LESSON 1: WHERE IS THE GEOMETRY? EXERCISES

EXERCISES

1. Write three things that you already know about measuring geometric figures.

   Share your summary with a classmate.
   What did you learn from one another?

2. Based on your previous work in math, write three things that you will do during this unit to increase your success. Write your strategies for all units in the same place so you can review your past strategies as you write new strategies for this unit.

   For example, consider ways you will participate in classroom discussions, your study habits, how you will organize your time, what you will do when you have a question, and so on.

3. In the lesson, you explored how geometry and measurement are important to architects and builders. You looked at scaled floor plans and elevation drawings for actual buildings and at how architects and builders use the plans—such as for determining the amounts of materials that will be needed in a building project.

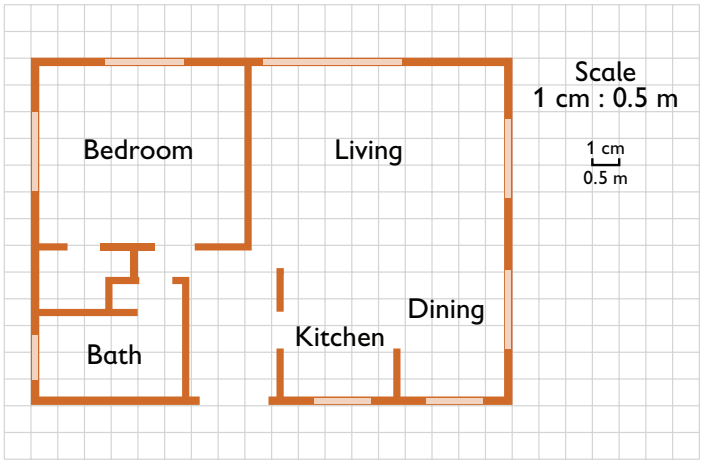
   Geometry and measurement are used in many professions other than architecture and building. Describe another real-world application of geometry and measurement (e.g., involving area, surface area, volume, circumference, or scale models).
   Your example can be based on something you already know or something you research.

LESSON 1: WHERE'S THE GEOMETRY?

EXERCISES

Use this information to answer questions 4–7.

This is a scaled floor plan of an apartment.



4. How long is the actual apartment in meters?

_____ m

5. How wide is the actual apartment in meters?

_____ m

6. How much floor space does the actual apartment have?

_____ m^2

7. How much floor space does the actual bedroom have?

_____ m^2

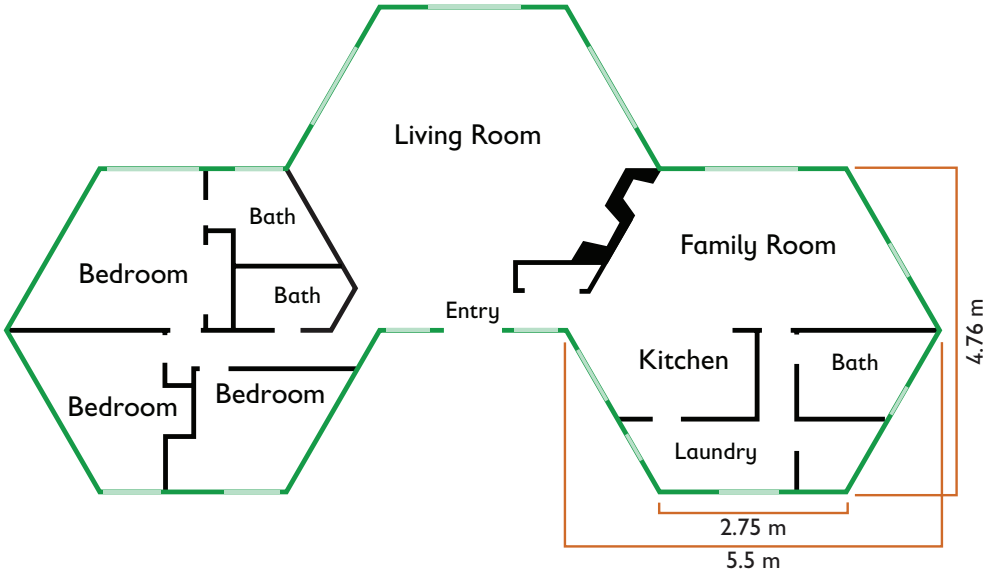
LESSON 2: AREA OF REGULAR POLYGONS

EXERCISES

EXERCISES

Use the following to answer questions 1–3.

Consider this floor plan of a house made up of three congruent regular hexagons.



1. What is the apothem of one of the hexagons?

   A 2.38 m
   B 2.75 m
   C 4.76 m
   D 5.5 m

2. Which equations could be used to determine the total area of the house, where P is the perimeter, a is the apothem, s is a side length, b is the base, and h is the height? There may be more than one correct equation.

   A $A = 3a(P \div 2)$
   B $A = a\left(\frac{P}{2}\right)^3$
   C $A = \frac{3}{2}bh$
   D $A = 6aP$
   E $A = 9as$

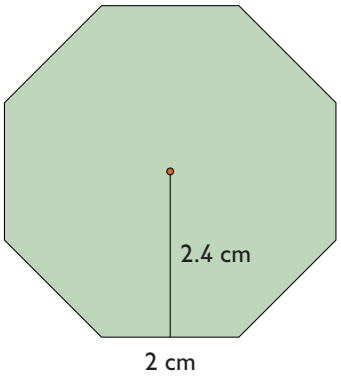
3. What is the total area of the house?

   A 19.635 m^2
   B 38.5 m^2
   C 58.905 m^2
   D 68.0625 m^2

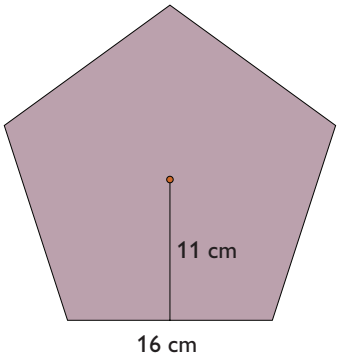
LESSON 2: AREA OF REGULAR POLYGONS

EXERCISES

4. What is the area of a regular octagon with side lengths of 2 cm and an apothem of 2.4 cm? Show your work.



5. What is the area of a regular pentagon with side lengths of 16 cm and an apothem of 11 cm? Show your work.



6. How is finding the area of a regular polygon different from finding the area of a polygon?

7. How is finding the area of a regular polygon similar to finding the area of a polygon?

8. If each of these regular polygons has the same side length, which one will have the longest apothem?

   A. Square
   B. Pentagon
   C. Hexagon
   D. Octagon

LESSON 2: AREA OF REGULAR POLYGONS

EXERCISES

9. For which regular polygons is the side longer than the apothem? There may be more than one correct polygon.

   A. Rectangle
   B. Pentagon
   C. Hexagon
   D. Octagon
   E. Decagon

Challenge Problem

10. A regular hexagon has an area of 1,050 in^2 and a perimeter of 120 in. How long is the apothem? Explain the steps you took to get your answer.

LESSON 3: CREATE A CITY

EXERCISES

1. Based on what your classmates shared about their projects, revise and make improvements to the polygon bases of the two buildings you and your partner (or group) are making for the Creating a City project.

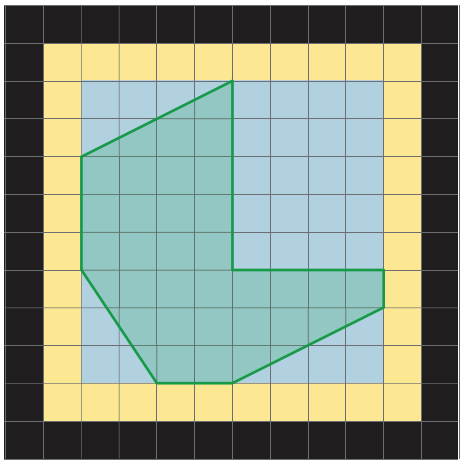
2. If you have a partner or are working with a group, make a list of assignments for each person. (If you are working independently, make a list of assignments for yourself.) Be sure that each assignment has a due date. Include your assignments in your project plan.

3. During the lesson, you had a class discussion about the project rubric. Do you think there are criteria in the rubric that will be particularly challenging to accomplish? In your project plan, include the parts of the rubric that you would like to pay extra attention to as you and your partner or group work on your buildings.

LESSON 3: CREATE A CITY

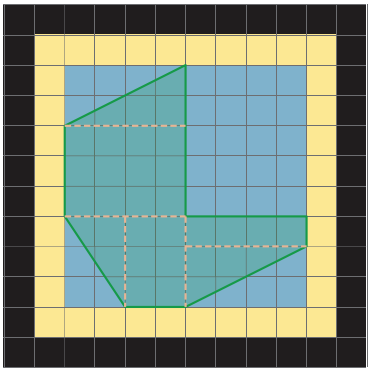
EXERCISES

4. A pair of students in Jack's class drew this irregular polygon as the base of a building they will model for the Creating a City project.

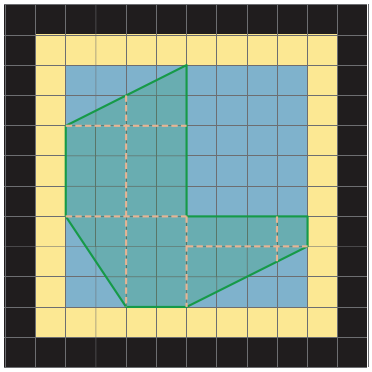


Which figure represents how the students could divide their polygon to determine the area of the base?

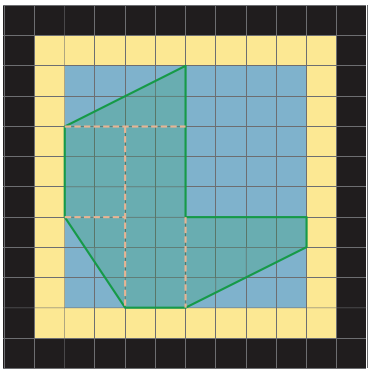
A



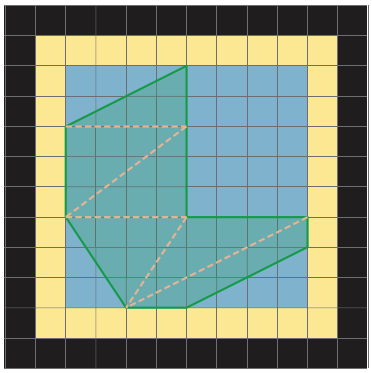
B



C



D



5. Continue to work on your project.

LESSON 4: CIRCUMFERENCE

EXERCISES

EXERCISES

1. Which regular polygon has a ratio of perimeter to width closest to π?

   A. Hexagon

   B. Octagon

   C. Decagon

   D. 30-gon

2. Which measurement is closest to the circumference of a circle that has a diameter of 10 inches?

   A. 15.2 inches

   B. 31.4 inches

   C. 62.8 inches

   D. 78.5 inches

3. If a circle has a circumference of π units, what is the diameter of the circle?

   _____ unit(s)

4. A circle has a radius of 5 feet. What is the circumference? Use π = 3.14.

   A. 8.14 feet

   B. 15.7 feet

   C. 31.4 feet

   D. 78.5 feet

5. Circumference formula: $C = 2\pi r$

   A circular building has a diameter of 275 ft. What is the circumference of the building? Round to the nearest foot. Use π = 3.14.

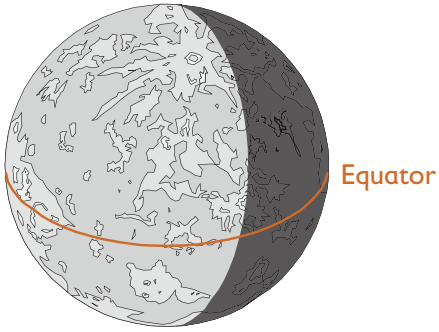
   C = _____ ft

LESSON 4: CIRCUMFERENCE

EXERCISES

6. Circumference formula: $C = 2\pi r$

   The equator is the hypothetical circle around the middle of the moon that divides the moon into two equal halves. The length of the moon's equator is about 10,917 km.



   What is the radius of the moon? Round to the nearest kilometer. Use $\pi = 3.14$.

   $r =$ _____ km

7. Marcus wants to plant rose bushes around the outside of a circular garden. The garden has a radius of 6 feet. He needs to leave about 4 feet between rose bushes. How many rose bushes can Marcus plant? Show your work.

8. A circle has a diameter of 20 cm. Find the circumference using 3.1, then 3.14, and finally 3.1416 for π.

   What can you conclude? For example, if you measured with string, which result would your measurement be closest to?

Challenge Problem

9. A pizza is cut into 8 equivalent slices. If the length of the crust on 1 slice is $7\frac{3}{4}$ in., about how long is each slice? Explain your reasoning, and show all your calculations.

LESSON 5: THE AREA OF A CIRCLE

EXERCISES

EXERCISES

1. A circle has a radius of 12 m. What is the approximate area of the circle?

   A. 37.68 m^2

   B. 75.36 m^2

   C. 113.04 m^2

   D. 452.16 m^2

2. A circular garden has a diameter of 40 meters. Which measurement is closest to the area of the garden?

   A. 126 square meters

   B. 252 square meters

   C. 1,256 square meters

   D. 5,024 square meters

3. A round swimming pool is 15 ft across. What is the approximate area of the bottom of the pool?

   A. 47.1 ft^2

   B. 94.2 ft^2

   C. 176.6 ft^2

   D. 706.5 ft^2

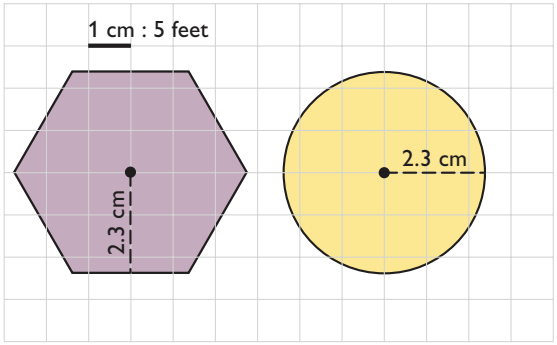
LESSON 5: THE AREA OF A CIRCLE

EXERCISES

Use the following to answer questions 4–5.

Circumference and area formulas:

$C = 2\pi r$ Circle: $A = \pi r^2$ Triangle: $A = \frac{1}{2}bh$



What is the circumference of the circle in feet? Round your answer to two decimal places. Use $\pi = 3.14$.

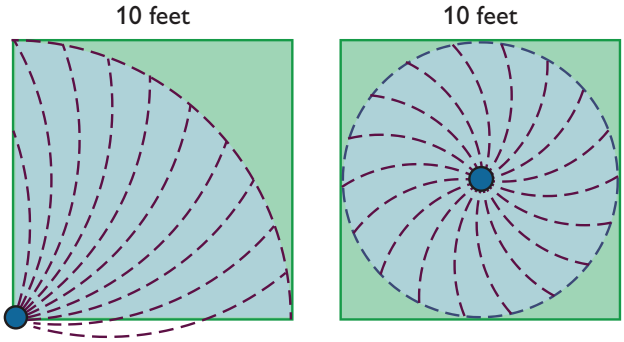
$C =$ _____ cm

4. Complete this sentence.
The area of the circle is _____ the area of the regular hexagon.

   A. greater than
   B. less than
   C. equal to

5. The area of a circle is 314 m^2. What is the diameter? Show your work.

6. Lucy has a square lawn area that is 10 feet on each side. The lawn needs to be watered regularly. She can't decide if she should place a sprinkler in the corner or in the center of the lawn.

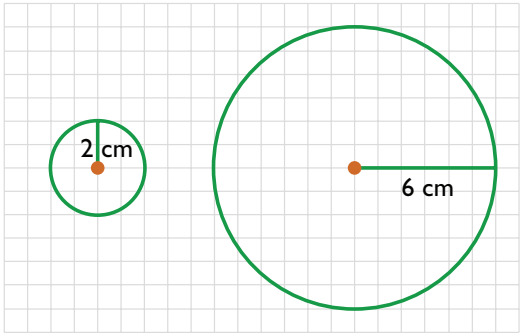


Which sprinkler placement will water a larger area of the lawn? Show your work.

LESSON 5: THE AREA OF A CIRCLE

EXERCISES

7. Sophie thinks that because the larger circle has a radius that is 3 times as long as the radius of the smaller circle, the area of the larger circle will be 3 times as great as the area of the smaller circle.



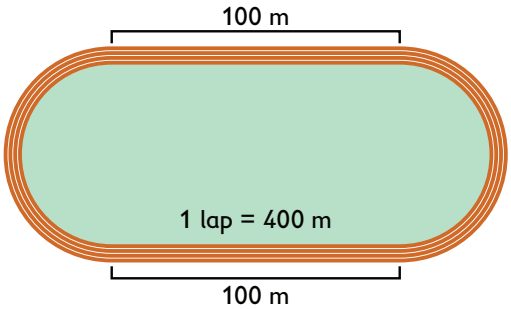
Do you agree with Sophie? Calculate the area of each circle to support your explanation.

8. The Pool and Spa shop sells covers for pools. It sells one cover for a pool with a diameter of 16 feet. A second cover is for a pool with a diameter of 8 feet.

Without doing the actual calculations, determine how the area of the cover for the first pool compares with the area of the cover for the second pool. Explain how you know.

Challenge Problem

9. A track has a total lap length of 400 m, with the straight sections of the track having a length of 100 m each.



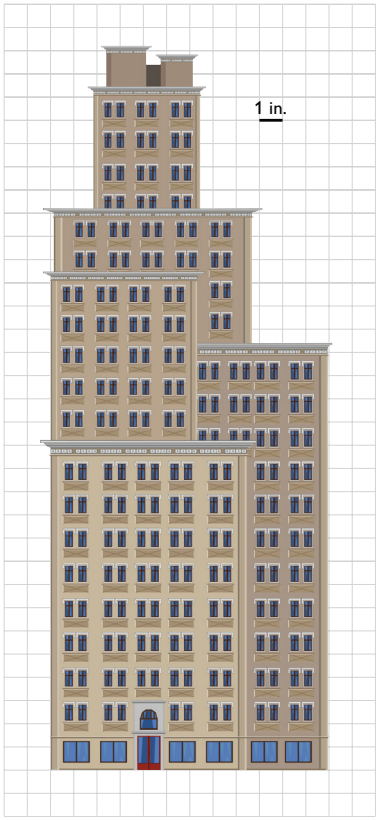
What is the area of the infield (the green area inside the track)? Explain your reasoning, and show your calculations.

LESSON 6: SCALE DRAWINGS

EXERCISES

EXERCISES

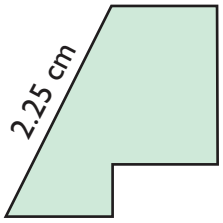
1. Consider this scale drawing of a building.



If the actual real-size building was built at a scale of $\frac{1}{4}$ inch : 1 foot , what would be the [base] length of the actual building?

A. 96 feet
B. 48 feet
C. 12 feet
D. 4 feet

2. This figure is a scale drawing of a hexagon measuring 54 cm on its longest side. What is the scale?



1 : _____

LESSON 6: SCALE DRAWINGS

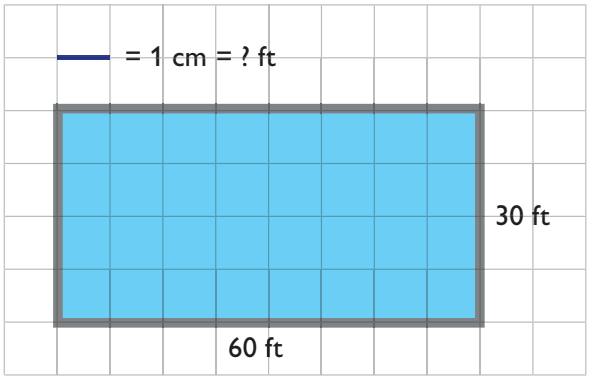
EXERCISES

3. Consider this photograph of an Indy race car. The average speed of these cars is about 220 miles per hour. Based on the photograph, what is a good estimate of the height of the car? Explain how you arrived at this estimate.

4. Maya has a picture of herself from head to toe. Her image in the picture is 12 inches tall. Maya is 60 inches tall in real life. What is the scale of the picture?

   1 : _____

5. A rectangular pool is 60 feet long and 30 feet wide. What is the scale of the drawing?

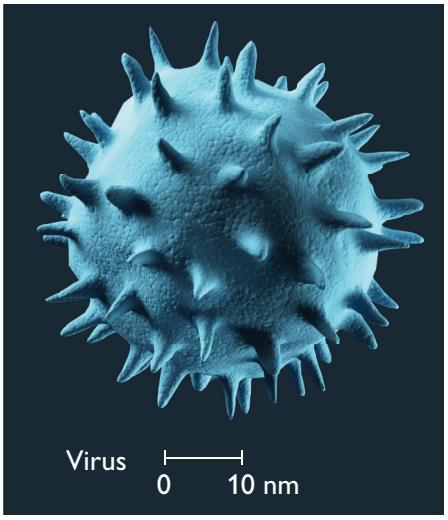


   A. 1 cm = 7.5 ft
   B. 1 ft = 15 cm
   C. 1 cm = 5 ft
   D. 1 cm = 15 ft

LESSON 6: SCALE DRAWINGS

EXERCISES

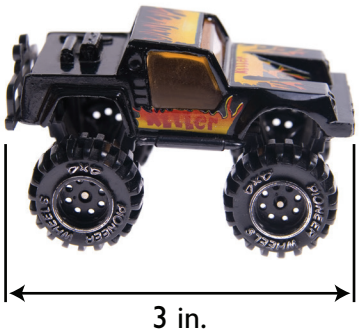
6. In this photograph of a virus magnified by an electron microscope, the scale shows a length of 10 nanometers (nm). 1 nm is $\frac{1}{1{,}000{,}000}$ of a millimeter.



What is the approximate length of the virus in millimeters?

_____ mm

7. A model truck is 3 inches long. If the scale of the model is 1 : 64, how long is the actual real-size truck? Show your work.

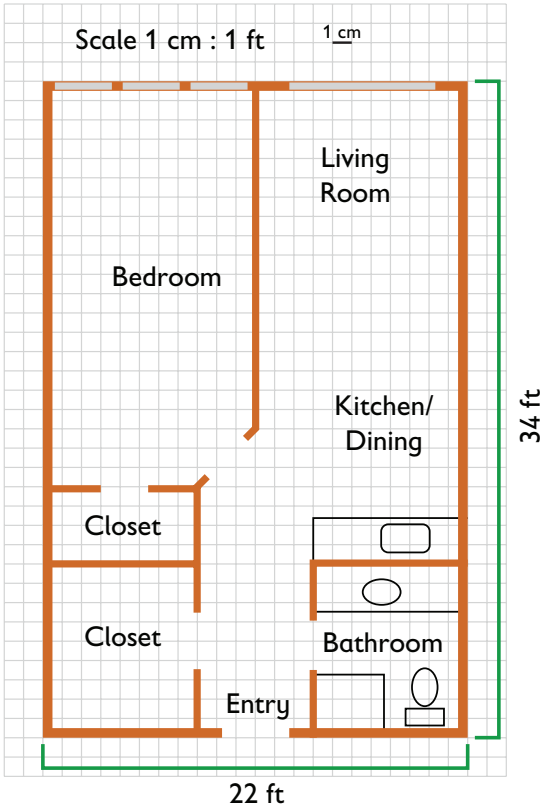


8. A toy airplane is 8 in. long. If the scale of the toy is 1 : 80, how long is the actual airplane? Show your calculations.

LESSON 6: SCALE DRAWINGS

EXERCISES

9. Consider this floor plan for an apartment.



If the area of the bathroom in the actual apartment is 72 ft^2, what is the ratio of the area of the bathroom to the total area of the apartment?

18 : _____

Challenge Problem

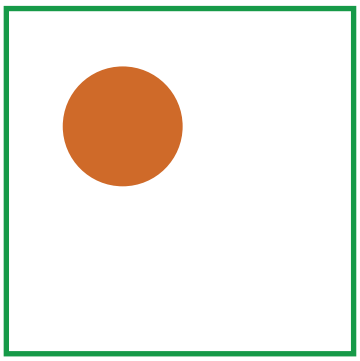
10. A house is designed so that the length to width ratio is 3 : 2. If a drawing of the house is 6 inches long and the scale is 1 inch : 8 feet, what is the actual width of the house? Explain your reasoning and show your work.

LESSON 7: AREA AND SCALE

EXERCISES

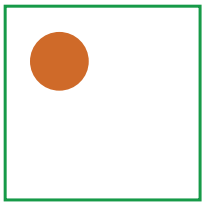
EXERCISES

1. Consider this drawing.

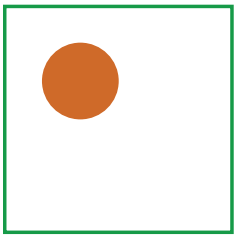


Which of these drawings is a scale version of the original drawing?

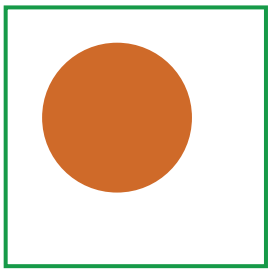
A



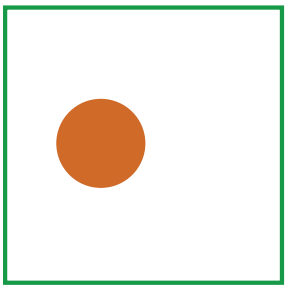
B



C



D



2. Sophie is planting a rectangular garden. She makes a scale drawing of the garden, where 1 inch = 3 feet. The dimensions of her scale drawing are 10 inches by 20 inches. What is the area of her actual garden?

   The area of the garden is _____ square feet.

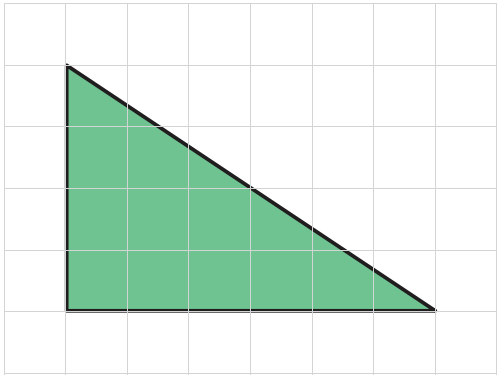
LESSON 7: AREA AND SCALE

EXERCISES

3. Sophie is planting a rectangular garden. She makes a scale drawing of the garden, where 1 inch = 3 feet. The dimensions of her scale drawing are 10 inches by 20 inches.

   Sophie decides to double the dimensions of her garden. She wants to use the same scale drawing. How can she do that?

4. A triangle is redrawn at 3 times the original scale so that it will appear 3 times as long and 3 times as wide. What effect does this new scale have on the area of the triangle?



   A. The area of the new triangle will be 3 times greater than the area of the original triangle.

   B. The area of the new triangle will be 4.5 times greater than the area of the original triangle.

   C. The area of the new triangle will be 9 times greater than the area of the original triangle.

   D. The area of the new triangle will be the same as the area of the original triangle.

5. A regular octagon is redrawn at a different scale. What is true about the octagon in either drawing?

LESSON 7: AREA AND SCALE

EXERCISES

Use the following to answer questions 6–10.

Circumference and area formulas:

$C = 2\pi r$ Circle: $A = \pi r^2$ Triangle: $A = \frac{1}{2}bh$

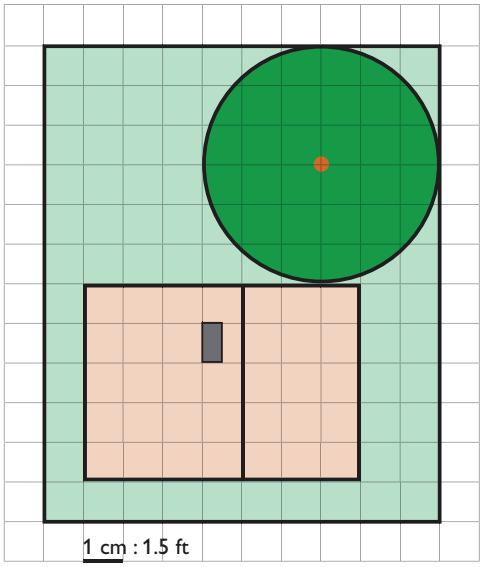
Here are two scale drawings of a cabin on a small site in a campground. Each grid square is 1 cm by 1 cm.

The first drawing, called a *site plan*, is the view looking down from above. It shows where the cabin is located on the site.

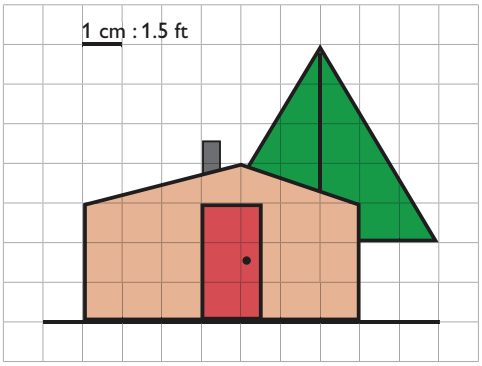
The other drawing is the front view of the cabin.

Notice the tree in both views, as well as the cabin (the roof in the site plan) and the stovepipe.

Site Plan



Front View



6. The circle in the site plan represents a tree. What area does the actual tree cover? Use $\pi = 3.14$.

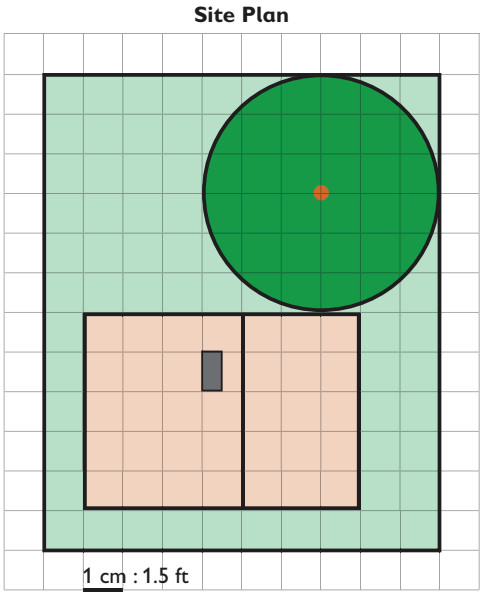
   A. 63.585 ft^2
   B. 113.04 ft^2
   C. 28.26 ft^2
   D. 254.34 ft^2

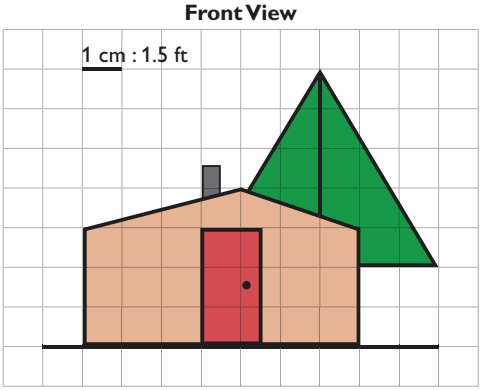
7. What is the actual area of the front of the cabin, not including the door? Round to the nearest hundredth.

   A. 45.00 ft^2
   B. 55.12 ft^2
   C. 47.25 ft^2
   D. 26.44 ft^2

LESSON 7: AREA AND SCALE

EXERCISES





8. If the site plan were redrawn at a scale of 1 cm : 1 ft, how wide (horizontally) would the drawing be?

   A. 10 cm
   B. 15 cm
   C. 7.5 cm
   D. 10.5 cm

9. What effect would redrawing the site plan to a new scale have on the area of the front of the cabin? Explain your reasoning.

10. If the radius of the tree were to double in size, what would be the new area that the actual tree covers? State your answer in terms of π.

    $A =$ _____ π ft^2

11. A scale floor plan of a rectangular apartment is drawn. The actual apartment is 22 feet long and 34 feet wide.

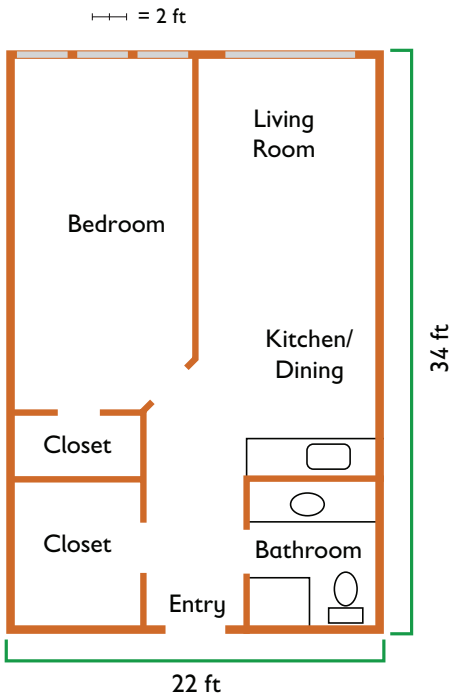
    Which dimensions could be the dimensions of the drawing? There may be more than one correct set of dimensions.

    A. 11 centimeters long, 17 centimeters wide
    B. 2 inches long, 3 inches wide
    C. 44 centimeters long, 68 centimeters wide
    D. 8 units long, 4 units wide
    E. 5.5 units long, 8.5 units wide

LESSON 7: AREA AND SCALE

EXERCISES

12. This is the floor plan for a one-bedroom apartment.



Redraw the floor plan on grid paper.
Be aware that not all of the lines in the drawing will match to lines on the grid, but measure and draw as accurately as you can.

Follow these guidelines.

- Decide the scale you will use.
- First locate the outside walls and windows; these define the perimeter of the apartment.
- Locate the interior walls.

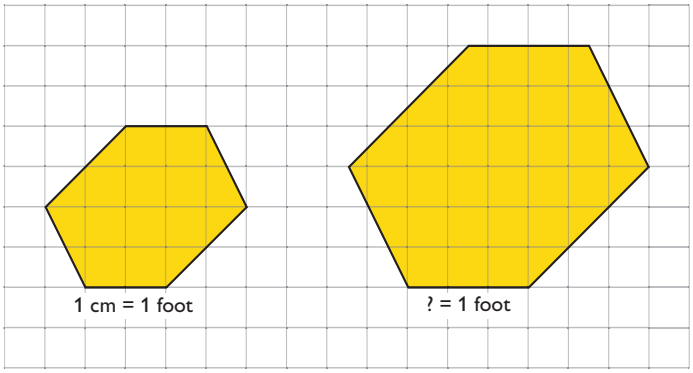
LESSON 7: AREA AND SCALE

EXERCISES

Challenge Problem

13. The hexagon on the right represents the same actual size hexagon as the one on the left, but redrawn at a different scale.

    What is the scale of the drawing on the right? Explain how you know.



LESSON 8: PROJECT WORK DAY 1

EXERCISES

EXERCISES

1. Make a plan to communicate your progress to your partner or group. Include your notes for this communication in your project plan.

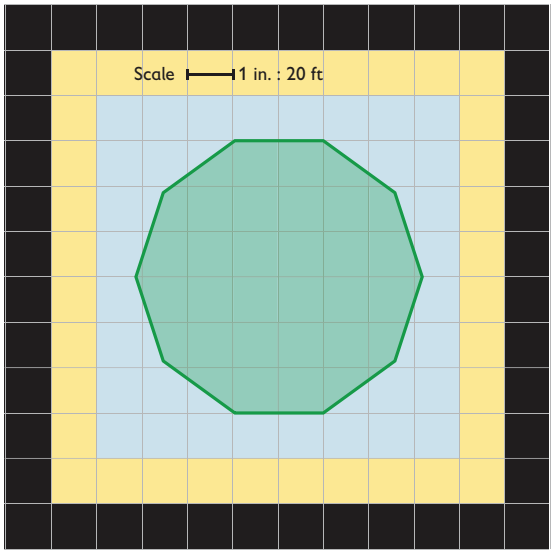
   For example, consider outlining the things you have completed on your project since the last time you and your partner or group worked together. You may also want to record questions, ideas, or concerns to discuss with your partner or group. In addition, think about how you will share updates with one another and how often.

2. In Lesson 3, you were asked to create a plan for the completion of your Creating a City project. Look at your list of assignments and assignment due dates. Compare what you have accomplished so far to your plan. Add your evaluation to your project plan.

   a. Based on this comparison, what steps will you complete before the next in-class project workday?

   b. Are there any additional tasks that need to be added to the assignment list? If so, work with your partner or group to update the list of project assignments and assignment due dates.

3. A pair of students in Sophie's class drew this decagon (10-sided regular polygon) as the base of a building they will model for the Creating a City project. Their model represents a building that is 91 ft tall.



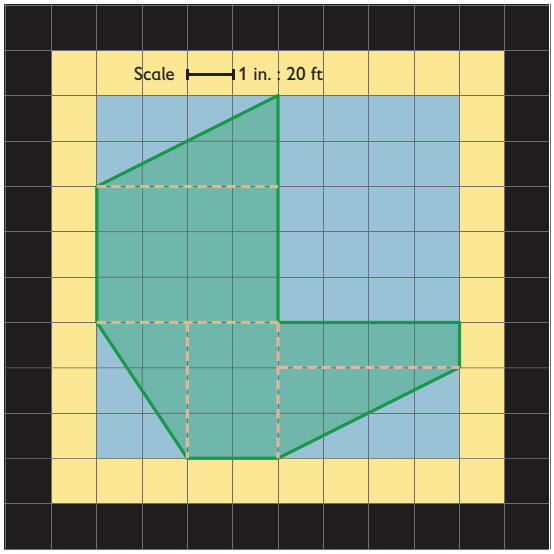
What will be the height of their model?

_____ in.

LESSON 8: PROJECT WORK DAY 1

EXERCISES

4. A pair of students in Jack's class drew this irregular polygon as the base of a building they will model for the Creating a City project. The dashed lines show how the students divided their polygon to determine the area of their model's base. They found the area was 33 in^2.



What would be the area of the base of a real-size building based on their model?

A. 660 ft^2

B. 4,400 ft^2

C. 13,200 ft^2

D. 17,600 ft^2

5. Continue to work on your project.

LESSON 9: PUTTING IT TOGETHER 1

EXERCISES

EXERCISES

1. Read your notes and think about your work in this unit so far.
   Write three things you have learned about the uses of geometry in the real world.

   Share your work with a classmate.
   Discuss how your observations are similar and how they are different.

2. Use your notes from class and your thoughts about the unit to add to your math vocabulary list in your notebook.

   Include the vocabulary word or phrase, a definition in your own words, and one or more examples. When appropriate, your example should include a diagram, a picture, or a step-by-step problem-solving approach.

Word or Phrase	Definition	Examples
integer	a whole number	can be positive, negative, or zero 1 −5,411 0 256 −8

   Add these items to your vocabulary list.
   - apothem
   - pi (π)

LESSON 9: PUTTING IT TOGETHER 1

EXERCISES

3. Consider your work in this unit with finding the perimeter, circumference, and area of polygons and circles.

   In your notebook, create a graphic organizer to show perimeter, circumference, and area formulas. Organize your visual in a way that will allow you to use it as a reference throughout the rest of the school year.

   Use a chart similar to the one shown, or create your own.

Area and Perimeter Formulas for 2-D Figures			
Figure	**Diagram**	**Perimeter/ Circumference Formula**	**Area Formula**
Triangle			
Rectangle			
Square			
Regular Polygon			
Circle			

4. Review the notes you took during the lessons about scale and using scale to find measurements and to make scale drawings. Add any additional ideas you have about the topic to your notes.

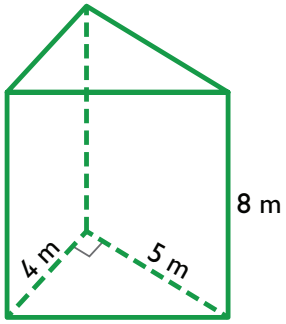
5. Complete any exercises that you have not finished from earlier lessons in this unit. If you have completed all of the exercises, continue working on your Creating a City project.

LESSON 13: VOLUME OF RIGHT PRISMS

EXERCISES

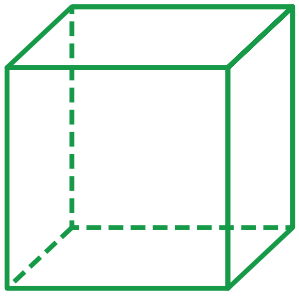
EXERCISES

1. A right triangular prism is 4 m long and 5 m wide, with a height of 8 m. What is the volume?



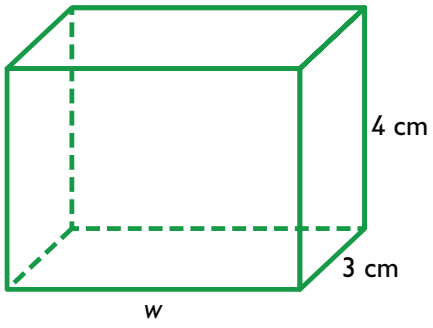
A. 72 m^3
B. 80 m^3
C. 144 m^3
D. 160 m^3

2. A cube has a volume of 64 cubic meters. What is the length of each side?



Each side is _____ meters long.

3. If the volume of a rectangular prism is 48 cm^3, the length is 3 cm, and the height is 4 cm, what is the width of the prism?



A. 2 cm
B. 4 cm
C. 36 cm
D. Cannot be determined

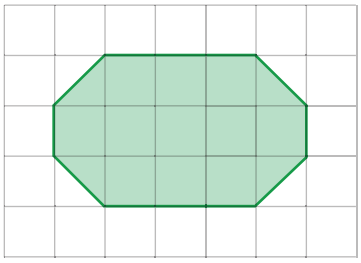
LESSON 13: VOLUME OF RIGHT PRISMS

EXERCISES

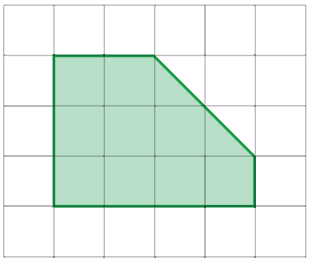
4. Assume that each of these four prisms has the same height.

   Which prism has the largest volume?

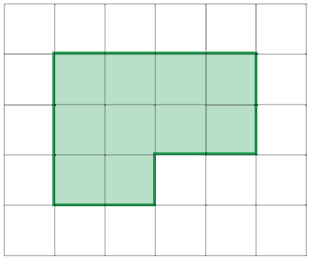
A



B



C



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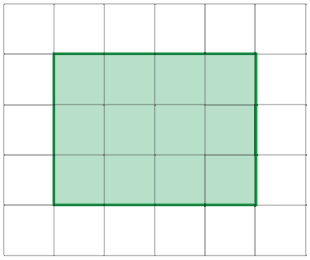
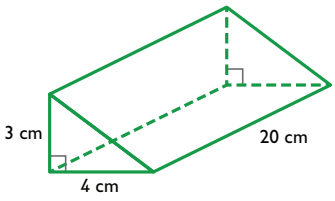
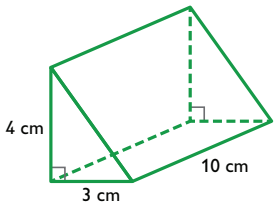


5. Which triangular prisms have a volume of 120 cm^3?
   There may be more than one correct prism.

A



B



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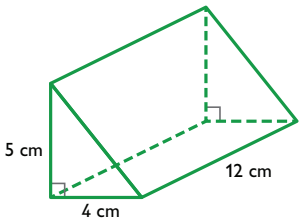

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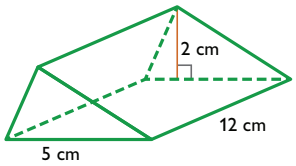
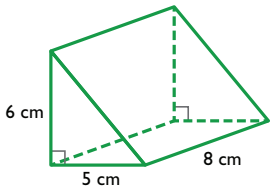


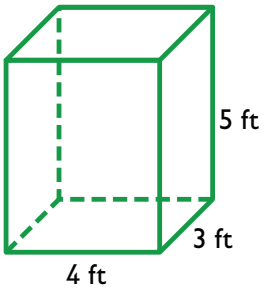
E

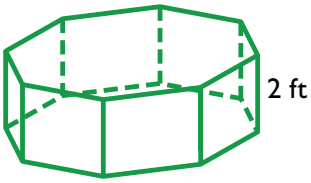


LESSON 13: VOLUME OF RIGHT PRISMS

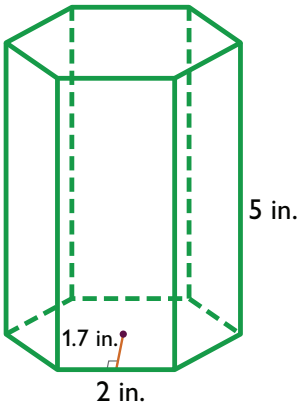
EXERCISES

6. A rectangular prism is 3 ft long, 4 ft wide, and has a height of 5 ft. The area of the base of an octagonal prism is 15 ft^2, and the prism has a height of 2 ft. What could be done to one prism to make both volumes equal?



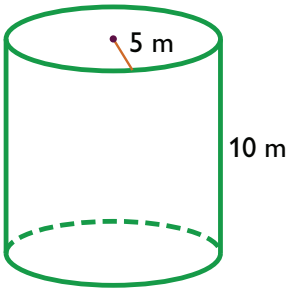


7. A regular hexagonal prism has a base with side lengths of 2 in. and an apothem of 1.7 in. If the prism has a height of 5 in., what is the volume of the prism? Show your work.



Challenge Problem

8. A prism with a circular base (a cylinder) has a radius of 5 m and a height of 10 m. What is the volume of the cylinder? Show your work.

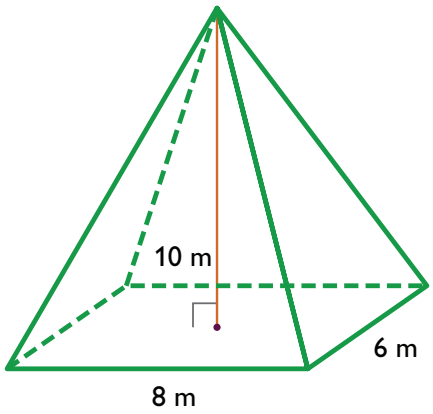


LESSON 14: VOLUME OF PYRAMIDS

EXERCISES

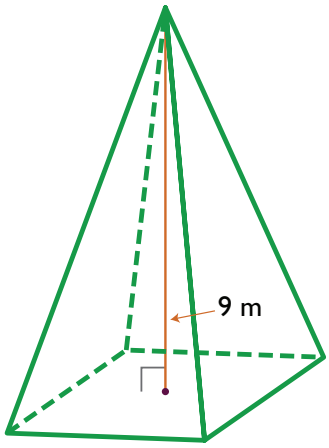
EXERCISES

1. A rectangular pyramid has a base that is 6 m wide and 8 m long, and it has a height of 10 m. What is the volume of the pyramid?



A. 120 m^3
B. 160 m^3
C. 240 m^3
D. 480 m^3

2. A square pyramid has a height of 9 m and a volume of 48 cm^2. What is the measure of each side of the base?



Each side of the base is _____ m.

LESSON 14: VOLUME OF PYRAMIDS

EXERCISES

3. Which figure has the greatest volume?

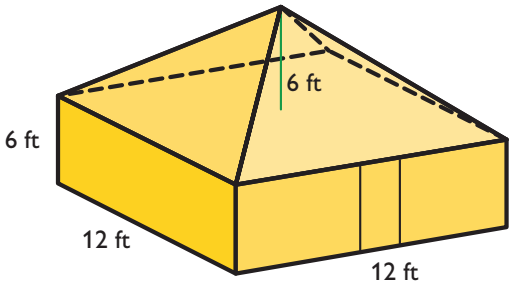
   A. A rectangular pyramid with 5 cm width, 10 cm length, and 8 cm height

   B. A rectangular prism with 4 cm width, 5 cm length, and 6 cm height

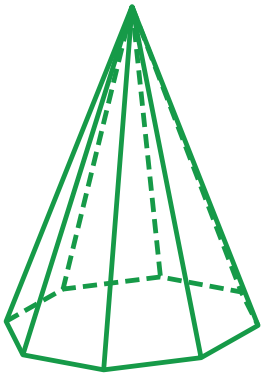
   C. A right triangular prism with 6 cm width, 5 cm length, and 8 cm height

   D. A square pyramid with 6 cm width, 6 cm length, and 10 cm height

4. A pavilion is set up at a fair. It has a square prism base and a pyramid for the roof portion. What is the volume of the pavilion? Show your work.



5. An octagonal pyramid has a base with an area of 36 m^2 and a volume of 144 m^3. What is the height of the pyramid?



   A. 4 m

   B. 8 m

   C. 12 m

   D. 16 m

LESSON 14: VOLUME OF PYRAMIDS

EXERCISES

6. The central portion of the Chhatarpur Temple near New Delhi, India, forms a square pyramid. The volume of the pyramid portion is approximately 60,750 ft^3. If each side of the base is 45 ft, what is the approximate height of the pyramid portion of the temple?

The height of the pyramid is about _____ ft.

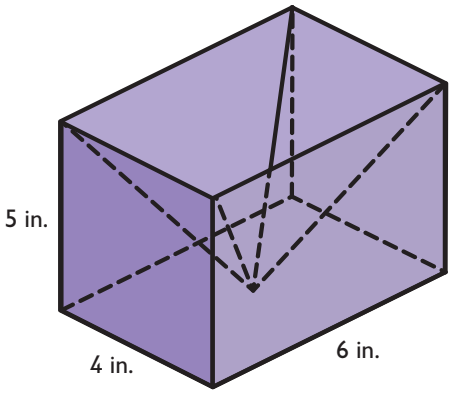
7. The Pyramid of Cestius, located in Rome, Italy, was built around 12 BCE. The base is a perfect square with a perimeter of 118.4 meters. The height is 37 meters. What is the volume of the pyramid? Round your answer to the nearest hundredth.

The volume of the pyramid is _____ cubic meters..

LESSON 14: VOLUME OF PYRAMIDS

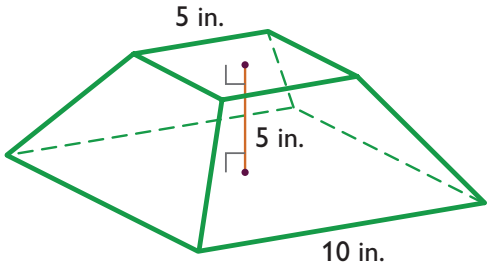
EXERCISES

8. A rectangular prism has the volume of a pyramid removed from it, leaving this figure. What is the volume of the new figure? Show your work.



Challenge Problem

9. A square pyramid is 10 in. on each side and has a height of 10 in. It is sliced horizontally so that the top portion is removed and the height is now 5 in. What is the volume of the truncated pyramid? Show your work.

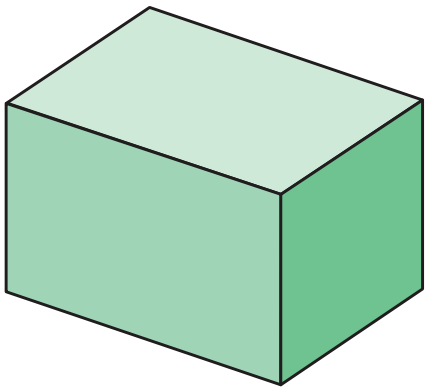


LESSON 15: SLICING THROUGH SOLIDS

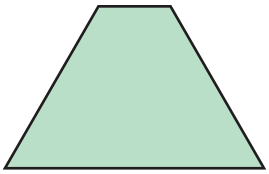
EXERCISES

EXERCISES

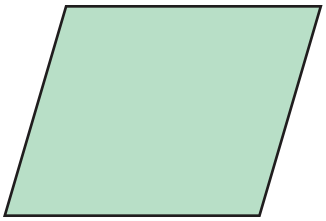
1. If a rectangular prism is intersected by a plane, which cross section figure is *not* possible?



A



B



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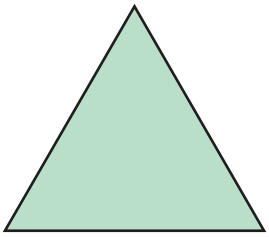
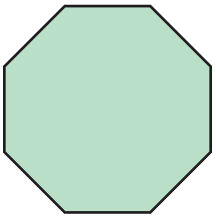
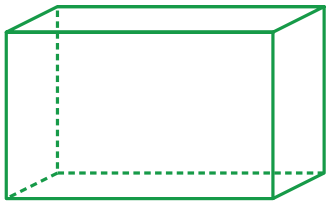
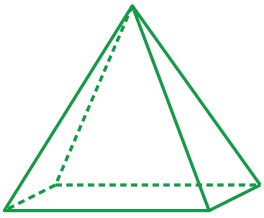


D



2. Which cuts will reveal an isosceles trapezoid cross section?



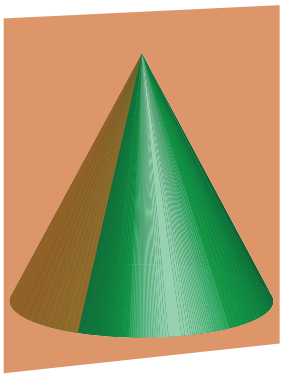


A. A cut perpendicular to a rectangular prism base
B. A cut parallel to a rectangular prism base
C. A cut perpendicular to a rectangular pyramid base
D. A cut parallel to a rectangular pyramid base

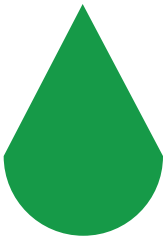
LESSON 15: SLICING THROUGH SOLIDS

EXERCISES

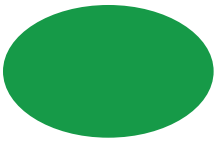
3. Which cross section would be formed by this plane cutting the cone perpendicular to the base?



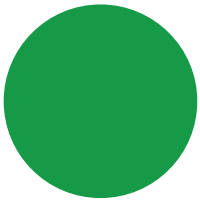
A



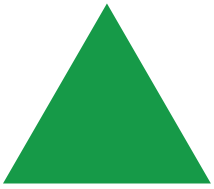
B



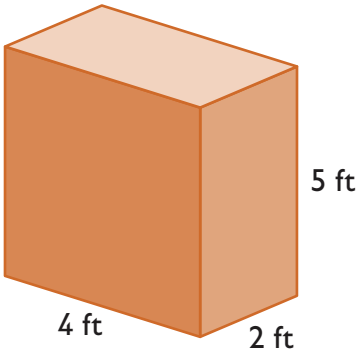
C



D



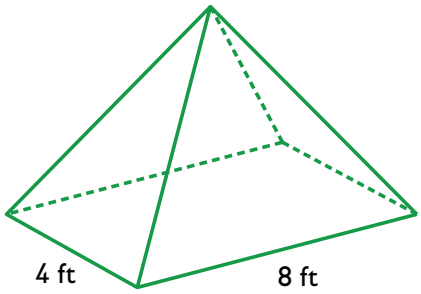
4. A rectangular prism is 4 ft long, 2 ft wide, and has a height of 5 ft. If a cut is made perpendicular to the base and parallel to the 4 ft long side, what is the area of the cross section that is revealed? Explain your reasoning and show your calculations.



LESSON 15: SLICING THROUGH SOLIDS

EXERCISES

5. A rectangular pyramid is 4 feet long and 8 feet wide. If a plane cuts the pyramid parallel to its base, a rectangular cross section is formed. Which dimensions describe a rectangular cross section that could be formed?



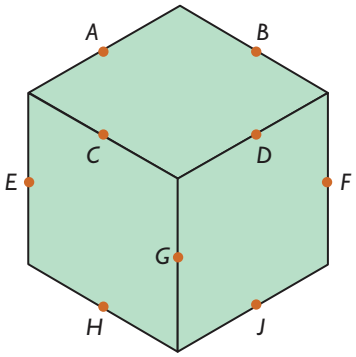
A. 2 feet long, 4 feet wide

B. 3 feet long, 5 feet wide

C. 5 feet long, 10 feet wide

D. Cannot be determined

6. Where could you slice through this cube to reveal a square cross section? There may be more than one possible slice.



A. A slice passing through *ACE*

B. A slice passing through *GHJ*

C. A slice passing through *ADJ*

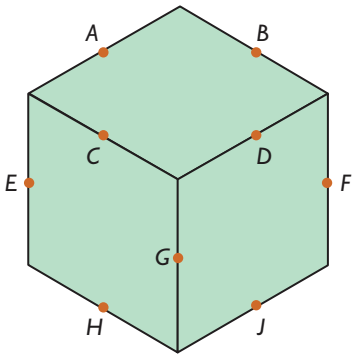
D. A slice passing through *EGF*

E. A slice passing through *BDF*

LESSON 15: SLICING THROUGH SOLIDS

EXERCISES

7. Where could you slice through this cube to reveal a rectangular surface?

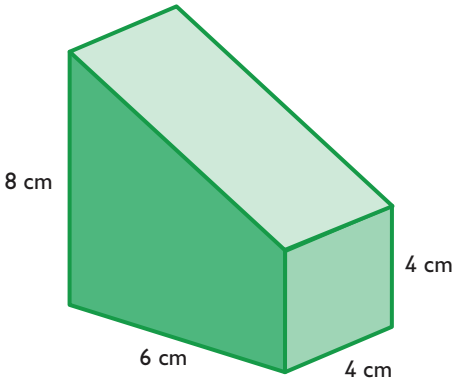


8. Imagine a rectangular prism. Slice *A* is a slice perpendicular to the base and parallel to two faces. Slice *B* is a slice parallel to the base. The cross sections revealed by slice *A* and slice *B* are congruent to one another. What is true about the prism?

Challenge Problem

9. A rectangular prism is sliced so that the revealed surface is a rectangle, although the cut is not parallel to the base.

   Given the dimensions shown, what is the volume of the figure? Explain your reasoning and show your calculations.



LESSON 16: SURFACE AREA AND NETS

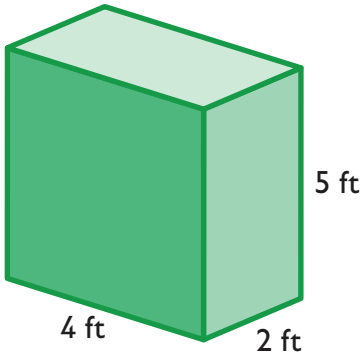
EXERCISES

EXERCISES

1. Jack wants to wrap a cube-shaped box with wrapping paper for his sister's birthday present. Each side of the box measures 2 feet.
   How much wrapping paper does he need?

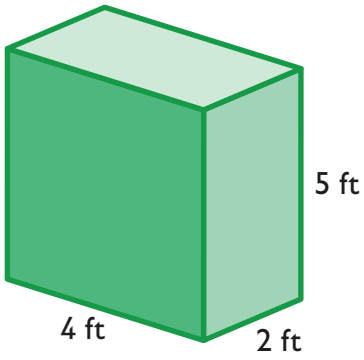
   Jack needs _____ square feet of wrapping paper.

2. What is the surface area of this rectangular prism?



   A. 40 ft^2
   B. 60 ft^2
   C. 76 ft^2
   D. 80 ft^2

3. Imagine that the dimensions of this rectangular prism are doubled.



   Without doing the actual calculations, how can you tell what the resulting surface area will be? Explain your reasoning.

LESSON 16: SURFACE AREA AND NETS

EXERCISES

4. A right rectangular prism has a base with a perimeter of 20 cm. If the prism has a height of 5 cm, what is the lateral area (the surface area *excluding* the area of the bases)?

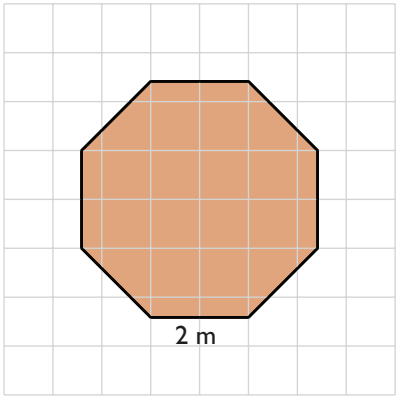
   A. 100 cm^2
   B. 120 cm^2
   C. 148 cm^2
   D. Cannot be determined

5. The volume of a prism is 96 $inches^3$. If the prism has a height of 8 inches and the perimeter of the base is 16 inches, what is the surface area of the prism? Explain your reasoning.

6. If the height of a prism is doubled, how will the surface area be affected?

   A. It will more than double.
   B. It will double also.
   C. It will increase, but by less than double.
   D. Cannot be determined.

7. A regular octagonal prism has a base with side lengths of 2 m. If the height of the prism is 3 m, what is the lateral area (the surface area *excluding* the area of the bases)?



Lateral area = _____ m^2

Challenge Problem

8. A prism with a circular base (a cylinder) has a radius of 5 m and a height of 10 m. What is the surface area of the prism? Explain your reasoning.

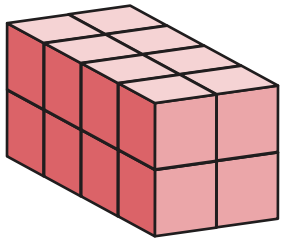
LESSON 17: SURFACE AREA OF 3-D FIGURES

EXERCISES

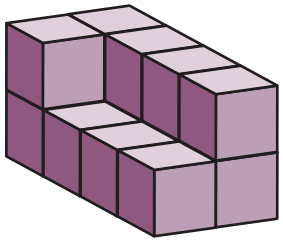
EXERCISES

1. Which figure has a different surface area than the others?

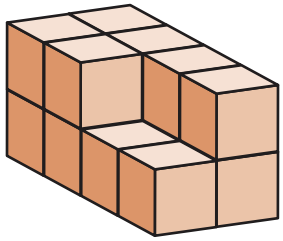
A



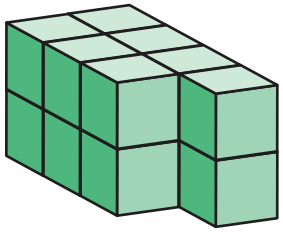
B



C



D



2. Consider the front view of this figure.

Front

What are the width of the top view and the height of the side view?

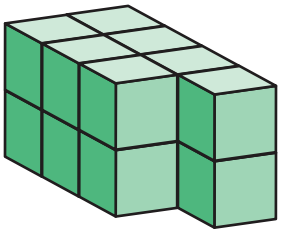
A. Top is 2 units wide; side is 2 units high.

B. Top is 5 units wide; side is 2 units high.

C. Top is 2 units wide; side is 5 units high.

D. Cannot be determined.

3. On paper, draw the 2-D top, front, and side views that could be used to find the surface area of this 3-D figure.

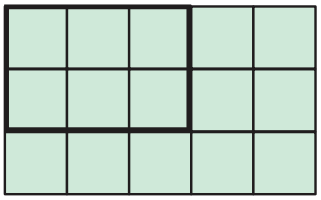


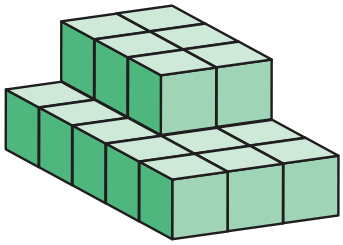
LESSON 17: SURFACE AREA OF 3-D FIGURES

EXERCISES

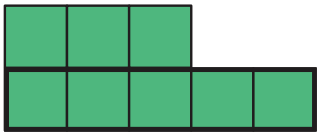
4. You can find the volume of solid figures using the 3-D and 2-D views. Divide the figure into solids that you know the volume of—similar to what you did with polygons. What is the volume of this figure?

Top

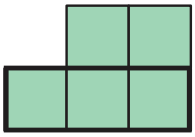




Front



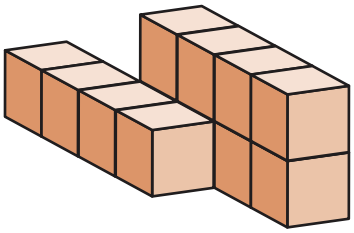
Side



A. 15 cubic units
B. 21 cubic units
C. 24 cubic units
D. 30 cubic units

Use the following to answer questions 5–6.

An architect uses this model made of unit cubes to explore the possibilities for a new building. The scale of the unit cube model is 1 : 144.



This model consists of 12 unit cubes. The side length of each cube is 1 in.

5. What is the surface area of the model, *excluding* the faces that are facing the ground?

SA = _____ in^2

6. What is the volume of the model?

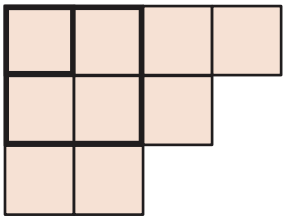
V = _____ in^3

LESSON 17: SURFACE AREA OF 3-D FIGURES

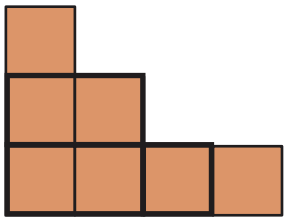
EXERCISES

7. Given the 2-D views, find the surface area.

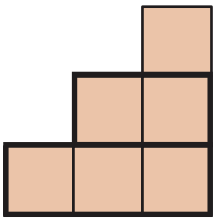
Top



Front



Side

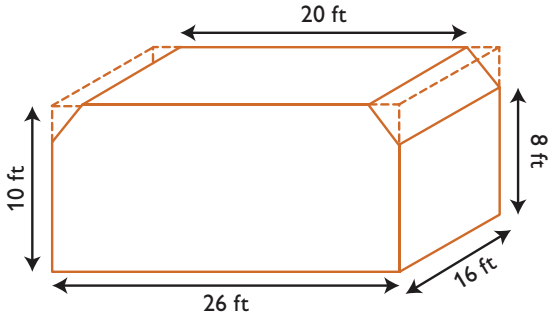


SA = _____ square units

8. Volume and area formulas:

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

This diagram shows the shape and dimensions of the living room of a house.

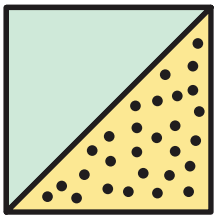


What is the surface area of the front wall? Explain your reasoning.

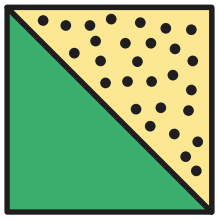
Challenge Problem

9. 2-D views can also be shown for prisms that have been sliced by a plane. Here are the 2-D views of such a figure. The 2-D views show dots where the slice was made. On paper, draw the 3-D figure. (Hint: The figure is based on a cube.)

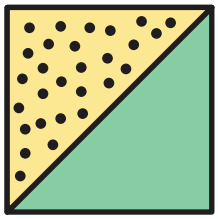
Top



Front



Side



LESSON 18: PROJECT WORK DAY 2

EXERCISES

1. Consider your work with your partner or group on the Creating a City project. Describe one (or more) way(s) that you have contributed to the success of your team and the project so far.

2. Continue to work on your project.

3. Check that you have addressed all the rubric criteria for your project.

4. Prepare for the presentation of your Creating a City project by creating a list of the key information you would like to share with the class.

   For example, what measurements and calculations should be included in your presentation? What do you want to show the class about your 3-D model buildings? What inspirations, discoveries, challenges, or teamwork accomplishments do you want to share?

5. To prepare for the presentation of your Creating a City project, meet with your partner or group. Share your responses to the previous exercise to compare your presentation ideas with one another.

   Decide what information you will cover, and organize the order in which you will present that information. Who will lead the different parts of the presentation?

LESSON 19: PUTTING IT TOGETHER 2

EXERCISES

EXERCISES

1. Read your Self Check and think about your work in this unit.
   Write three things you have learned.

   Share your work with a classmate.
   Does your classmate understand what you wrote?

2. Review the notes you took during the lessons about working with 3-D figures. Think about topics such as visualizing the cross sections created by slicing 3-D figures, creating nets of 3-D figures, and converting measurements between real-world buildings and scale models in order to compare them.

   If you are still confused about any topics, research your questions and add more information to your notes. Ask for help from a classmate, review the related lessons, look at the resources in the Concept Corner, talk with your teacher, and so on, to help you be clear about areas of confusion.

3. Consider your work in this unit with finding the surface area and volume of 3-D figures.

   In your notebook, create a graphic organizer to show surface area and volume formulas. Organize your visual in a way that will allow you to use it as a reference throughout the rest of the school year.

   Use a chart similar to the one shown, or create your own.

Surface Area and Volume Formulas for 3-D Figures			
Figure	**Diagram**	**Surface Area Formula**	**Volume Formula**
Right Regular Prism			
Regular Pyramid			
Rectangular Prism			

4. Complete any exercises from this unit that you have not finished.