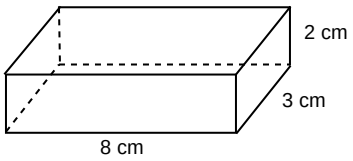
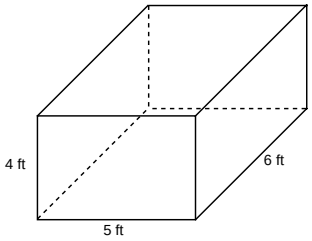
Chapter 9 Review

<table>
<tr><td colspan="3">Objective [9.1a] Find the volume of a rectangular solid using the formula $V = l \cdot w \cdot h$.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercise</td></tr>
<tr><td>Substitute in the formula and carry out the calculation.</td><td>Find the volume.
 

$V = l \cdot w \cdot h$
$= 8 \text{ cm} \cdot 3 \text{ cm} \cdot 2 \text{ cm}$
$= 24 \cdot 2 \text{ cm}^3$
$= 48 \text{ cm}^3$</td><td>1. Find the volume.
 

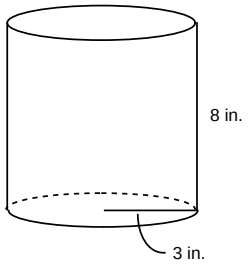
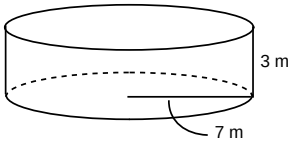
A. 15 ft^3
B. 54 ft^3
C. 120 ft^3
D. 160 ft^3</td></tr>
<tr><td colspan="3">Objective [9.1b] Convert from one unit of capacity to another.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercise</td></tr>
<tr><td>Make a substitution or multiply by one.</td><td>Complete:
a) 80 oz = ___ pt
b) 6.1 L = ___ mL

a) We multiply by one.
$80 \text{ oz} = 80 \text{ oz} \cdot \frac{1 \text{ pt}}{16 \text{ oz}}$
$= \frac{80}{16} \cdot 1 \text{ pt}$
$= 5 \text{ pt}$
b) We make a substitution.
$6.1 \text{ L} = 6.1 \times 1 \text{ L}$
$= 6.1 \times 1000 \text{ mL}$
$= 6100 \text{ mL}$</td><td>2. Complete: 16 qt = ___ gal
A. 4
B. 8
C. 32
D. 64</td></tr>
</table>

Objective [9.1c] Solve applied problems involving capacity.

Brief Procedure	Example	Practice Exercise
Use the conversion facts for units of capacity.	A doctor wants a patient to receive 2.7 L of a normal saline solution in a 24-hour period. How many milliliters must be administered per hour? First convert 2.7 L to milliliters. $2.7\text{ L} = 2.7 \times 1\text{ L}$ $= 2.7 \times 1000\text{ mL}$ $= 2700\text{ mL}$ Then divide to find the number of mL that must be administered each hour. $\frac{2700\text{ mL}}{24\text{ hr}} = 112.5\text{ mL/hr}$ The patient should receive 112.5 mL per hour.	3. A patient receives 50 mL per hour of normal saline solution. How many liters did the patient receive in a 12-hr period? A. 0.05 L B. 0.6 L C. $4.1\overline{6}$ L D. 600 L

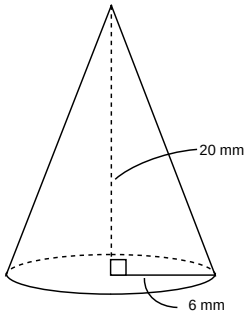
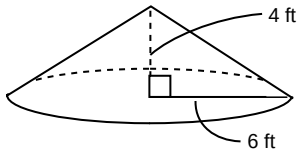
Objective [9.2a] Given the radius and the height, find the volume of a circular cylinder.

Brief Procedure	Example	Practice Exercise
The volume of a circular cylinder is the product of the area of the base B and the height h: $V = B \cdot h$, or $V = \pi \cdot r^2 \cdot h$.	Find the volume of the circular cylinder. Use 3.14 for π.  $V = B \cdot h = \pi \cdot r^2 \cdot h$ $\approx 3.14 \times 3\text{ in.} \times 3\text{ in.} \times 8\text{ in.}$ $\approx 226.08\text{ in}^3$	4. Find the volume of the circular cylinder. Use $\frac{22}{7}$ for π.  A. 66 m^3 B. 198 m^3 C. 349 m^3 D. 462 m^3

Objective [9.2b] Given the radius, find the volume of a sphere.

Brief Procedure	Example	Practice Exercise
The volume of a sphere with radius r is given by $V = \frac{4}{3} \cdot \pi \cdot r^3$.	Find the volume of a sphere with radius 21 cm. Use $\frac{22}{7}$ for π. $V = \frac{4}{3} \cdot \pi \cdot r^3$ $\approx \frac{4}{3} \times \frac{22}{7} \times (21\text{ cm})^3$ $\approx \frac{4 \times 22 \times 9261\text{ cm}^3}{3 \times 7}$ $\approx 38,808\text{ cm}^3$	5. Find the volume of a sphere with radius 5 in. Use 3.14 for π. A. 104.67 in^3 B. 166.67 in^3 C. 392.5 in^3 D. 523.33 in^3

Objective [9.2c] Given the radius and the height, find the volume of a circular cone.

Brief Procedure	Example	Practice Exercise
The volume of a circular cone with base radius r is one-third the product of the base area and the height: $V = \frac{1}{3} \cdot B \cdot h = \frac{1}{3}\pi \cdot r^2 \cdot h.$	Find the volume of the circular cone. Use 3.14 for π.  $V = \frac{1}{3}\pi \cdot r^2 \cdot h$ $\approx \frac{1}{3} \times 3.14 \times 6 \text{ mm} \times 6 \text{ mm} \times 20 \text{ mm}$ $\approx 753.6 \text{ mm}^3$	6. Find the volume of the circular cone. Use 3.14 for π.  A. 150.72 ft^3 B. 452.16 ft^3 C. 602.88 ft^3 D. 904.32 ft^3

Objective [9.2d] Solve applied problems involving volumes of circular cylinders, spheres, and cones.

Brief Procedure	Example	Practice Exercise
Use the five-step problem solving process and the formulas for the volume of a circular cylinder, a sphere, and a cone.	A cylindrical log has a diameter of 10 in. and a height of 18 in. Find the volume. Use 3.14 for π. 1. *Familiarize.* We will use the formula for the volume of a circular cylinder, $V = \pi \cdot r^2 \cdot h$. Note that the radius of the log is 12 in./2, or 6 in. 2. *Translate.* We substitute in the formula. $V \approx 3.14 \times (6 \text{ in.})^2 \times 18 \text{ in.}$ 3. *Solve.* We carry out the calculation. $V \approx 3.14 \times (6 \text{ in.})^2 \times 18 \text{ in.}$ $\approx 3.14 \times 6 \text{ in.} \times 6 \text{ in.} \times 18 \text{ in.}$ $\approx 2034.72 \text{ in}^3$ 4. *Check.* We repeat the calculations. The answer checks. 5. *State.* The volume of the log is about 2034.72 in^3.	7. The diameter of a beach ball is 30 cm. Find the volume. Use 3.14 for π. A. 3532.5 cm^3 B. 10,597.5 cm^3 C. 14,130 cm^3 D. 113,040 cm^3

Objective [9.3a] Convert from one American unit of weight to another.

Brief Procedure	Example	Practice Exercise
Make a substitution or multiply by one.	Complete: a) 3.5 lb = ___ oz b) 8400 lb = ___ T a) We make a substitution. $3.5 \text{ lb} = 3.5 \times 1 \text{ lb}$ $= 3.5 \times 16 \text{ oz}$ $= 56 \text{ oz}$ b) We multiply by one. $8400 \text{ lb} = 8400 \cancel{\text{lb}} \times \frac{1 \text{ T}}{2000 \cancel{\text{lb}}}$ $= \frac{8400}{2000} \text{ T}$ $= 4.2 \text{ T}$	8. Complete: 1.5 T = ___ oz A. 24 B. 300 C. 24,000 D. 48,000

Objective [9.3b] Convert from one metric unit of mass to another.

Brief Procedure	Example
Converting from one metric unit of mass to another involves moving a decimal point. Consider the following diagram. 1000 g | 100 g | 10 g | 1 g | 0.1 g | 0.01 g | 0.001 g 1 kg | 1 hg | 1 dag | 1 g | 1 dg | 1 cg | 1 mg Each move to the right or to the left in the table corresponds to moving the decimal point one place in the same direction.	Complete: 2586 g = ___ kg To go from g to kg in the diagram shown is a move three places to the left, so we move the decimal point three places to the left. 2586 2.586. ↑ ⌊ ⌋ 2586 g = 2.586 kg
	Practice Exercise
	9. Complete: 192 mg = ___ g A. 0.192 B. 19.2 C. 1920 D. 192,000

Objective [9.3c] Convert from one unit of time to another.

Brief Procedure	Example	Practice Exercise
Make a substitution or multiply by one.	Complete: a) 1800 min = ___ days b) 5 hr = ___ sec a) We multiply by one. $1800 \text{ min} = 1800 \text{ min} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ day}}{24 \text{ hr}} = \frac{1800}{60 \cdot 24} \text{ days} = 1.25 \text{ days}$ b) We make a substitution. $5 \text{ hr} = 5 \cdot 1 \text{ hr} = 5 \cdot 60 \text{ min} = 5 \cdot 60 \cdot 1 \text{ min} = 5 \cdot 60 \cdot 60 \text{ sec} = 18,000 \text{ sec}$	10. Complete: 8 wk = ___ hr A. 56 B. 192 C. 1344 D. 80,640

Objective [9.4a] Make an approximate conversion from Celsius temperature to Fahrenheit temperature and from Fahrenheit temperature to Celsius temperature.

Brief Procedure	Example	Practice Exercise
Place a ruler or a piece of paper horizontally between the scales on page 493 of the text, lining up the corresponding Celsius and Fahrenheit temperatures.	Convert 50°F to Celsius using the scales on page 493 of the text. Approximate to the nearest ten degrees. Following the procedure described at the left, we see that 50°F corresponds to 10°C.	11. Convert 60°C to Fahrenheit using the scales on page 493 of the text. Approximate to the nearest ten degrees. A. 20°F B. 80°F C. 140°F D. 160°F

Objective [9.4b] Convert from Celsius temperature to Fahrenheit and from Fahrenheit temperature to Celsius using the formulas $F = \frac{9}{5} \cdot C + 32$ and $C = \frac{5}{9} \cdot (F - 32)$.

Brief Procedure	Example	Practice Exercise
Substitute in the appropriate formula and carry out the calculation.	Convert 45°C to Fahrenheit. $F = \frac{9}{5} \cdot C + 32$ $F = \frac{9}{5} \cdot 45 + 32$ $= 81 + 32 = 113°$ Thus, 45°C = 113°F.	12. Convert 68°F to Celsius. A. 20°C B. 30°C C. 69.8°C D. 154.4°C

Objective [9.5a] Convert from one American unit of area to another.

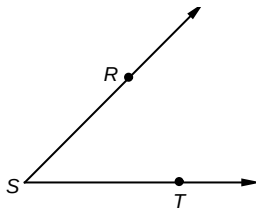
Brief Procedure	Example	Practice Exercise
Make a substitution or multiply by one.	Complete: a) $4\ \text{ft}^2 =$ ___ in^2 b) $72\ \text{ft}^2 =$ ___ yd^2 a) We make a substitution. $4\ \text{ft}^2 = 4 \cdot 1\ \text{ft}^2$ $= 4 \cdot (12\ \text{in.})^2$ $= 4 \cdot 12\ \text{in.} \cdot 12\ \text{in.}$ $= 576\ \text{in}^2$ b) We multiply by one. $72\ \text{ft}^2 = 72\ \cancel{\text{ft}^2} \times \frac{1\ \text{yd}^2}{9\ \cancel{\text{ft}^2}}$ $= \frac{72}{9} \times 1\ \text{yd}^2$ $= 8\ \text{yd}^2$	13. Complete: $18\ \text{yd}^2 =$ ___ ft^2 A. 2 B. 54 C. 162 D. 180

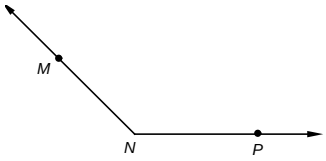
Objective [9.5b] Convert from one metric unit of area to another.

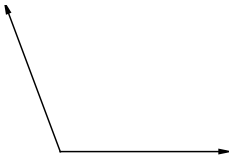
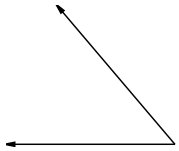
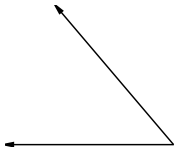
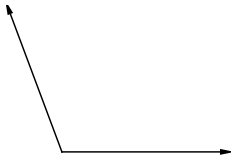
Brief Procedure	Example
Converting from one metric unit of area to another involves moving a decimal point. Consider the following diagram. 1000 m | 100 m | 10 m | 1 m | 0.1 m | 0.01 m | 0.001 m 1 km | 1 hm | 1 dam | 1 m | 1 dm | 1 cm | 1 mm Each move to the right or to the left between units of length in the table corresponds to moving the decimal point *twice* that number of places in the same direction when converting units of area. s	Complete: $0.013\ \text{m}^2 =$ ___ cm^2 To go from m to cm in the table is a move of 2 places to the right, so we move the decimal point $2 \cdot 2$, or 4 places to the right. 0.013 0.0130. $0.013\ \text{m}^2 = 130\ \text{cm}^2$

Practice Exercise

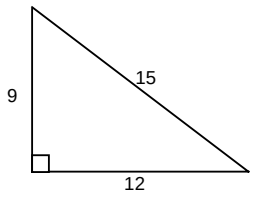
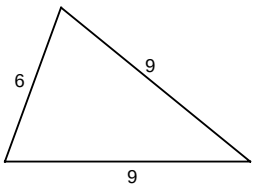
14. Complete:
$7514\ \text{mm}^2 =$ ___ m^2
A. 0.007514
B. 0.7514
C. 7.514
D. 7,514,000

<table>
<tr><td colspan="3">Objective [9.6a] Name an angle in four different ways and given an angle, measure it with a protractor.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercises</td></tr>
<tr><td>Begin naming an angle by writing “angle” or “$\angle$.” Then proceed by listing the names of points on its sides and the name of its vertex, with the name of the vertex given in the middle. An angle can also be named using only the vertex if no confusion results.</td><td>Name the angle in four different ways.
 

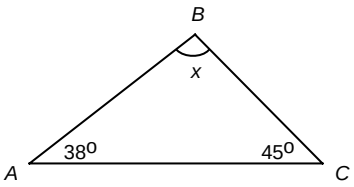
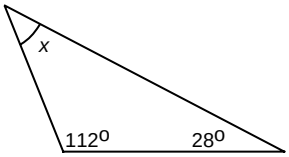
The angle can be named angle RST, angle TSR, $\angle RST$, $\angle TSR$, or $\angle S$. Any four of these can be used.</td><td>15. Which is not a correct name for the angle shown?
 

A. $\angle MNP$
B. $\angle MPN$
C. angle PNM
D. $\angle N$</td></tr>
<tr><td>To measure an angle with a protractor, place the $\triangle$ of the protractor at the vertex and line up one of the sides at 0°, either on the inner or the outer scale. Then determine where the angle’s other side crosses the scale and read the measure of the angle from that scale.</td><td>Use a protractor to measure this angle.
 
Place the $\triangle$ of the protractor at the vertex of the angle and line up one of the sides at 0°. We choose the horizontal side. Since 0° is on the inside scale, we check where the other side of the angle crosses the inside scale. It crosses at 110°. Thus, the measure of the angle is 110°.</td><td>16. Use a protractor to measure this angle.
 
A. 50°
B. 70°
C. 120°
D. 130°</td></tr>
<tr><td colspan="3">Objective [9.6b] Classify an angle as right, straight, acute, or obtuse.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercise</td></tr>
<tr><td>Right angle: An angle whose measure is 90°.
Straight angle: An angle whose measure is 180°.
Acute angle: An angle whose measure is greater than 0° and less than 90°.
Obtuse angle: An angle whose measure is greater than 90° and less than 180°.</td><td>Classify the angle as right, straight, acute, or obtuse. Use a protractor if necessary.
 
The measure of the angle is greater than 0° and less than 90°, so this is an acute angle.</td><td>17. Classify the angle as right, straight, acute, or obtuse. Use a protractor if necessary.
 
A. Right
B. Straight
C. Acute
D. Obtuse</td></tr>
</table>

Objective [9.6c] Classify a triangle as equilateral, isosceles, or scalene, and as right, obtuse, or acute.

Brief Procedure	Example	Practice Exercise
Equilateral triangle: All sides are the same length. **Isosceles triangle**: Two or more sides are the same length. **Scalene triangle**: All sides are of different lengths. **Right triangle**: One angle is a right angle. **Obtuse triangle**: One angle is an obtuse angle. **Acute triangle**: All three angles are acute.	Classify the triangle as equilateral, isosceles, or scalene. Then classify it as right, obtuse, or acute.  All the sides are different lengths, so this is a scalene triangle. One angle is a right angle, so this is a right triangle.	18. Classify the triangle as equilateral, isosceles, or scalene. Then classify it as right, obtuse, or acute.  A. Scalene; acute B. Isosceles; acute C. Isosceles; obtuse D. Equilateral; obtuse

Objective [9.6d] Given two of the angle measures of a triangle, find the third.

Brief Procedure	Example	Practice Exercise
In any triangle ABC, the sum of the measures of the angles is $180°$: $m(\angle A) + m(\angle B) + m(\angle C) = 180°$.	Find the missing angle measure.  $m(\angle A)+m(\angle B)+m(\angle C) = 180°$ $38° + x + 45° = 180°$ $x + 83° = 180°$ $x = 180° - 83°$ $x = 97°$ The missing angle measure is $97°$.	19. Find the missing angle measure.  A. $28°$ B. $30°$ C. $40°$ D. $50°$