

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 5. As you study the chapter, complete each term's definition or description. Remember to add the page number where you found the term.

Vocabulary Term	Found on Page	Definition/Description/Example
area		
axis		
circumference suh•KUHMP•fuhrnts		
cone		
customary units		
cylinder SIH•luhn•duhr		
favorable outcome		
indirect proof		
lateral edges LA•tuh•ruhl		
lateral faces		
like units		
locus		
metric units		

(continued on the next page)

Reading to Learn Mathematics*Vocabulary Builder (continued)*

Vocabulary Term	Found on Page	Definition/Description/Example
perimeter		
polyhedron PAH•lee•HEE•druhn		
prism		
probability PRAH•buh•BIH•luh•tee		
pyramid PEER•ah•MIHD		
random		
rate		
ratio		
sphere		
surface area		
unit price		
unit rate		
vertex		
volume		

RETEACHING 5-1**RATIOS AND UNITS OF MEASURE**

A ratio is a quotient of two numbers that compares one number with another. When you write a ratio involving measurement, you must sometimes convert from one unit to another. Remember to multiply when changing a larger unit to a smaller unit and to divide when changing a smaller unit to a larger unit.

Example 1

Complete.

- a. 4 pt = ■ c
b. 2000 m = ■ km

Solution

- a. 1 pt = 2 c, so multiply by 2.
(2)(4) = 8, so 4 pt = 8 c.
b. 1 km = 1000 m, so divide by 1000.
 $2000 \div 1000 = 2$,
so 2000 m = 2 km.

Example 2

Write the ratio of 200 mL to 1 L in lowest terms.

Solution

Write the ratio as $\frac{200 \text{ mL}}{1 \text{ L}}$.
Then rename the measurements.

$$\frac{200 \text{ mL}}{1 \text{ L}} = \frac{200 \text{ mL}}{1000 \text{ mL}}$$

Divide to write fractions in lowest terms.

$$\frac{200 \div 200}{1000 \div 200} = \frac{1}{5}$$

The ratio in lowest terms is $\frac{1}{5}$.

EXERCISES

Complete.

- | | | |
|-----------------------|------------------------|----------------------|
| 1. 132 in. = _____ ft | 2. 8 yd = _____ in. | 3. 5 lb = _____ oz |
| 4. 108 ft = _____ yd | 5. 256 cups = _____ pt | 6. 5 gal = _____ qt |
| 7. 3.4 L = _____ mL | 8. 1085 g = _____ kg | 9. 4.35 m = _____ cm |
| 10. 8 g = _____ mg | 11. 3.2 km = _____ m | 12. 23 mm = _____ m |

Write each ratio in lowest terms.

13. 3 lb to 54 oz

14. 12 ft to 5 yd

15. 8 qt to 4 gal

16. 5 g to 2 kg

17. 520 mm to 4 m

18. 3 L to 5500 mL

EXTRA PRACTICE **5-1****RATIO AND UNITS OF MEASURE****EXERCISES**

Complete.

- | | |
|-----------------------------|--------------------------------|
| 1. 5 qt = _____ c | 2. 38 in. = _____ ft _____ in. |
| 3. 5 kg = _____ g | 4. 2.5 T = _____ lb |
| 5. 40 m = _____ mm | 6. 8 gal = _____ oz |
| 7. 0.005 mL = _____ kL | 8. 15 yd = _____ ft |
| 9. 70 oz = _____ c _____ oz | 10. 1300 cm = _____ km |

Name the best customary unit for expressing the measure of each.

- | | |
|---------------------------------|--------------------------------------|
| 11. height of a flag pole _____ | 12. capacity of a large bucket _____ |
|---------------------------------|--------------------------------------|

Name the best metric unit for expressing the measure of each.

- | | |
|-------------------------|--------------------------------|
| 13. mass of a pen _____ | 14. length of a driveway _____ |
|-------------------------|--------------------------------|

Write each ratio in lowest terms.

- | | |
|--|--------------------------|
| 15. 16 mg : 48 mg _____ | 16. 16 in. to 3 ft _____ |
| 17. $\frac{4 \text{ h}}{45 \text{ min}}$ _____ | 18. 8 km to 500 m _____ |

Find each unit rate.

- | |
|--|
| 19. \$52 for 8 hours of work _____ |
| 20. 32 minutes to run 4 miles _____ |
| 21. \$10.71 for 9 gallons of gas _____ |

Solve.

22. Which is a better buy, 5 apples for \$2.10, or 7 apples for \$3.01? _____
23. Which is a better buy, 8 oz of bottled water for \$0.72, or 12 oz of bottled water for \$0.96? _____

Choose the best estimate for each.

- | | | | | |
|----------------------|----------|----------|---------|-------|
| 24. weight of a dog | a. 15 oz | b. 15 lb | c. 15 T | _____ |
| 25. height of a door | a. 8 in. | b. 8 ft | c. 8 mi | _____ |

RETEACHING 5-2**PERIMETER, CIRCUMFERENCE, AND AREA**

You can find the perimeter of a polygon by adding the lengths of its sides.

You can use this formula to find the circumference of a circle: $C = \pi d$.

You can use these formulas to find the areas of the figures listed.

Square: $A = s^2$

Rectangle: $A = lw$

Parallelogram: $A = bh$

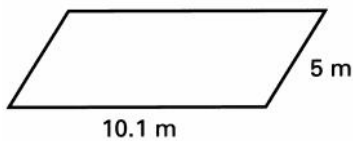
Triangle: $A = \frac{1}{2}bh$

Circle: $A = \pi r^2$

Trapezoid: $A = \frac{1}{2}h(b_1 + b_2)$

Example 1

Find the perimeter of the parallelogram.

**Solution**

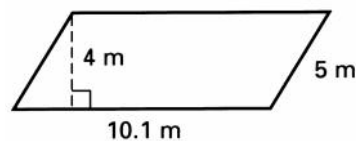
You can add or use $P = 2l + 2s$ to find the perimeter.

$$P = (2)(10.1) + (2)(5) = 30.2$$

The perimeter is 30.2 m.

Example 2

Find the area of the parallelogram.

**Solution**

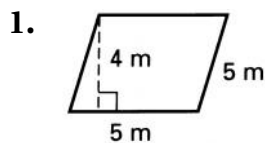
Use $A = bh$ to find the area.

$$A = (10.1)(4) = 40.4$$

The area is 40.4 m^2 .

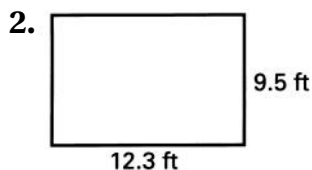
EXERCISES

Find the perimeter or circumference of each. Then find the area.



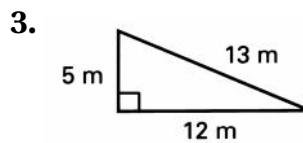
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$A = \underline{\hspace{2cm}}$



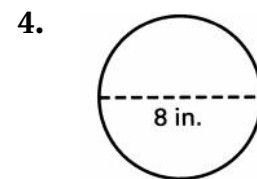
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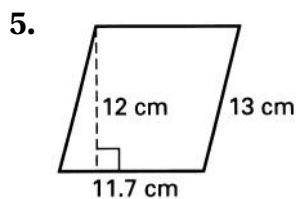
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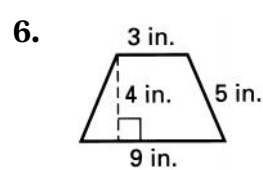
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$A = \underline{\hspace{2cm}}$



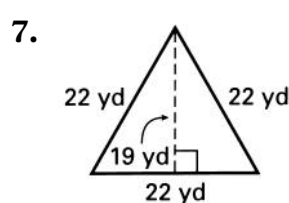
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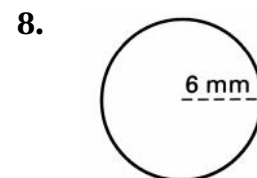
$P = \underline{\hspace{2cm}}$

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$P = \underline{\hspace{2cm}}$

$A = \underline{\hspace{2cm}}$



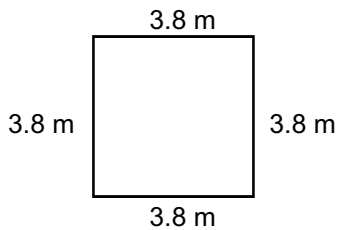
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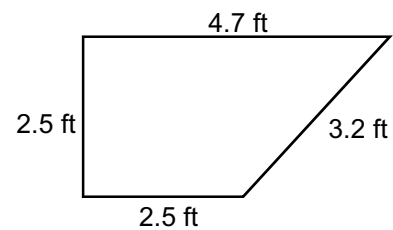
EXTRA PRACTICE **5-2****PERIMETER, CIRCUMFERENCE, AND AREA****EXERCISES**

Find the perimeter or circumference of each. Then find the area of each. If necessary, round answers to the nearest whole number.

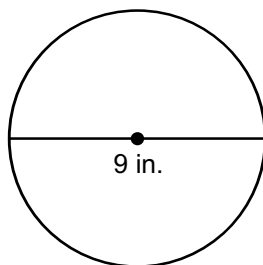
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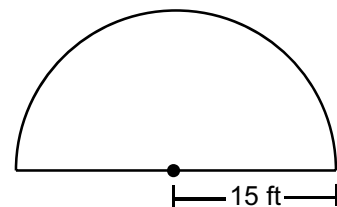
2.



3.



4.



5. What is the perimeter of a regular pentagon with 8-ft sides? _____

6. What is the perimeter of a regular hexagon with 3.5-cm sides? _____

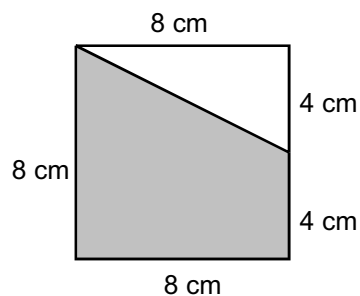
7. What is the circumference to the nearest in. of a circle with a diameter of 9.5 in.? _____

8. Find the height of a triangle if area = 54 ft^2 and base = 9 ft. _____

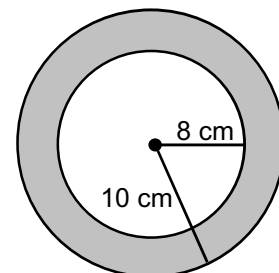
9. Find the base of a triangle if area = 97.5 m^2 and height = 13 m. _____

Find the area of the shaded region of each figure.

10.



11.



RETEACHING 5-3

PROBABILITY AND AREA

The probability of any event can be expressed as a ratio:

$$P(\text{any event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

To find the probability that a point selected at random appears in a shaded region of a figure, you may need to select some of these formulas to help you find the area.

Square: $A = s^2$

Rectangle: $A = lw$

Parallelogram: $A = bh$

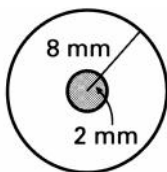
Triangle: $A = \frac{1}{2}bh$

Circle: $A = \pi r^2$

Trapezoid: $A = \frac{1}{2}h(b_1 + b_2)$

Example 1

Find the probability that a point selected at random is in the shaded region.



Solution

$$P(\text{point in shaded circle}) = \frac{\text{area of shaded circle}}{\text{area of entire circle}}$$

$$P = \frac{(\pi)(2)(2)}{(\pi)(8)(8)} = \frac{4}{64} = \frac{1}{16}$$

The probability that a point is in the shaded region is $\frac{1}{16}$, or 0.0625.

Example 2

Suppose you lost your ring somewhere in your 1500-ft² home. What is the probability that you will find it in the 20-ft by 12-ft den?

Solution

$$P(\text{finding ring in den}) = \frac{\text{area of den}}{\text{area of entire home}}$$

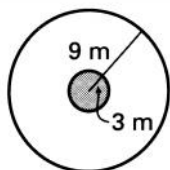
$$P = \frac{(20)(12)}{1500} = \frac{240}{1500} = \frac{4}{25}$$

The probability that you will find your ring in the den is $\frac{4}{25}$, or 0.16.

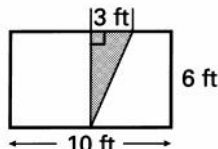
EXERCISES

Find the probability that a point selected at random in each figure is in the shaded region.

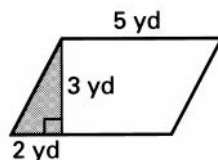
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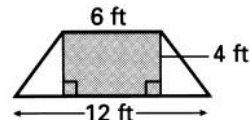
2.



3.



4.



5. The total area of Florida is 58,560 mi². Of these, 4308 mi² are inland water. If a meteor were to land somewhere in the state, what is the probability that it will splash down on the inland water?

6. The area of a yard is 420 ft². What is the probability that any leaf landing in the yard will land in a circular wading pool that has a diameter of 14 ft? Use $\frac{22}{7}$ for π .

EXTRA PRACTICE 5-3

PROBABILITY AND AREA

EXERCISES

A standard deck of playing cards has 52 cards. A card is drawn at random from a shuffled deck. Find each probability.

1. $P(\text{ace})$ _____

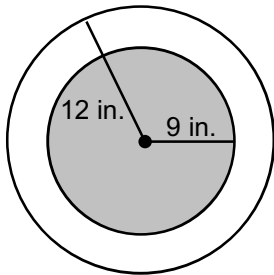
2. $P(\text{club})$ _____

3. $P(\text{red } 2)$ _____

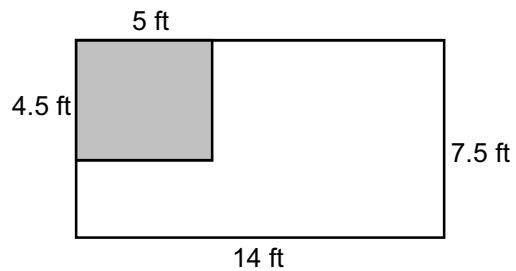
4. $P(\text{face card})$ _____

Find the probability that a point selected at random in each figure is in the shaded region.

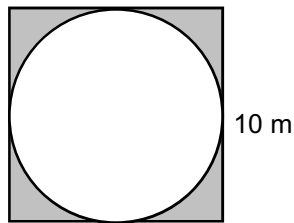
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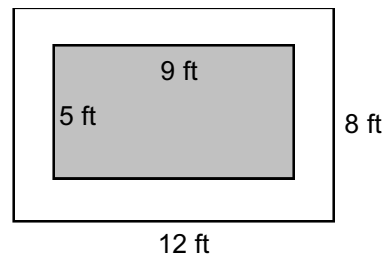
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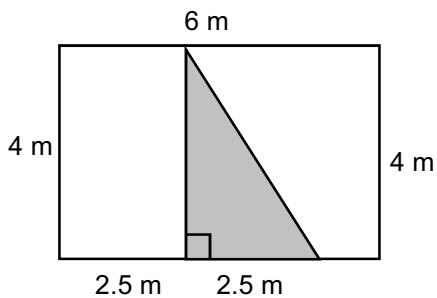
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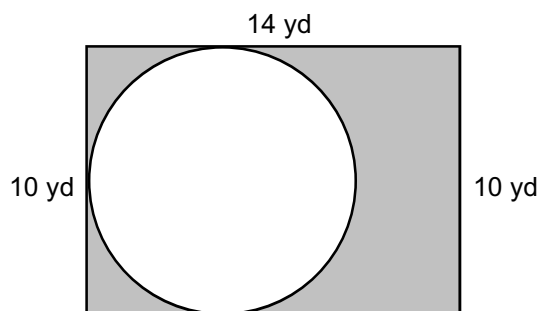
8.



9.



10.



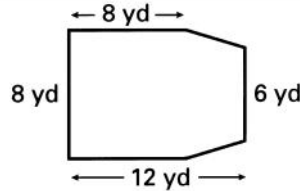
RETEACHING 5-4**PROBLEM SOLVING SKILLS: IRREGULAR SHAPES**

One strategy you can use to find the answer to a complex problem is to solve a simpler problem first. Then use these formulas to help you find the area.

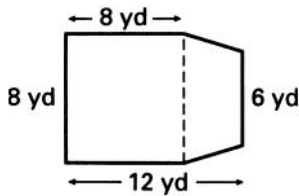
Rectangle: $A = lw$ Triangle: $A = \frac{1}{2}bh$ Trapezoid: $A = \frac{1}{2}h(b_1 + b_2)$ Circle: $A = \pi r^2$

Example

Joan wants to carpet the floor of her family room. She selects carpet that costs \$20 per square yard. How much money will she spend?

**Solution**

Step 1: Begin by finding the area in square yards.



a. Separate the floor into two regions—a trapezoid and a rectangle—to simplify the problem.

b. Find the area of each figure.

Area of trapezoid:

$$A = \frac{1}{2}h(b_1 + b_2)$$

$$A = \frac{1}{2}(4)(8 + 6) = 28$$

The area is 28 yd².

Area of rectangle:

$$A = lw$$

$$A = (8)(8) = 64$$

The area is 64 yd².

c. Add to find the total area.

$$\text{Total area} = 28 + 64 = 92$$

The area of the family room is 92 yd².

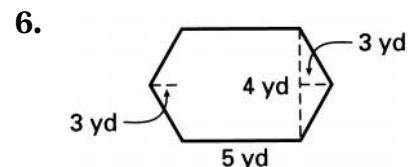
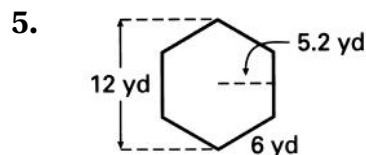
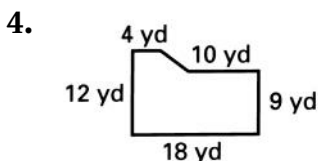
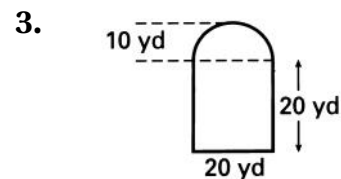
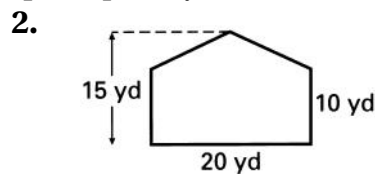
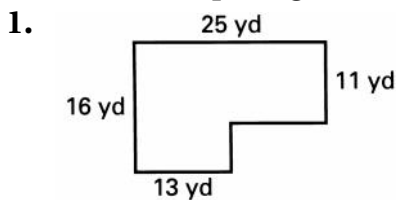
Step 2: Then multiply the number of square yards by the cost per square yard.

$$20 \cdot 92 = 1840$$

The cost of the carpeting is \$1840.

EXERCISES

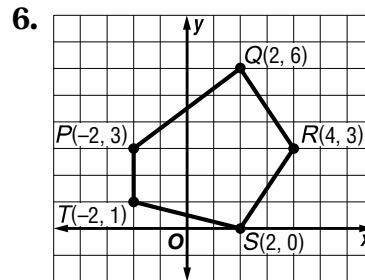
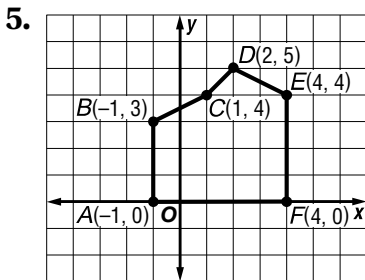
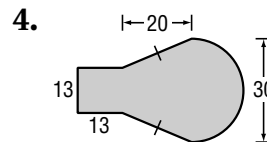
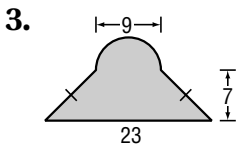
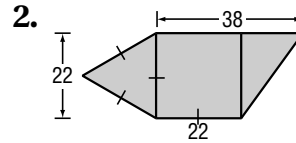
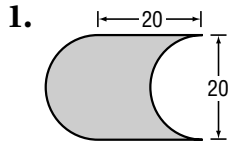
Find the area of each figure. Then tell how much money you would spend to carpet each floor if carpeting costs \$15 per square yard.



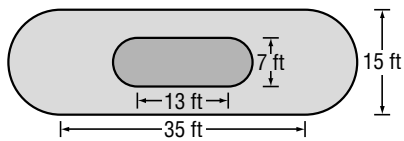
EXTRA PRACTICE 5-4
AREAS OF IRREGULAR FIGURES

EXERCISES

Find the area of each figure. Round to the nearest tenth if necessary.



LANDSCAPING For Exercises 7 and 8, use the following information.
 One of the displays at a botanical garden is a koi pond with a walkway around it.
 The figure shows the dimensions of the pond and the walkway.



7. Find the area of the pond to the nearest tenth.

8. Find the area of the walkway to the nearest tenth.

RETEACHING 5-5

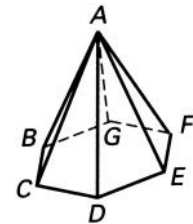
THREE-DIMENSIONAL FIGURES AND LOCI

A prism has two bases with three or more lateral faces which are shaped like parallelograms.

A pyramid has one base with three or more lateral faces which are shaped like triangles.

Example

Name and identify the polyhedron, its vertices and each of its bases. Then identify the intersecting faces and edge at which they intersect.



Solution

The polyhedron is a hexagonal pyramid; it has one hexagonal base and six triangular faces.

Vertices: Points A, B, C, D, E, F, G

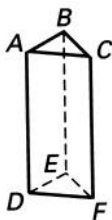
Base: $BCDEFG$

Intersecting faces and edges: $\triangle ABC$ and $BCDEFG$, \overline{BC} ; $\triangle ACD$ and $BCDEFG$, \overline{CD} ; $\triangle ADE$ and $BCDEFG$, \overline{DE} ; $\triangle AEF$ and $BCDEFG$, \overline{EF} ; $\triangle AFG$ and $BCDEFG$, \overline{FG} ; $\triangle AGB$ and $BCDEFG$, \overline{GB}

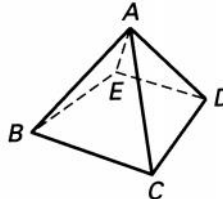
EXERCISES

Name and identify each polyhedron, each vertex and each of its bases.

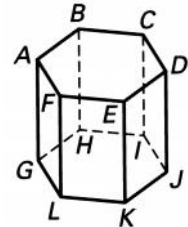
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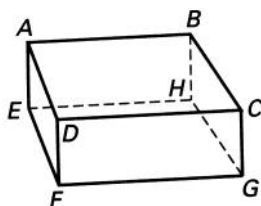
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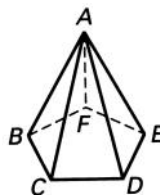
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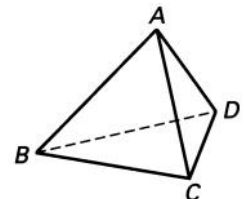
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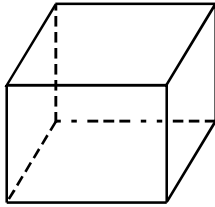
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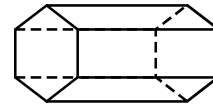
EXTRA PRACTICE **5-5****THREE-DIMENSIONAL FIGURES AND LOCI****EXERCISES**

Name the polyhedra shown below. Then state the number of faces, vertices, and edges each has.

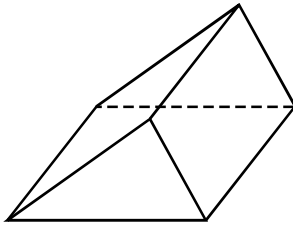
1.



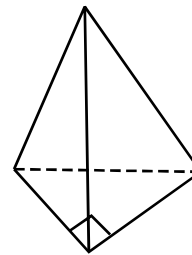
2.



3.



4.



Draw the figure.

5. square pyramid

6. pentagonal prism

7. sphere

8. oblique cylinder

9. hexagonal pyramid

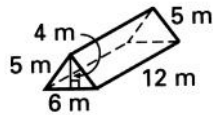
10. oblique rectangular prism

RETEACHING 5-6**SURFACE AREA OF THREE-DIMENSIONAL FIGURES**

To find the surface area (SA) of a polyhedron, add the area of each base to the sum of the areas of all the lateral sides.

Example

Find the surface area of the triangular prism.

**Solution**

$SA =$ sum of the area of each lateral face $+ 2(\text{area of base})$

Use the formula $A = lw$ to find area of each lateral face.

$$\text{Face 1: } A = (5)(12) = 60$$

$$\text{Face 2: } A = (5)(12) = 60$$

$$\text{Face 3: } A = (6)(12) = 72$$

Use the formula $A = \frac{1}{2}bh$ to find area of a base.

$$A = \frac{1}{2}(4)(6) = 12$$

Use the formula $SA =$ sum of the areas of the lateral faces $+ 2(\text{area of base})$.

$$SA = 60 + 60 + 72 + (2)(12)$$

$$= 192 + 24$$

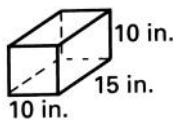
$$= 216$$

The surface area of the triangular prism is 216 m^2 .

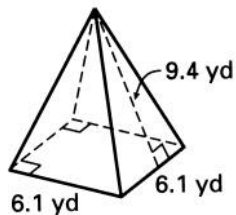
EXERCISES

Find the surface area of each figure.

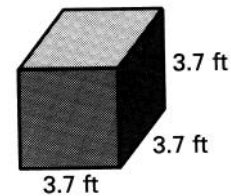
1.



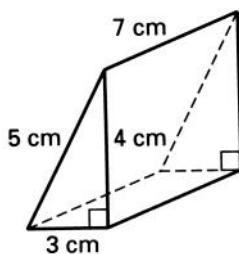
2.



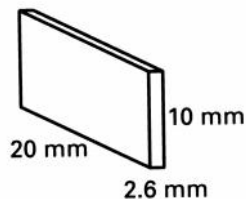
3.



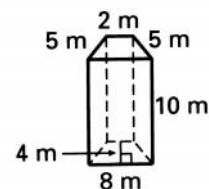
4.



5.



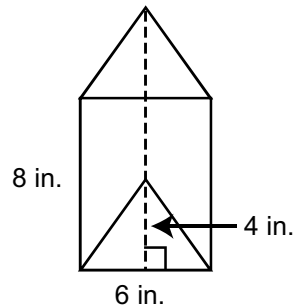
6.



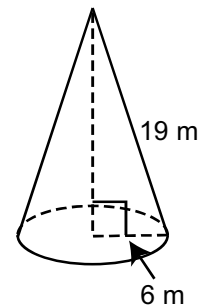
EXTRA PRACTICE **5-6****SURFACE AREA OF THREE-DIMENSIONAL FIGURES****EXERCISES**

Find the surface area of each figure. Assume that all pyramids are regular pyramids. Use $\pi = 3.14$. Round answers to the nearest whole number.

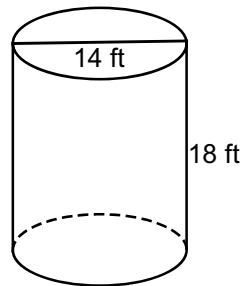
1.



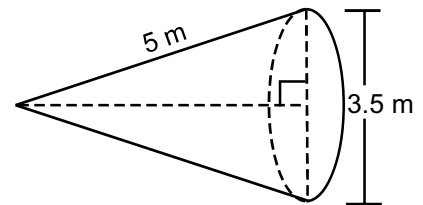
2.



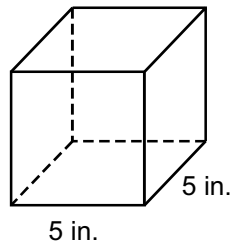
3.



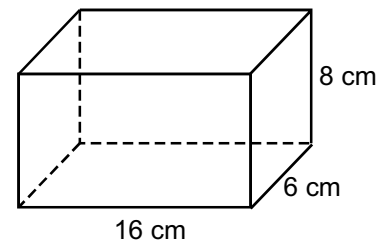
4.



5.



6.



7. What is the surface area of a ball with a diameter of about 15 cm? _____
8. What is the surface area of a square pyramid whose base length is 8 ft and whose faces have heights of 12 ft? _____
9. What is the surface area of a box with a height of 5 in., a length of 8 in. and a width of 4 in.? _____
10. What is the surface area of a cube if each edge has length 3.5 ft? _____
11. Can you find the surface area of a cylinder if all you know is its radius? Explain.

RETEACHING 5-7

VOLUME OF THREE-DIMENSIONAL FIGURES

Volume is a measure of the number of cubic units needed to fill a region of space. You can use a formula to find the volume for these figures.

Remember, B represents area of the base.

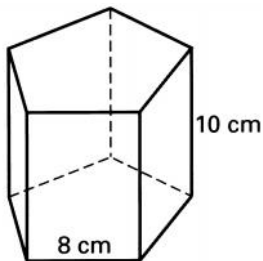
Prism: $V = Bh$ Cylinder: $V = \pi r^2 h$ Cone: $V = \frac{1}{3}\pi r^2 h$ Pyramid: $V = \frac{1}{3}Bh$

Example 1

Find the volume.
The area of the base is 110 cm^2 .

Solution

Use the formula
 $V = Bh$
 $V = (110)(10)$
 $V = 1100$
The volume is 1100 cm^3 .

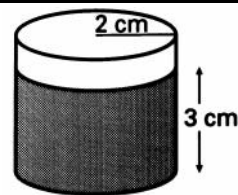


Example 2

Find the volume of the powder left in the can.

Solution

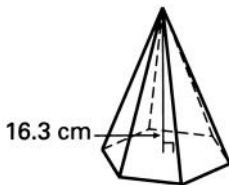
Use the formula $V = \pi r^2 h$
 $V = (3.14)(2)(2)(3)$
 $V = 37.68$
The volume of the powder left in the can is about 37.68 cm^3 .



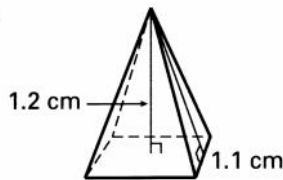
EXERCISES

Find the volume of each figure.

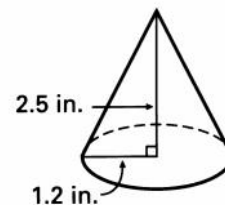
1. Area of base: 37.8 cm^2



2.

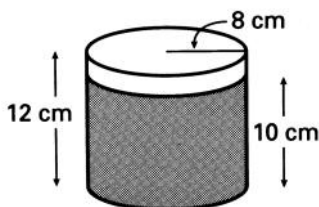


3.

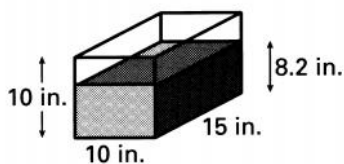


Find the volume of each container. Then find the volume of the powder left in each container.

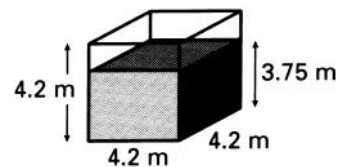
4.



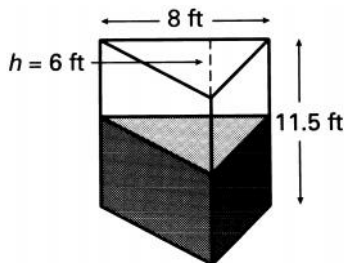
5.



6.



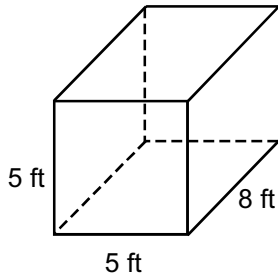
7. The volume of the powder poured out of the triangular prism is 120 ft^3 . What is the volume of the powder left inside the prism?



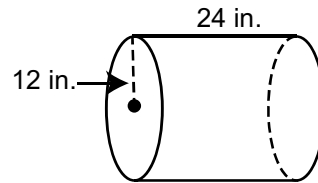
EXTRA PRACTICE **5-7****VOLUME OF THREE-DIMENSIONAL FIGURES****EXERCISES**

Find the volume to the nearest whole number. Use 3.14 for π .

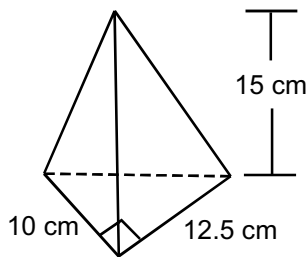
1.



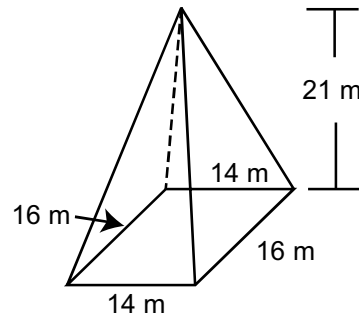
2.



3.



4.



5. How many cubic meters of water can a water tank hold, if the tank is a cylinder 10 m high and 12 m in diameter? _____
6. A rectangular prism has a volume of 382.5 in.^3 and a base area of 45 in.^2 . What is the height of the prism? _____
7. A sphere has a radius of 4 m. What is the volume of the sphere? _____
8. A cylinder with a diameter of 8 in. and a height of 5 in. fits completely inside a rectangular box with a height of 5 in., a length of 10 in., and a width of 8 in. What is the volume of the box outside of the cylinder? _____
9. What happens to the volume of a rectangular prism if its height is doubled? _____
10. A container is made by placing a triangular pyramid with a base area of 12 cm^2 and a height of 8 cm on top of a rectangular prism with a height of 6 cm, a length of 8 cm, and a width of 4 cm. What is the volume of the container? _____

CHAPTER 5

MEASUREMENT

STANDARDIZED TEST PRACTICE

Name _____

Date _____

Scoring Record	
Possible: 18	Earned:

1. Which is not a rational number?
- A. $\sqrt{11}$ B. $-\frac{3}{7}$
 C. -0.27 D. $\sqrt{64}$
 E. 8

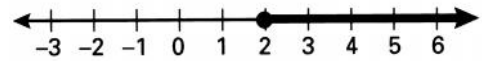
2. Evaluate $x - (-xy)$ if $x = 3$, $y = -0.2$.
- A. 3.6 B. 2.4
 C. 0.8 D. 0.4
 E. none of these

3. Evaluate x^{-4} if $x = 2$.
- A. $-\frac{1}{16}$ B. $\frac{1}{16}$
 C. 16 D. 8
 E. -8

4. Given $f(x) = 3x - 2$ and $g(x) = -2x + 1$, find $f(2) + g(-1)$.
- A. 7 B. 1
 C. 12 D. -2
 E. 3

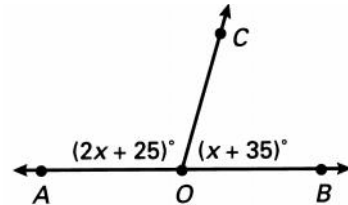
5. Solve. $-3x + 4 = x - 16$
- A. 10 B. 5
 C. 6 D. -5
 E. none of these

6. Which inequality is shown by this graph?



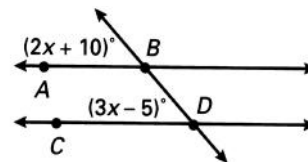
- A. $3x - 1 > 5$
 B. $3x - 1 < 5$
 C. $3x - 1 \geq 5$
 D. $3x - 1 \leq 5$
 E. $3x - 1 \geq -5$

7. In the figure, find $m\angle COB$.



- A. 105° B. 40°
 C. 75° D. 15°
 E. none of these

8. In the figure, $\overline{AB} \parallel \overline{CD}$. Find $m\angle ABD$.



- A. 140° B. 15°
 C. 40° D. 164°
 E. none of these

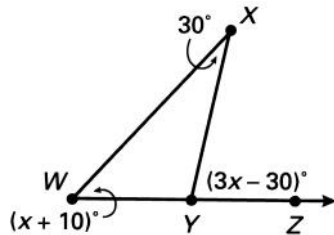
9. Which statement is the converse of the following?

If $m\angle MRN = m\angle PRQ$,
then \overrightarrow{RS} bisects $\angle MRQ$.

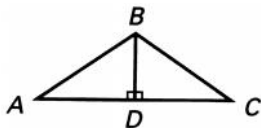
- A. If \overrightarrow{RS} bisects $\angle MRQ$,
then $m\angle MRN = m\angle PRQ$.
- B. If \overrightarrow{RS} does not bisect $\angle MRQ$,
then $m\angle MRN \neq m\angle PRQ$.
- C. If \overrightarrow{RS} bisects $\angle MRQ$,
then $m\angle MRN \geq m\angle PRQ$.
- D. If $m\angle MRN \neq m\angle PRQ$,
then \overrightarrow{RS} does not bisect $\angle MRQ$.
- E. none of these

10. Find $m\angle XYZ$ in the figure.

- A. 35°
- B. 105°
- C. 115°
- D. 42.5°
- E. 75°



11. Given that $AD = CD$, which postulate can you use to prove $\triangle ABD$ is congruent to $\triangle CBD$?



- A. ASA
- B. SAS
- C. SSS
- D. AAA
- E. none of these

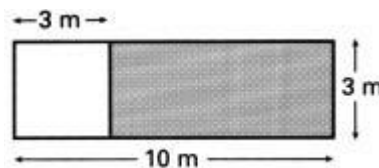
12. Which of these measures cannot be the lengths of the sides of a triangle?

- A. 2 cm, 3 cm, 4 cm
- B. 8 cm, 10 cm, 12 cm
- C. 2 cm, 3 cm, 6 cm
- D. 4 m, 6 m, 7 m
- E. 6 m, 8 m, 10 m

13. Find the sum of the measures of the interior angles of a polygon with 12 sides.

- A. 2160°
- B. 1620°
- C. 1800°
- D. 360°
- E. none of these

14. Find the probability that a point selected at random in the figure is in the shaded area.



- A. $\frac{3}{10}$
- B. $\frac{1}{3}$
- C. $\frac{3}{7}$
- D. $\frac{7}{10}$
- E. $\frac{4}{7}$