—"Surely he hath borne our griefs, and carried our sorrows: yet we did esteem him stricken, smitten of God, and afflicted. But he was wounded for our transgressions, he was bruised for our iniquities: the chastisement of our peace was upon him; and with his stripes we are healed." John 10:27–28—"My sheep hear my voice, and I know them, and they follow me: and I give unto them eternal life; and they shall never perish, neither shall any man pluck them out of my hand.")

F. **Christ as Intercessor**—Having pardoned them through His blood, Christ performs the office of High Priest in praying for His people. (Hebrews 7:25—"Wherefore he is able also to save them to the uttermost that come unto God by him, seeing he ever liveth to make intercession for them." John 17:20—"Neither pray I for these alone, but for them also which shall believe on me through their word.")

G. **Christ as Friend**—In giving salvation to the believer, Christ enters a personal, loving relationship with the Christian that cannot be ended. This relationship is understood and enjoyed on the believer's part through fellowship with the Lord through Bible reading and prayer. (Isaiah 54:5—"For thy Maker is thine husband; the Lord of hosts is his name; and thy Redeemer the Holy One of Israel; The God of the whole earth shall he be called." Romans 8:38–39—"For I am persuaded, that neither death, nor life, nor angels, nor principalities, nor powers, nor things present, nor things to come, nor height, nor depth, nor any other creature, shall be able to separate us from the love of God, which is in Christ Jesus our Lord.")

H. **God as Father**—God has appointed Himself to be responsible for the well-being of the Christian. He both protects and nourishes the believer, and it was from Him that salvation originated. (Isaiah 54:17—"No weapon that is formed against thee shall prosper; and every tongue that shall rise against thee in judgment thou shalt condemn. This is the heritage of the servants of the Lord, and their righteousness is of me, saith the Lord." Psalm 103:13—"Like as a father pitieth his children, so the Lord pitieth them that fear him.")

I. **God as Master**—God is sovereign over all creation. He orders the lives of His people for His glory and their good. (Romans 8:28—"And we know that all things work together for good to them that love God, to them who are the called according to his purpose.")

Manipulatives Management

Plan a storage system

- Use resealable plastic bags, envelopes, or paper cups to package items for individual students, partners, or groups.
- To provide ease of distribution, store packages in durable, labeled containers such as plastic storage bins or shoeboxes.
- Keep a "spare-parts" container.

Plan a distribution system

- One student in each row may distribute manipulatives to his row.
- Students may pass the container of manipulatives around the room.
- Students may pick up manipulatives on their way into the classroom from another activity.
- Students may keep manipulatives at their desks.
- The teacher may distribute manipulatives.

Organize for individual or group use

- Allow students to work in small groups, providing opportunities to explain their thinking to each other. Listen to their discussions to determine how well students understand a concept.

Obtain manipulatives alternatives (optional)

- See the Teacher's Toolkit CD for inexpensive manipulative alternatives.
- Arrange students to work in groups or as partners, allowing for the purchase of fewer manipulatives.
- Choose manipulatives that can be used to model several concepts.
- Share manipulatives with several classes. Establish a checkout system and store manipulatives in the school library or another convenient location.

Follow guidelines

- Make sure the students use manipulatives along with teacher demonstration.
- Before distributing new materials, discuss appropriate behavior for using them.
- Before teaching with new materials, allow time for students to play and explore with them.
- Do some group work to allow students to discuss their thinking with other students.
- Connect manipulatives activities to understanding the problems that students are solving.

Guide for Math Facts

Teaching Math Facts

Fact Memorization

Memorization of math facts is difficult for some students. A negative attitude that often lasts a lifetime begins when students become frustrated because they are unable to remember answers to facts. The ability to remember math facts is a memory skill, not a math skill. Some students memorize Bible verses easily and struggle to memorize math facts. Vital elements of memorization are understanding and concentration.

- Use manipulatives to develop students' understanding before giving them facts to memorize.
- Provide specific study times for a concentrated effort in memorization.
- Concentrate on memorizing only a few new facts while reviewing previously memorized facts. Too many flashcards will not provide the review needed. It is better to study only a few facts at a time. Practice is more beneficial when it is short and frequent.
- Vary the activities during the study time to include hearing, seeing, writing, and saying the facts. Involving nearly all the senses will aid the students in the recall of the facts.
- Expect students to state the fact with the answer, not just give the answer (e.g., 2 + 9 = 11).

The purpose of memorizing and practicing math facts is to obtain both accuracy and speed. Encourage the students to achieve accuracy first and then to work toward a quick recall of the facts. Lists of facts are located on pages A14–A16.

Fact Reviews

Student progress may be evaluated using the *Fact Reviews* which are located on the Teacher's Toolkit CD. The purpose of the evaluation is to check individual progress in the area of accuracy.

- Encourage each student to set a goal of mastering a few more facts on each consecutive Fact Review. You may choose to design a chart for each student to record his progress.
- Fact Reviews may be graded (if not timed) after students have had sufficient opportunities to practice and memorize the facts. For younger students or struggling students, it is reasonable to assign a grade based upon their improvement. Indicate how many facts are correct.
- Fact Reviews may be reproduced multiple times for additional practice at home and at school. Alternate the different Fact Reviews so students do not have the same review page consecutively.
- If you choose to time the Fact Reviews, begin by allowing 4 seconds for each fact. When the allotted time has passed, tell students to circle the last completed fact and to continue working until they complete the page. This approach provides the slower student with additional practice, and you can evaluate whether he knows the facts but needs to develop speed. Decrease the time gradually as the students develop confidence and demonstrate mastery of the facts.
- Timed Fact Reviews are for the purpose of increasing speed and mastery. They should not be graded.

Fact Strategies, Properties, and Principles

Some students may not memorize easily and may benefit from learning strategies. These strategies give the student a way to figure out the answer. Math properties and principles also aid students in completing the answers to facts.

Addition

- ***Count On 1***—Start with the larger addend and count on 1. (6 + 1 = __; count 6, 7)
- ***Count On 2***—Start with the larger addend and count on 2. (6 + 2 = __; count 6, 7, 8)
- ***Doubles***—Notice that both addends are the same. (4 + 4 = 8)
- ***Near Doubles***—Think of the double fact for the smaller addend and then add 1. (6 + 7 = __; think 6 + 6 = 12, 12 + 1 = 13)
- ***Adding 9***—Add 10 instead of 9 to the other addend and then subtract 1. (9 + 7 = __; add 10 + 7 = 17, 17 − 1 = 16)
- ***Identity Property of Addition***—When 0 is an addend, the sum is the other addend. (3 + 0 = 3)
- ***Commutative Property of Addition***—The order of the addends can be changed without changing the sum. (2 + 4 = 6, 4 + 2 = 6)
- ***Associative Property of Addition***—The grouping of the addends can be changed without changing the sum. [(6 + 2) + 2 = 10, 6 + (2 + 2) = 10]

Subtraction

- ***Count Back 1***—Count back 1 from the larger number. (6 − 1 = __; count 6, 5)
- ***Count Back 2***—Count back 2 from the larger number. (6 − 2 = __; count 6, 5, 4)
- ***Count Up***—When the numbers of a subtraction fact are close together in counting order, count up from the smaller number to the larger number. (9 − 6 = __; count 6, 7, 8, 9)
- ***Subtract All***—When *all* is subtracted from a number, the answer is 0. Both numbers of the subtraction problem are the same since the number is subtracted from itself. (8 − 8 = 0)
- ***Subtract Nearly All***—When *nearly all* is subtracted from a number, the answer is 1. (8 − 7 = 1)
- ***Zero Principle of Subtraction***—When 0 is subtracted from a number, the answer is that number. (8 − 0 = 8)

Multiplication

- **2 as a factor**—When 2 is a factor, double the other factor to find the product. ($2 \times 8 = \_\_$, $8 + 8 = 16$)
- **Count By**—Count by one of the factors to find the product; e.g., when 4 is a factor, count by 4s to find the product. ($5 \times 4 = \_\_$; count 4, 8, 12, 16, 20)
- **Identity Property of Multiplication**—When 1 is a factor, the product is the other factor. ($7 \times 1 = 7$)
- **Zero Property of Multiplication**—When 0 is a factor, the product is 0. ($4 \times 0 = 0$)
- **Commutative Property of Multiplication**—The order of the factors can be changed without changing the product. ($2 \times 3 = 6$, $3 \times 2 = 6$)
- **Associative Property of Multiplication**—The grouping of the factors can be changed without changing the product. [$(4 \times 2) \times 5 = 40$; $4 \times (2 \times 5) = 40$]
- **Multiplication-Addition Principle (Distributive Property)**—To find the product of 2 factors, separate 1 factor into 2 parts, multiply each part by the other factor, and add the partial products. [$5 \times 12 = \_\_$; $5 \times (10 + 2) = \_\_$, $(5 \times 10) + (5 \times 2) = \_\_$, $50 + 10 = 60$.]

Division

- **Count By**—Count by the divisor until you reach the dividend. [$20 \div 4 = \_\_$; count by 4s (the divisor): 4, 8, 12, 16, 20 (the dividend); counted 5 times, so $20 \div 4 = 5$.]
- **Related Multiplication Fact**—Think of the related multiplication fact to solve a division fact. ($18 \div 6 = \_\_$, think $6 \times 3 = 18$)

Math Background for the Teacher

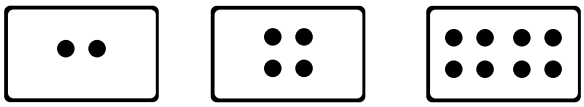
(Kindergarten—Grade 6)

Math is a skill subject. Each new skill builds on a previously learned skill. If a student is weak in a particular skill, many future skills are affected. When a building is built, the foundation determines the strength of the building. Likewise, it is important for the elementary math teacher to understand how math concepts are related so that a strong foundation is laid for future teachers to build upon. For example, if students do not understand addition or multiplication of whole numbers, they will struggle to understand addition and multiplication of fractions, decimals, and integers. Some students are able to memorize facts and follow procedural steps to find an answer, but they do not understand the process behind the operation or the meaning of the answer. It is important that these students are identified and their foundations strengthened, or they will struggle to understand more advanced math concepts.

Numeration

Teach numeration concepts to all students. Providing meaningful and enjoyable activities will span the needs of the advanced student as well as the less mature student and provide opportunities for all to succeed.

- *Rote counting* is oral counting to practice number sequence.
- *Counting objects* is counting a set of objects to find how many are in the set. By moving objects within a set, students learn to recognize that the number of objects remains the same regardless of their position.
- *Making sets* is making a set containing a specific number of objects.
- *Number recognition* is identifying a specific number.
- *Number reading* is telling the name of a specific number.
- *Number writing* includes tracing and writing a number.
- *One-to-one correspondence* is the matching of two sets of objects so that each object in the first set is matched to an object in the second set.
- *Comparing numbers* is matching two sets of objects to find out which set has more objects or fewer objects. Students will compare the value of a number as being greater than or less than another number.
- *Ordinal numbers* are those that describe the position of an object: first, second, third, and so on.
- *Dot patterns* are dots arranged in a specific pattern to provide a visual system for immediate recognition of the number in a set.



Ordering/Seriation

- Students learn to order objects from shortest to tallest, longest to shortest, and smallest to largest. They also learn relationships such as *more than, less than,* and *the same as*.
- Toys, measuring cups, and other household objects help students understand ordering.

Place Value

- Students benefit from activities that include groups of hundreds, tens, and individual items (ones).
- Students need to connect written numbers to a set of objects representing that number. Provide objects such as dimes, pennies, beansticks, Unifix Cubes, base ten blocks, an abacus, and even packages of candy for making groups.

Addition

Definition and Terms

- *Addition* is the process of joining two or more sets.
- *Addends* (each number to be added) are the sets to be joined together in an addition equation.
- *Sum* (the answer) is the resulting set after two or more sets are joined together.

Readiness

- Students learn to make the addends, using manipulatives. Each student needs experience in joining sets of objects and discovering how many are in the new set.
- Students discover that when they combine unlike sets, the new sets of objects will have new names.

$$\text{dogs} + \text{cats} = \text{animals}$$

Sequential Learning Steps

- Addition starts with joining sets that do not require renaming. When joining sets that require renaming, it is important to name the place and the value of each digit.

$$19 \text{ is } 1 \text{ ten and } 9 \text{ ones.}$$

- The first step in renaming is adding sets that require the renaming of 10 ones as a set of 1 ten.

$$\begin{aligned} 8 \text{ ones} + 7 \text{ ones} &= 15 \text{ ones} \\ &= 1 \text{ ten } 5 \text{ ones} \end{aligned}$$

Properties of Addition

- The *Commutative Property* (called the *Order Principle* in lower grades) means that the order of the addends does not affect the sum.

$$2 + 3 = 3 + 2$$

Subtraction is *not* commutative.

$$3 - 2 = 2 - 3$$

- The *Identity Property* (called the *Zero Principle* in lower grades) means that when adding 0 (the identity element) to any addend, the sum is always the nonzero addend.

$$3 + 0 = 3$$
$$0 + 3 = 3$$

Subtraction has no identity element.

$$3 - 0 = 3$$
$$0 - 3 \neq 3$$

- The *Closure Property* means that when two whole numbers are added, the sum is a whole number. The set is said to be closed because there will be only whole numbers in the operation.

$$5 + 3 = 8$$

Closure does *not* apply in subtraction because the difference is not always a whole number.

$$4 - 5 = {}^{-}1$$

When teaching subtraction it is important *not* to say "You cannot subtract 5 from 4." Rather use concrete materials to show that there are not enough objects in the set to solve the problem.

- The *Associative Property* (called the *Grouping Principle* in the lower grades) means that the order in which several addends are grouped will not affect the sum.

$$(2 + 3) + 4 = 9$$
$$2 + (3 + 4) = 9$$

The three addends need to be grouped into sets of two because we can join only two sets at a time. It does not matter which sets are joined first.

Subtraction is *not* associative.

$$(4 - 2) - 1 = 1$$
$$4 - (2 - 1) = 3$$

Subtraction

Definition and Terms

- *Subtraction* is the opposite or inverse operation of addition. It is the removal of parts from a whole set. Subtraction is also used in comparing sets and finding a missing addend.
- *Minuend* (the first number in a subtraction equation) is the whole set that will be separated into subsets.
- *Subtrahend* (the second number in a subtraction equation) is the subset or part removed from the whole set (the minuend).
- *Minus* is the sign in a subtraction problem. It is important for students to call this sign by its mathematical name. When reading a subtraction problem, always read the sign as "minus," not as "take-away." (Many subtraction word problems are take-away problems, but the take-away problem is only one type of subtraction. Students that refer to the sign as a take-away sign frequently struggle when a subtraction word problem is not a take-away problem.)

Readiness

- Students learn to make the minuend using manipulatives. Students need experiences in removing part of the set (the subtrahend) from the whole set and discovering how many remain.
- Students benefit from using one-to-one correspondence to compare two sets and determine how many *more* objects are in one set.

Sequential Learning Steps

- Subtraction begins with removing a set that does not require renaming. When removing a set that requires renaming, it is important to name the place and the value of each digit. The first step in renaming is subtracting a set that requires the renaming of 1 ten as 10 ones.

$$12 - 5 =$$
12 is 1 ten and 2 ones.
Rename 1 ten as 10 ones so 12 becomes 12 ones.
Subtract 5 ones from 12 ones.
7 ones remain.

Types of Subtraction

- Students must learn that there are several situations that call for subtraction. This concept is important when problem solving so that students can determine the correct problem-solving method.
- It is *not* important that a student initially be able to label the different types, but he does need to understand the different situations in which he will need to subtract.
- In *take-away* problems, part is taken away from the whole set. The student subtracts to find out how much is left.

There were 6 cookies. Tom ate 4 cookies. How many cookies remain?

6 − 4 = 2 cookies

- In *comparison* problems, two sets are being compared. The student subtracts to find out the difference between the two sets (how much more or how much less).

Bill ate 6 cookies, and Tom ate 4 cookies. How many more cookies did Bill eat than Tom?

6 − 4 = 2 cookies

- In *missing addend* problems, part of the set is missing. The student subtracts to find out how many must be added to make the set whole.

There are 4 cookies in the package. If each package holds 6 cookies, how many cookies are needed to fill the package?

4 + ___ = 6
6 − 4 = 2 cookies

- In *unknown part* problems, the whole set has been separated into two parts. The student knows one part, so he subtracts to find out the other part.

There are 6 cookies in the package. Four of the cookies are chocolate; the rest of the cookies are peanut butter. How many peanut butter cookies are there?

$6 - 4 = 2$ *cookies*

- In *missing subtrahend* problems, part is taken away from the whole set. The student knows how much remains, so he subtracts to find out how much was taken away.

Six cookies were placed on the plate. Now there are 4 cookies on the plate. How many cookies were taken?

$6 - 4 = 2$ *cookies*

Addition/Subtraction Fact Memorization

- Frequent practice is needed in order for most students to memorize the facts. Students usually do not master the facts in a single year, but they need fact practice throughout the elementary years. It is important that understanding the addition and subtraction operations is emphasized before students begin to memorize the facts.
- Understanding the *Commutative Property* reduces the number of addition facts to memorize. There are forty-five pairs of addition facts. If a student remembers one fact, he can change the order of the addends for the other fact.

$3 + 2 = 5$ $\quad$ $5 + 7 = 12$ $\quad$ $4 + 6 = 10$
$2 + 3 = 5$ $\quad$ $7 + 5 = 12$ $\quad$ $6 + 4 = 10$

- Understanding the *Identity Property* makes all facts with 0 as an addend easy to remember.

$0 + 6 = 6$ $\quad$ $3 + 0 = 3$ $\quad$ $0 + 9 = 9$

- A *fact family* is three related numbers that have four (or two) addition and subtraction facts. Understanding of addition and subtraction as inverse operations increases when addition and subtraction facts are learned in a fact family.

2-4-6

$2 + 4 = 6$ $\quad$ $6 - 2 = 4$
$4 + 2 = 6$ $\quad$ $6 - 4 = 2$

- Many students learn the families with doubles easily.

4-4-8

$4 + 4 = 8$ $\quad$ $8 - 4 = 4$

- Near doubles are made easier if a student knows the doubles and then adds 1 or subtracts 1.

$6 + 7 =$
think $(6 + 6) + 1 =$
$12 + 1 = 13$

- Adding 9 is made easier if a student knows how to add 10 and subtract 1.

$9 + 4 =$
think $(10 + 4) - 1 =$
$14 - 1 = 13$

Multiplication

Definition and Terms

- *Multiplication* is the repeated addition of equal-sized sets to form a new set.

$4 \times 7 = 28$
$7 + 7 + 7 + 7 = 28$

- *Factors* are the numbers in a multiplication equation that are multiplied together.
- *Multiplier* is the first factor in an equation; it tells the number of groups or sets (the number of times you repeat the addition of these sets).
- *Multiplicand* is the second factor in an equation; it tells the number of objects in each set.
- *Product* (the answer) is the resulting set after all the equal-sized sets are joined together.

Readiness

- Students learn to make equal-sized sets using manipulatives. Students need experience in counting the objects in these sets and also in joining the sets to discover how many are in the new set.
- Students learn to count by 2s, 5s, and 10s, so these facts are easier to memorize. Students should also practice skip counting by 3s, 4s, 6s, 7s, 8s, and 9s.
- Extensive work on developmental concepts of multiplication is appropriate for nearly all students.

Sequential Learning

- The first step in multiplication is to understand that it is the same process as repeated addition, but multiplication simplifies and shortens the computational process.
- Multiplication begins by working with small groups of up to ten objects before memorizing the basic facts.

Properties of Multiplication

- The *Commutative Property* (called the *Order Principle* in lower grades) means that the order of the factors does not affect the product.

$$2 \times 3 = 3 \times 2$$

  Division is *not* commutative.

$$6 \div 2 \neq 2 \div 6$$

- The *Identity Property* means that when multiplying 1 (the identity element) by any factor, the product is always the other factor.

$$3 \times 1 = 3$$
$$1 \times 3 = 3$$

  Division has no identity element.

$$3 \div 1 = 3$$
$$1 \div 3 \neq 3$$

- The *Closure Property* means that when two whole numbers are multiplied, the product is a whole number. The set is said to be closed because there will be only whole numbers in the operation.

$$3 \times 7 = 21$$

  Division does *not* have closure because some answers require a remainder that is less than a whole.

$$7 \div 5 = 1\tfrac{2}{5}$$

- The *Associative Property* (called the *Grouping Principle* in the lower grades) means that the order in which several factors are grouped will not affect the product. The three factors need to be grouped into sets of two because you can multiply only two factors at a time. It does not matter which two factors you choose to multiply first.

$$(2 \times 3) \times 4 = 24$$
$$2 \times (3 \times 4) = 24$$

  Division is *not* associative.

$$(12 \div 2) \div 3 = 12 \div (2 \div 3)$$

- The *Distributive Property* (called the *Multiplication/Addition Principle* in lower grades) means that a product can be found by separating one factor into addends, multiplying each addend by the other factor, and adding the partial products together. The Distributive Property also applies to subtraction.

Multiplication over Addition

$$\begin{aligned} 6 \times 7 &= \\ 6 \times (5 + 2) &= \\ (6 \times 5) + (6 \times 2) &= \\ 30 + 12 &= 42 \end{aligned}$$

Multiplication over Subtraction

$$\begin{aligned} 9 \times 8 &= \\ 9 \times (10 - 2) &= \\ (9 \times 10) - (9 \times 2) &= \\ 90 - 18 &= 72 \end{aligned}$$

- Students may have a better understanding of the Distributive Property if one of the factors is a two-digit number so that the ones and tens can be considered separately.

$$\begin{aligned} 3 \times 75 &= \\ 3 \times (70 + 5) &= \\ (3 \times 70) + (3 \times 5) &= \\ 210 + 15 &= 225 \end{aligned}$$

$$\begin{array}{r} 75 \\ \times\ 3 \\ \hline 15 \\ +\ 210 \\ \hline 225 \end{array} \qquad \begin{array}{l} \\ \\ 3 \times 5 \\ 3 \times 70 \end{array}$$

- When introducing multiplication, teachers should express the place value as the problem is worked.

$$\begin{array}{r} 513 \\ \times\ 4 \\ \hline 12 \\ 40 \\ +\ 2000 \\ \hline 2052 \end{array} \qquad \begin{array}{r} \\ \\ 4 \times 3 \text{ ones} = 12 \text{ ones} \\ 4 \times 1 \text{ ten} = 4 \text{ tens} \\ 4 \times 5 \text{ hundreds} = 20 \text{ hundreds} \end{array}$$

- Expressing place value should extend into multiplication with a two-digit multiplier.

Division

Definition and Terms

- *Division* is the opposite or inverse operation of multiplication. It is repeated subtractions or the removal of equal-sized sets from a whole set.
- *Dividend* is the total number of items in the set or the amount to be divided.
- *Divisor* is the number of equal-sized sets to be removed or the number in each of these sets. It is the number to divide by.
- *Quotient* (the answer) is the number of equal-sized sets removed or the number in each of these sets resulting from the division.
- *Remainder* is the number left after the division is complete. The remainder is less than the amount that the identical subsets have. The remainder indicated as the amount left over can be expressed as a fraction of the dividend, rounded up, or just disregarded.

$17 \div 5 = 3$ remainder 2
$17 \div 5 = 3\frac{2}{5}$
$17 \div 5 = 3.4$

Types of Division

- A student should learn that there are several situations that call for division. This concept is important during problem solving so that the student can determine the correct problem-solving method.
- It is *not* important that a student initially be able to label the different types, but he needs to understand the different situations in which he will need to divide.
- In *measurement* division there is repeated subtraction from the original set. The answer can be found by removing equal sets of manipulatives from the original/whole set in a repeated subtraction sequence. The question tells how many are in each set. Divide to find out how many sets.

How many tables will be needed for 24 people if 4 people sit at each table?

Separate or divide 24 people into groups of 4 to determine how many groups of 4 there are and how many tables are needed.

$24 \div 4 = 6$ tables

- In *partition* or *partitive* division there is a separation of the original set into equal-sized subsets. The question tells you how many equal-sized sets. Divide to find out how many are in each set.

How many people will be seated at each table if there are 6 tables for 24 people?

$24 \div 6 = 4$ people

Multiplication/Division Fact Memorization

- Frequent practice is needed in order for most students to memorize the facts. Students usually do not master the facts in a single year but need fact practice throughout the elementary years. It is important that understanding the multiplication and division operations is emphasized before students begin to memorize the facts.
- Understanding the *Commutative Property* reduces the number of multiplication facts to memorize. If a student remembers one fact, he can change the order of the factors for the other fact.

$3 \times 5 = 15$ $\quad$ $6 \times 7 = 42$ $\quad$ $4 \times 8 = 32$
$5 \times 3 = 15$ $\quad$ $7 \times 6 = 42$ $\quad$ $8 \times 4 = 32$

- Understanding the *Identity Property* makes all facts with 1 as a factor easy to remember.

$1 \times 6 = 6$ $\quad$ $7 \times 1 = 7$ $\quad$ $1 \times 9 = 9$

- Multiplication facts with 0 as a factor are easy for students since making 0 sets of a number or having a number of sets containing 0 objects always results in 0.

$0 \times 6 = 0$ $\quad$ $7 \times 0 = 0$ $\quad$ $0 \times 9 = 0$

- Division facts with 0 are more difficult for students to understand. A fact can have a dividend of 0 and the quotient will be 0 because 0 objects divided evenly into any number of sets will result in 0 objects in each set.

$0 \div 4 = 0$ $\quad$ $0 \div 7 = 0$ $\quad$ $0 \div 9 = 0$

A division fact cannot have a divisor of 0 because the quotient cannot be determined. The fact is undefined. A set of objects cannot be divided evenly into 0 sets.

$4 \div 0 =$ undefined $\quad$ $7 \div 0 =$ undefined

- A *fact family* is three related numbers that have four (or two) multiplication and division facts. When multiplication and division facts are learned in a fact family, understanding of multiplication and division as inverse operations increases. There are no multiplication/division fact families that contain 0 since 0 can never be a divisor.

4-8-32

$4 \times 8 = 32$ $\quad$ $32 \div 4 = 8$
$8 \times 4 = 32$ $\quad$ $32 \div 8 = 4$

- Many students easily learn the families with doubles.

7-7-49

$7 \times 7 = 49$ $\quad$ $49 \div 7 = 7$

Measurement

Readiness

- Students need many experiences in measuring with nonstandard and standard units of measure before they will realize that shape or position does not affect quantity.
- Young students need to measure objects that they frequently encounter and are part of their world of interest.

  the length of a crayon
  the height of a desk
  the amount of drink in a cup
  the distance to the water fountain
- Beginning measuring activities should include measuring with nonstandard units. Young students have never measured with an inch ruler, so it is important that they measure with objects such as a paper clip, Unifix®Cubes, a shoe, or a crayon. Neither have they held an object containing a liter or weighing a pound. If the students were allowed to hold a liter bottle of water, they may confuse the capacity of the bottle with the weight of it. Also, since students have used different-sized cups at home, some do not understand that 1 cup is a standard measure that remains the same.
- Students do *not* realize that smaller units will be expressed with a larger number when measuring. It seems a contradiction to them that 12 *inches* is the same as 1 *foot* because 12 is larger than 1. Experiences measuring the same object using different units will help to develop this understanding.

12 inches = 1 foot

Standard Units of Measure

- Most countries use metric measurements as their standard measures. People in the United States come in contact with metric measurements every day if they purchase a soft drink in a liter bottle or a prescription in milligrams, or if they work in an area of science.
- The *Metric System* makes it possible to rename units using multiples of 10.

  1 millimeter × 1000 = 1 meter
  1 centimeter × 100 = 1 meter
  1 decimeter × 10 = 1 meter
- The *U.S. Customary System* seems rather chaotic in comparison to the metric system.

  1 inch × 12 = 1 foot
  1 inch × 36 = 1 yard
  1 foot × 3 = 1 yard
  1 ounce × 16 = 1 pound
  1 cup × 2 = 1 pint
  1 pint × 2 = 1 quart
  1 quart × 4 = 1 gallon
- It is important to provide students with activities using the metric and the customary systems in order to develop an understanding of both systems.

Geometry

- Students learn about the figures that men use to describe things observed in God's creation. The attributes, relationships, and measurements of basic geometric elements such as the point, line, angle, and surface make up these figures.
- Young students need to hold flat shapes so they can feel the edges and corners as they count them. This activity enables students to classify and identify shapes, even if they cannot define them. For example, students can distinguish a square from other flat shapes, but most will not be able to define what makes it a square.
- Young students are able to develop an understanding of geometric concepts such as patterns, positions, and symmetry.
- Young students need opportunities to hold solid objects so they can feel the edges, the vertices, and the curved surfaces. Students need to experiment with these objects to see which ones can roll. They will learn to distinguish a cylinder (can-shape) from other solid figures, but they will not be able to define it until they are older.
- Students benefit from paper-folding and paper-cutting activities; these help students to develop an understanding of symmetry.
- Students need to learn about patterns; this concept is best introduced using flat shapes and solid figures. Identifying, copying, and extending shape patterns develops problem-solving skills. The pattern concept will be expanded further as students move from working with shape patterns to working with number patterns.
- As students study geometric properties, connections between arithmetic and geometry are developed. For example, if you want to determine the amount of edging needed to go around a tree, you must first know the shape being made. If you make a square with the edging, you will need to find the size of the square and calculate the perimeter of that square. However, if you make a circle with the edging, you will need to find the size of the circle and calculate the circumference of that circle.

Fractions

Definition and Terms

- A *fraction* names part of a whole or part of a set. A *fraction* indicates a quantity less than 1.
- *Numerator* is the digit above the fraction bar. It tells the **number** of parts that are being considered.
- *Denominator* is the digit below the fraction bar. It **names** the number of equal parts in all.

$\frac{\text{numerator (number)}}{\text{denominator (name)}}$ $\frac{\text{three}}{\text{fourths}}$ $\frac{3}{4}$

- *Mixed number* is the sum of a whole number and a fraction. It contains a whole number and a fraction.

$2\frac{3}{4}$

- *Improper fraction* is a fraction in which the numerator is equal to or greater than the denominator. Its value is equal to or greater than 1.

$\frac{4}{4}$ $\frac{7}{4}$

- *Equivalent fractions* name the same part of a whole or the same part of a set. These fractions have an equal value.
- *Like fractions* are fractions that have the same denominator.
- *Unlike fractions* are fractions that have different denominators. Unlike fractions are *related fractions* when one of the denominators is a multiple of the other denominator; they are *unrelated fractions* when neither denominator is a multiple of the other denominator.
- *Least common denominator* is the least common multiple of two or more denominators.
- *Multiple* is the product of two whole numbers. For example, the first five multiples of 4 are 0, 4, 8, 12, and 16.
- *Prime number* is a number with exactly two different factors (the number itself and 1). The first five prime numbers are 2, 3, 5, 7, and 11.
- *Reciprocals* are two numbers that when multiplied together equal 1.

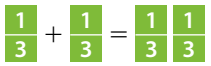
$\frac{1}{4} \times \frac{4}{1} = \frac{4}{4}$ or 1, so $\frac{4}{1}$ is the reciprocal of $\frac{1}{4}$

Readiness

- Young students should see and manipulate real objects (such as an apple, a pan of brownies, or a pizza) that are cut in halves, thirds, and fourths.
- Students of all ages need to use fraction manipulatives before performing mathematical operations with fractions. A fraction kit containing colored fraction pieces helps students to compare and order fractions, find equivalent fractions, and add, subtract, multiply, and divide with fractions.

Addition and Subtraction of Fractions

- Students begin addition and subtraction with *like* fractions using fraction manipulatives. A frequent addition error is that students add the numerators together and then add the denominators together. For example, they add $\frac{1}{3} + \frac{1}{3}$ and get $\frac{2}{6}$. The use of fraction manipulatives usually eliminates this error.



$\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$

- Students progress to addition and subtraction of *unlike* fractions. Using fraction manipulatives, students become familiar with renaming *related* fractions so that they have a common denominator.

$\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

- To add and subtract unlike fractions without manipulatives, the fractions must be renamed into equivalent fractions having a common denominator. Strategies need to be taught for determining which common denominator should be used and then finding equivalent fractions in that denominator.
- Equivalent fractions are found by applying the Identity Property of Multiplication. When multiplying any fraction by 1 (or a fractional form of 1 such as $\frac{3}{3}, \frac{4}{4}, \frac{10}{10}$), its value remains the same.

$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$ $\frac{1}{2} \times \frac{4}{4} = \frac{4}{8}$ $\frac{1}{2} \times \frac{10}{10} = \frac{10}{20}$

$\frac{1}{2} = \frac{3}{6}$ $\frac{1}{2} = \frac{4}{8}$ $\frac{1}{2} = \frac{10}{20}$

- To determine which *common denominator* to use for solving an addition or subtraction problem, multiply the two denominators together or find the LCM (least common multiple) of the two denominators.
- Multiplying the denominators together to find a common denominator is best used when one or both denominators are prime, but this method can be used with any fractions.

$\frac{3}{4} + \frac{1}{5} =$

$4 \times 5 = 20$

$\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$ $\frac{1}{5} \times \frac{4}{4} = \frac{4}{20}$

$\frac{15}{20} + \frac{4}{20} = \frac{19}{20}$

1. Multiply denominators.
2. Rename as equivalent fractions with a denominator of 20.
3. Add.

- Finding the LCM to determine the least common denominator is best used when neither denominator is prime, but this method can be used with any fractions.

$$\frac{10}{24} - \frac{7}{18} =$$

multiples of 24: 24, 48, 72, 96, 120
multiples of 18: 18, 36, 54, 72, 90, 108, 126

$$\frac{10}{24} \times \frac{3}{3} = \frac{30}{72} \qquad \frac{7}{18} \times \frac{4}{4} = \frac{28}{72}$$

$$\frac{30}{72} - \frac{28}{72} = \frac{2}{72} = \frac{1}{36}$$

1. Find the LCM by using one of two methods: listing multiples of each denominator (shown above) or listing the prime factorizations of each denominator and multiplying by the highest power of each prime number.
2. Rename as equivalent fractions with a denominator of 72.
3. Subtract. Simplify if necessary.

- The teacher's edition and student text provide several strategies for helping students understand how to determine prime factors for multiple numbers.

Multiplication and Division of Fractions

- Most students have little difficulty multiplying fractions. It is important to use manipulatives and real-life applications so that students understand what is happening.
- *Multiplication of a whole number by a fraction* is the repeated addition of equal-sized fractions.

Mom bought 3 pieces of different-colored fabric for her quilt. Each piece is $\frac{1}{4}$ yard long. How much fabric did she buy?

$$3 \times \frac{1}{4} = \frac{3}{4}$$

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} \text{ yard}$$

- *Multiplication of a fraction by a fraction* is often used to find a fraction of a measure.

Mom has a recipe that calls for $\frac{2}{3}$ cup of sugar. How much sugar will she need if she makes $\frac{1}{2}$ of the recipe?

$$\frac{1}{2} \times \frac{2}{3} = \frac{2}{6} \text{ or } \frac{1}{3} \text{ cup sugar}$$

- *Multiplication of a fraction by a whole number* is often used when finding a part of a set.

Alice has 8 stuffed animals on her bed. One-fourth of these animals are dogs. How many stuffed dogs does Alice keep on her bed?

$$\frac{1}{4} \times 8 = \frac{8}{4} \text{ or 2 dogs}$$

- Division is more difficult to understand than multiplication. Apply the division of fractions to a real-life situation in order to help students understand the division concept.

John has $\frac{3}{4}$ of a yard of string. He is cutting the string into pieces that are $\frac{1}{8}$ yard long. How many pieces of string $\frac{1}{8}$ yard long will he have?

$$\frac{3}{4} \div \frac{1}{8} = 6 \text{ pieces of string}$$

- An understanding of the division process helps to develop an understanding of algebraic equations. The easiest number to have as the divisor in a division problem is 1. To change a fraction to 1, multiply by its reciprocal. In order not to change the result of the equation when multiplying the divisor by a number, multiply the dividend by that same number.

$$\frac{3}{4} \div \frac{1}{8} =$$

$$\left(\frac{3}{4} \times \frac{8}{1}\right) \div \left(\frac{1}{8} \times \frac{8}{1}\right) =$$

$$\left(\frac{3}{4} \times \frac{8}{1}\right) \div 1 =$$

$$\frac{24}{4} \div 1 =$$

$$6 \div 1 = 6 \text{ pieces of string}$$

Decimals

- *Decimals* or *decimal fractions* are fractions that have denominators that are powers of ten (i.e., tenths, hundredths, thousandths). The decimal point makes it unnecessary to write the denominator.
- Decimal fractions should build upon the relationship between decimals and fractional forms.
- Students of all ages need to use manipulatives to represent decimals before performing mathematical operations with them. A student's use of a place value kit and money helps him compare and order decimals, find equivalent decimals, and add, subtract, multiply, and divide with decimals.
- When the decimal point is regarded as the center of a number, the digits on either side of the decimal point do *not* have symmetry with regard to place value. There is symmetry when the *Ones place* is considered as the center of the decimal numeral. The decimal point shows the location of the *Ones place*.

- Students need to regard the decimal point as marking the *Ones place*. This approach will help them to see the relationship between what they know about place value of whole numbers and the corresponding place on the decimal side of the *Ones place*.

Addition and Subtraction of Decimals

- After students use manipulatives to model tenths and hundredths, they quickly understand addition and subtraction because of the foundation they have established when working with whole number addition and subtraction concepts.
- Addition and subtraction begin with joining sets that do not require renaming, but renaming can be introduced soon afterward. Just as students know to rename 10 ones as 1 ten and 10 tens as 1 hundred, they learn to rename 10 tenths as 1 one and 10 hundredths as 1 tenth. Manipulatives should be used for students to totally develop the understanding of renaming with decimals.
- Addition and subtraction of decimals with different powers of ten can be troublesome for some students. They need to learn to keep the place value columns lined up at the decimal point. Annexing zeros in empty places on the right is helpful for some students.

0.115	0.1150
0.72	0.7200
+ 0.3146	+ 0.3146

Multiplication and Division of Decimals

- The process for multiplying and dividing with decimals is the same as with whole numbers. Students should use manipulatives to illustrate the multiplication and division process with decimals. Students can use manipulatives to multiply a whole number by a decimal and to divide a decimal by a whole number.
- Determining the position of the decimal point in the answer is difficult for some students. In multiplication the number of decimal places in the product is the sum of the number of decimal places in the factors.

24.57	(2 places)
× 4.1	+ (1 place)
100.737	(3 places)

- In division, if the divisor is a decimal, change the divisor to a whole number before dividing. To change the decimal to a whole number, multiply the divisor by a power of 10 (i.e., 10, 100, 1000). In order not to change the quotient, the dividend must also be multiplied by the same power of 10. The result is the positioning of the decimal point so that the problem represents a whole number operation.

$5.5\overline{)111.65}$ $\qquad$ $10 \times 5.5\overline{)111.65} \times 10$ $\qquad$ $55\overline{)1116.5}$

Problem Solving

- Problem solving is the primary goal of all math instruction. It is the process of confronting a problem by using one's knowledge and insight to solve the problem. Solving problems successfully is a result of understanding, questioning, and thinking. A good problem solver will realize there may be alternative processes for finding solutions.
- Math has a language that describes the basic operations, number relationships, and meanings of abstract symbols. Students learn math language by using concrete materials and pictures as models. Words and symbols are introduced as they describe the action that is taking place.
- Problem solving does not refer just to word problems. Word problems are simply simulations of real-life situations that require reasoning and a mathematical answer. Not all problem-solving activities require mathematical answers. Some activities, such as identifying and extending color or shape patterns, develop a student's reasoning abilities or critical-thinking skills.
- Teachers should *not* teach students to look for *keywords* to tell them what operation to use to solve a word problem. Memorizing keywords does not develop a student's reasoning or critical-thinking skills. Keywords are usually not included in real-life problems, and the goal is to produce a student that can solve problems in real life.
- Allowing a student to explain how he might try to solve a problem and asking questions that point him in the right direction are strategies for developing math comprehension.

Basic Steps for Solving Problems

1. Identify the question.
2. Identify the necessary information from the word problem.
3. Develop a plan to solve the problem.
4. Solve the problem.
5. Decide whether the answer is reasonable.

Basic Strategies for Solving Problems

1. Use manipulatives to model the situation.
2. Make a visual form such as a graph, chart, table, or picture.
3. Act out the problem.
4. Think of personal experiences to gain insight.

- Since calculators are widely used at home and in the workplace, students will benefit from instruction in and use of these tools as part of their math experience. Calculators can be especially helpful in problem-solving situations by allowing a student to focus on the problem-solving process instead of the computation. A calculator can never give a student a correct answer if the student does not first determine how to correctly solve the problem.
- Students who use calculators for problem solving are able to gain access to mathematical ideas and experiences that go beyond those levels limited by traditional paper-and-pencil computation.

Estimation

- *Estimating* is giving an approximate answer for a math problem. Estimation requires having a good sense of what a number means. Students who are good estimators also have good mental computational skills.
- There is more than one way to estimate an answer. Students are taught to estimate by rounding and by using front-end estimation. One method is not better than the other method. Both methods are taught with the intent that each student will use the method that seems easier to him as he solves problems he encounters in real life.
- Finding an estimate is especially important in problem-solving situations. If the final answer is not in the range of a student's estimate, he should examine his solution procedures and computation accuracy.
- *Front-end estimation* is a method of estimating by adding (or subtracting) the front digits and then annexing zeros. When a more accurate estimate is wanted, the digits in the front two places are added (or subtracted) before annexing zeros.

674,135	674,135	674,135	674,135
+ 252,061	+ 252,061	+ 252,061	+ 252,061
	800,000	920,000	926,196

- *Rounding* is a method of estimating in which a number is expressed to the nearest place value (ten, hundred, thousand). The digit in the highest place will remain the same if the digit in the next highest place is 4 or less. The digit will increase by 1 if the digit in the next highest place is 5 or more. When a more accurate estimate is wanted, the digits in the front two places are rounded.

674,135	700,000	670,000	674,135
+ 252,061	+ 300,000	+ 250,000	+ 252,061
	1,000,000	920,000	926,196

Conclusion

A teacher of elementary students must view his role as part of a total effort in laying a foundation of math understanding within each student. The teacher must maintain a "big picture" view of math so that he can see where students have come from and where they are going. This view will provide a consistency of purpose, goals, and methods. Above all, it is important for the teacher to enjoy teaching math and to pass that joy on to his students.

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Math 6 Worktext

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Getting Started

Viewing the Teacher's Tookit materials requires Adobe® Reader® 7.0 or higher. The most recent version of Adobe Reader may be downloaded at no charge from the Adobe website at www.adobe.com. An Internet connection is required to download Reader.

Windows

Insert the CD. If it does not start automatically, open the CD's file listing and launch the file "Startup.exe." Read and accept the license agreement to begin using the Teacher's Toolkit materials. Navigate within the CD using the bookmarks on the left side of the screen.

Mac

Insert the CD, click on the CD icon, and open the file "main.pdf" to begin using the Teacher's Toolkit materials.

Minimum System Requirements

Processor: Pentium IV
Operating System: Windows XP or Mac OS Leopard (version 10.5)
RAM: 256 MB
Display: 1024 × 768
Adobe Reader: version 7.0

Additional Help

Additional usage information can be found on the CD in the file "CD_info.pdf." For further assistance, call BJU Press Customer Service at 1-800-845-5731.