

Chapter 8 Review

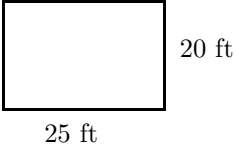
Objective [8.1a] Convert from one American unit of length to another.																				
Brief Procedure		Example			Practice Exercise															
<p>Make a substitution or multiply by one.</p>		<p>Complete each of the following.</p> <p>a) 4 yd = ___ in. b) 10,560 ft = ___ mi</p> <p>a) To convert from a larger unit to a smaller one, we can make a substitution.</p> $4 \text{ yd} = 4 \times 1 \text{ yd}$ $= 4 \times 3 \text{ ft}$ $= 4 \times 3 \times 1 \text{ ft}$ $= 4 \times 3 \times 12 \text{ in.}$ $= 144 \text{ in.}$ <p>b) To convert from a smaller unit to a larger one, we can multiply by one. (This procedure can also be used to convert from a larger unit to a smaller one.)</p> $10,560 \text{ ft} = 10,560 \cancel{\text{ft}} \times \frac{1 \text{ mi}}{5280 \cancel{\text{ft}}}$ $= \frac{10,560}{5280} \times 1 \text{ mi}$ $= 2 \times 1 \text{ mi}$ $= 2 \text{ mi}$			<p>1. Complete: 54 in. = ___ yd</p> <p>A. $0.\overline{6}$ B. $1.\overline{3}$ C. 1.5 D. $1.\overline{6}$</p>															
Objective [8.2a] Convert from one metric unit of length to another.																				
Brief Procedure				Example																
<p>Converting from one metric unit of length to another involves moving a decimal point. Consider the following table.</p> <table border="1" style="width: 100%; text-align: center; border-collapse: collapse; margin: 10px 0;"> <tr> <td style="padding: 5px;">1000 m</td> <td style="padding: 5px;">100 m</td> <td style="padding: 5px;">10 m</td> <td style="padding: 5px;">1 m</td> <td style="padding: 5px;">0.1 m</td> <td style="padding: 5px;">0.01 m</td> <td style="padding: 5px;">0.001 m</td> </tr> <tr> <td style="padding: 5px;">1 km</td> <td style="padding: 5px;">1 hm</td> <td style="padding: 5px;">1 dam</td> <td style="padding: 5px;">1 m</td> <td style="padding: 5px;">1 dm</td> <td style="padding: 5px;">1 cm</td> <td style="padding: 5px;">1 mm</td> </tr> </table> <p>Each move to the right or to the left in the table corresponds to moving the decimal point one place in the same direction.</p>				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	<p>Complete: 5 m = ___ cm</p> <p>To go from m to cm in the table shown is a move two places to the right, so we move the decimal point two places to the right.</p> $5 \quad 5.00.$ <div style="text-align: center; margin: 5px 0;"> $\begin{array}{c} \square \uparrow \\ \square \end{array}$ </div> <p>5 m = 500 cm</p>		
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														
				Practice Exercise																
				<p>2. Complete: 432 mm = ___ m</p> <p>A. 0.432 B. 4.32 C. 4320 D. 432,000</p>																

Objective [8.2b] Convert between American and metric units of length.

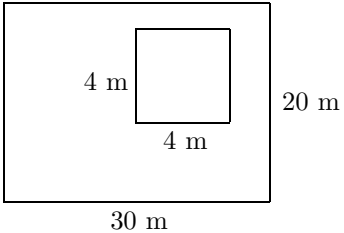
Brief Procedure	Example	Practice Exercise														
<p>Make a substitution or multiply by one, using conversion facts from the following table.</p> <table border="1" data-bbox="196 401 506 850"> <thead> <tr> <th>Metric</th> <th>American</th> </tr> </thead> <tbody> <tr> <td>1 m</td> <td>39.37 in.</td> </tr> <tr> <td>1 m</td> <td>3.3 ft</td> </tr> <tr> <td>0.303 m</td> <td>1 ft</td> </tr> <tr> <td>2.54 cm</td> <td>1 in.</td> </tr> <tr> <td>1 km</td> <td>0.621 mi</td> </tr> <tr> <td>1.609 km</td> <td>1 mi</td> </tr> </tbody> </table>	Metric	American	1 m	39.37 in.	1 m	3.3 ft	0.303 m	1 ft	2.54 cm	1 in.	1 km	0.621 mi	1.609 km	1 mi	<p>Complete: 8 in. = ___ cm</p> $8 \text{ in.} = 8 \times 1 \text{ in.}$ $\approx 8 \times 2.54 \text{ cm}$ $\approx 20.32 \text{ cm}$	<p>3. Complete: 50 km = ___ mi</p> <p>A. 31.05 B. 80.45 C. 98.4 D. 165</p>
Metric	American															
1 m	39.37 in.															
1 m	3.3 ft															
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Objective [8.3a] Find the perimeter of a polygon.

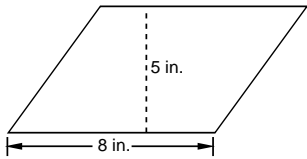
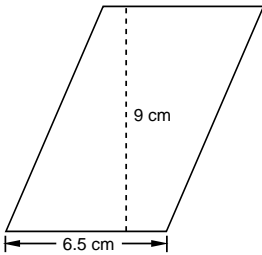
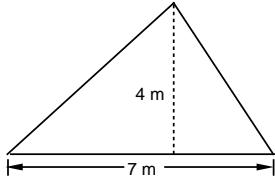
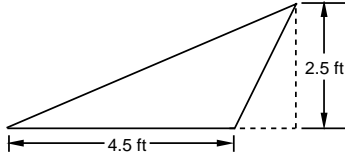
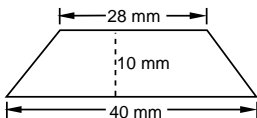
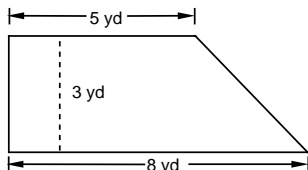
Brief Procedure	Example	Practice Exercise
<p>Find the sum of the lengths of the sides of the polygon. Since rectangles and squares appear frequently in applications, we have special formulas to find their perimeters. The perimeter of a rectangle with length l and width w is given by</p> $P = 2 \cdot (l + w), \text{ or}$ $P = 2 \cdot l + 2 \cdot w.$ <p>The perimeter of a square with side s is given by</p> $P = 4 \cdot s.$	<p>Find the perimeter of a rectangle that is 4.5 ft by 2.5 ft.</p> $P = 2 \cdot (l + w)$ $= 2 \cdot (4.5 \text{ ft} + 2.5 \text{ ft}) = 2 \cdot 7 \text{ ft}$ $= 14 \text{ ft}$	<p>4. Find the perimeter of a square whose sides are 5 cm long.</p> <p>A. 10 cm B. 15 cm C. 20 cm D. 25 cm</p>

Objective [8.3b] Solve applied problems involving perimeter.		
Brief Procedure	Example	Practice Exercise
Use the five-step problem solving process. If appropriate, use the formula for the perimeter of a rectangle or a square.	<p>A fence is to be built around a 25 ft by 20 ft play area. How many feet of fence will be needed? If fencing sells for \$4.95 per foot, what will the fencing cost?</p> <ol style="list-style-type: none"> <i>Familiarize.</i> We make a drawing and let P = the perimeter.  <ol style="list-style-type: none"> <i>Translate.</i> The perimeter of the play area is given by $P = 2 \cdot (l + w) = 2 \cdot (25 \text{ ft} + 20 \text{ ft}).$ <i>Solve.</i> We calculate the perimeter. $P = 2 \cdot (25 \text{ ft} + 20 \text{ ft})$ $= 2 \cdot (45 \text{ ft}) = 90 \text{ ft}$ <p>Then we multiply the perimeter by \$4.95 to find the cost of the fencing: Cost = \$4.95 \times Perimeter = \$4.95 \times 90 ft = \$445.50.</p> <i>Check.</i> We repeat the calculations. The answers check. <i>State.</i> The 90 ft of fencing that is needed will cost \$445.50. 	<p>5. A fence is to be built around a 200 m by 180 m field. If the fencing sells for \$1.85 per meter, what will the fencing cost?</p> <p>A. \$703 B. \$760 C. \$1215 D. \$1406</p>
Objective [8.4a] Find the area of a rectangle or a square.		
Brief Procedure	Example	Practice Exercises
<p>The area of a rectangle with length l and width w is given by</p> $A = l \cdot w.$	<p>Find the area of a rectangle that is 4.5 m by 2.3 m.</p> $A = l \cdot w = 4.5 \text{ m} \times 2.3 \text{ m}$ $= 4.5 \times 2.3 \times \text{m} \times \text{m}$ $= 10.35 \text{ m}^2$	<p>6. Find the area of a rectangle that is 8 ft by 6 ft.</p> <p>A. 28 ft² B. 36 ft² C. 48 ft² D. 64 ft²</p>
<p>The area of a square with sides of length s is given by</p> $A = s \cdot s, \text{ or } A = s^2.$	<p>Find the area of a square with sides of length 17 cm.</p> $A = s \cdot s = 17 \text{ cm} \cdot 17 \text{ cm}$ $= 17 \cdot 17 \cdot \text{cm} \cdot \text{cm}$ $= 289 \text{ cm}^2$	<p>7. Find the area of a square with sides of length 6.4 yd.</p> <p>A. 25.6 yd² B. 32.4 yd² C. 40.96 yd² D. 52.8 yd²</p>

Objective [8.4b] Solve applied problems involving areas of rectangles or squares.

Brief Procedure	Example	Practice Exercise
<p>Use the five-step problem solving process and the formula for the area of a rectangle or a square.</p>	<p>A square flower garden 4 m on a side is dug in a 30 m by 20 m lawn. How much area is left over?</p> <p>1. <i>Familiarize.</i> We make a drawing.</p>  <p>2. <i>Translate.</i> We let A = the area left over.</p> $\underbrace{\text{Area left over}} \quad \text{is} \quad \underbrace{\text{area of lawn}} \quad \text{minus}$ $\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$ $A \quad = \quad (30 \text{ m}) \times (20 \text{ m}) \quad -$ area of garden \downarrow $(4 \text{ m}) \times (4 \text{ m})$ <p>3. <i>Solve.</i> The area of the lawn is</p> $(30 \text{ m}) \times (20 \text{ m})$ $= 30 \times 20 \times \text{m} \times \text{m}$ $= 600 \text{ m}^2.$ <p>The area of the garden is</p> $(4 \text{ m}) \times (4 \text{ m})$ $= 4 \times 4 \times \text{m} \times \text{m}$ $= 16 \text{ m}^2.$ <p>The area left over is</p> $A = 600 \text{ m}^2 - 16 \text{ m}^2 = 584 \text{ m}^2.$ <p>4. <i>Check.</i> We repeat the calculations. The answer checks.</p> <p>5. <i>State.</i> The area left over is 584 m^2.</p>	<p>8. A field measures 250 ft by 175 ft. A portion of the field measuring 180 ft by 150 ft is paved for a parking area. How much of the field is left unpaved?</p> <p>A. 850 ft^2 B. $16,750 \text{ ft}^2$ C. $27,000 \text{ ft}^2$ D. $43,750 \text{ ft}^2$</p>

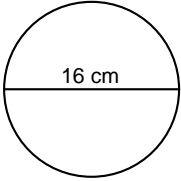
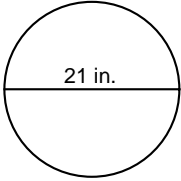
Objective [8.5a] Find the area of a parallelogram, a triangle, and a trapezoid.

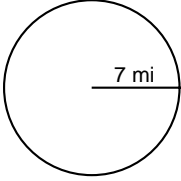
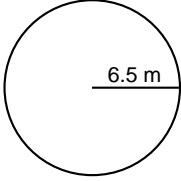
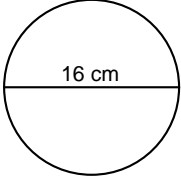
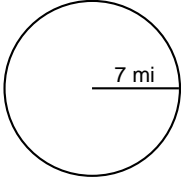
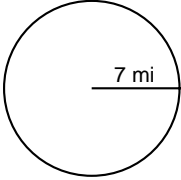
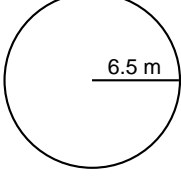
Brief Procedure	Example	Practice Exercises
<p>The area of a parallelogram with base b and height h is given by</p> $A = b \cdot h.$	<p>Find the area.</p>  $\begin{aligned} A &= b \cdot h \\ &= 8 \text{ in.} \cdot 5 \text{ in.} \\ &= 40 \text{ in}^2 \end{aligned}$	<p>9. Find the area.</p>  <p>A. 31 cm^2 B. 42.25 cm^2 C. 58.5 cm^2 D. 81 cm^2</p>
<p>The area of a triangle with base b and height h is given by</p> $A = \frac{1}{2} \cdot b \cdot h.$	<p>Find the area.</p>  $\begin{aligned} A &= \frac{1}{2} \cdot b \cdot h \\ &= \frac{1}{2} \cdot 7 \text{ m} \cdot 4 \text{ m} \\ &= \frac{7 \cdot 4}{2} \text{ m}^2 = 14 \text{ m}^2 \end{aligned}$	<p>10. Find the area.</p>  <p>A. 5.625 ft^2 B. 7 ft^2 C. 9.875 ft^2 D. 11.25 ft^2</p>
<p>The area of a trapezoid with height h and bases (parallel sides) a and b is given by</p> $\begin{aligned} A &= \frac{1}{2} \cdot h \cdot (a + b) \\ &= h \cdot \frac{a + b}{2}. \end{aligned}$	<p>Find the area.</p>  $\begin{aligned} A &= \frac{1}{2} \cdot h \cdot (a + b) \\ &= \frac{1}{2} \cdot 10 \text{ mm} \cdot (28 + 40) \text{ mm} \\ &= \frac{10 \cdot 68}{2} \text{ mm}^2 = \frac{2 \cdot 5 \cdot 68}{2 \cdot 1} \text{ mm}^2 \\ &= \frac{2}{2} \cdot \frac{5 \cdot 68}{1} \text{ mm}^2 \\ &= 340 \text{ mm}^2 \end{aligned}$	<p>11. Find the area.</p>  <p>A. 19.5 yd^2 B. 24 yd^2 C. 39 yd^2 D. 40 yd^2</p>

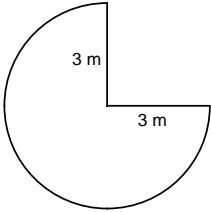
Objective [8.5b] Solve applied problems involving areas of parallelograms, triangles, and trapezoids.

Brief Procedure	Example	Practice Exercise
<p>Use the five-step problem solving process and the formula for the area of a parallelogram, a triangle, or a trapezoid.</p>	<p>A square piece of plywood has sides of length 6 ft. A parallelogram with base 3 ft and height 1.5 ft is cut from the piece. How much area is left over?</p> <ol style="list-style-type: none"> <i>Familiarize.</i> We will use the formulas for the area of a square and the area of a parallelogram. Let A = the area left over. <i>Translate.</i> $\begin{array}{rccccccc} & \text{Area} & & & \text{area of} & & \\ & \text{of square} & - & & \text{parallelogram} & = & \\ & \underbrace{\hspace{2cm}} & & & \underbrace{\hspace{2cm}} & & \\ & \downarrow & & \downarrow & \downarrow & & \downarrow \\ & 6 \text{ ft} \cdot 6 \text{ ft} & - & & 3 \text{ ft} \cdot 1.5 \text{ ft} & = & \\ & & & & \underbrace{\hspace{2cm}} & & \\ & & & & \text{area} & & \\ & & & & \text{left over} & & \\ & & & & \underbrace{\hspace{2cm}} & & \\ & & & & \downarrow & & \\ & & & & A & & \end{array}$ <i>Solve.</i> The area of the square is $6 \text{ ft} \cdot 6 \text{ ft} = 36 \text{ ft}^2$. The area of the parallelogram is $3 \text{ ft} \cdot 1.5 \text{ ft} = 4.5 \text{ ft}^2$. The area left over is $A = 36 \text{ ft}^2 - 4.5 \text{ ft}^2 = 31.5 \text{ ft}^2$. <i>Check.</i> We repeat the calculations. The answer checks. <i>State.</i> The area left over is 31.5 ft^2. 	<p>12. A rectangular piece of canvas measures 10 ft by 3 ft. A triangular piece with base 4 ft and height 1.8 ft is cut from the canvas. How much area is left over?</p> <p>A. 3.6 ft^2 B. 7.2 ft^2 C. 26.4 ft^2 D. 30 ft^2</p>

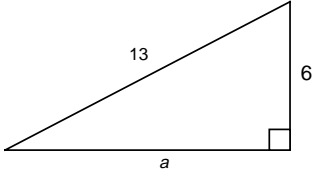
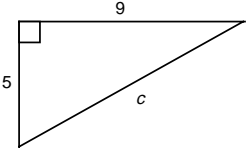
Objective [8.6a] Find the length of a radius of a circle given the length of a diameter, and find the length of a diameter given the length of a radius.

Brief Procedure	Example	Practice Exercise
<p>The radius of a circle with diameter d is given by</p> $r = \frac{d}{2}.$	<p>Find the length of a radius of this circle.</p>  $r = \frac{d}{2} = \frac{16 \text{ cm}}{2} = 8 \text{ cm}$ <p>The radius is 8 cm.</p>	<p>13. Find the length of a radius of this circle.</p>  <p>A. 10.5 in. B. 18 in. C. 32 in. D. 42 in.</p>

Objective [8.6a] continued		
Brief Procedure	Example	Practice Exercise
<p>The diameter of a circle with radius r is given by</p> $d = 2 \cdot r.$	<p>Find the length of a diameter of this circle.</p>  <p>$d = 2 \cdot r = 2 \cdot 7 \text{ mi} = 14 \text{ mi}$ The diameter is 14 mi.</p>	<p>14. Find the length of a diameter of this circle.</p>  <p>A. 3.25 m B. 12.5 m C. 13 m D. 42.25 m</p>
Objective [8.6b] Find the circumference of a circle given the length of a diameter or a radius.		
Brief Procedure	Example	Practice Exercise
<p>The circumference of a circle with diameter d is given by</p> $C = \pi \cdot d.$ <p>The circumference of a circle with radius r is given by</p> $C = 2 \cdot \pi \cdot r.$ <p>The number π is about 3.14 or about $\frac{22}{7}$.</p>	<p>Find the circumference of this circle. Use 3.14 for π.</p>  <p>$C = \pi \cdot d \approx 3.14 \times 16 \text{ cm} \approx 50.24 \text{ cm}$ The circumference is about 50.24 cm.</p>	<p>15. Find the circumference of this circle. Use $\frac{22}{7}$ for π.</p>  <p>A. 14 mi B. 22 mi C. 44 mi D. 49 mi</p>
Objective [8.6c] Find the area of a circle given the length of a radius.		
Brief Procedure	Example	Practice Exercise
<p>The area of a circle with radius r is given by</p> $A = \pi \cdot r \cdot r, \text{ or } A = \pi \cdot r^2.$	<p>Find the area of this circle. Use $\frac{22}{7}$ for π.</p>  <p>$A = \pi \cdot r \cdot r$ $\approx \frac{22}{7} \cdot 7 \text{ mi} \cdot 7 \text{ mi}$ $\approx \frac{22}{7} \cdot 49 \text{ mi}^2 \approx 154 \text{ mi}^2$</p>	<p>16. Find the area of this circle. Use 3.14 for π.</p>  <p>A. 13 m^2 B. 20.41 m^2 C. 98.375 m^2 D. 132.665 m^2</p>

Objective [8.6d] Solve applied problems involving circles.		
Brief Procedure	Example	Practice Exercise
Use the formulas for the radius, diameter, circumference, and area of a circle along with any other necessary formulas from geometry.	<p>Find the perimeter. Use 3.14 for π.</p>  <p>The perimeter is composed of three-fourths of the circumference of a circle with a radius of 3 m plus twice the radius of the circle.</p> <p>Three-fourths the circumference:</p> $\frac{3}{4} \cdot 2 \cdot \pi \cdot r \approx \frac{3}{4} \cdot 2 \cdot 3.14 \cdot 3 \text{ m}$ $\approx \frac{3 \cdot 2 \cdot 3.14 \cdot 3}{4} \text{ m}$ $\approx 14.13 \text{ m}$ <p>Twice the radius: $2 \cdot 3 \text{ m} = 6 \text{ m}$</p> <p>Perimeter: $14.13 \text{ m} + 6 \text{ m} = 20.13 \text{ m}$</p> <p>The perimeter is about 20.13 m.</p>	<p>17. Find the area of the figure in the example at the left. Use 3.14 for π.</p> <p>A. 18.84 m² B. 21.195 m² C. 28.26 m² D. 30.145 m²</p>
Objective [8.7a] Simplify square roots such as $\sqrt{25}$.		
Brief Procedure	Example	Practice Exercise
If a number is a product of two identical factors, then either factor is a square root of the number. That is, if $a = c^2$, then c is a square root of a .	<p>Simplify: $\sqrt{81}$.</p> $\sqrt{81} = \sqrt{9 \cdot 9} = 9$ <p>(The square root of 81 is 9, because $9^2 = 81$.)</p>	<p>18. Simplify: $\sqrt{16}$.</p> <p>A. 2 B. 4 C. 8 D. 32</p>
Objective [8.7b] Approximate square roots.		
Brief Procedure	Example	Practice Exercise
Use a calculator, rounding to the desired number of decimal places.	<p>Approximate $\sqrt{74}$ to three decimal places.</p> <p>Use a calculator to find the square root. Then round to three decimal places.</p> $\sqrt{74} \approx 8.602$	<p>19. Approximate $\sqrt{268}$ to three decimal places.</p> <p>A. 15.427 B. 16.371 C. 23.833 D. 134</p>

Objective [8.7c] Given the lengths of any two sides of a right triangle, find the length of the third side.

Brief Procedure	Example	Practice Exercise
<p>Use the Pythagorean theorem: In any right triangle, if a and b are the lengths of the legs and c is the length of the hypotenuse, then $a^2 + b^2 = c^2$.</p>	<p>Find the length a for this right triangle. Give an exact answer and an approximation to three decimal places.</p>  $a^2 + b^2 = c^2$ $a^2 + 6^2 = 13^2$ $a^2 + 36 = 169$ $a^2 + 36 - 36 = 169 - 36$ $a^2 = 133$ $a = \sqrt{133} \quad \text{Exact answer}$ $a \approx 11.533 \quad \text{Approximation}$	<p>20. Find the length of the hypotenuse of this right triangle. Give an exact answer.</p>  <p>A. 7.483 B. 10.296 C. $\sqrt{56}$ D. $\sqrt{106}$</p>