MATH GRADE 7 UNIT 4

ZOOMING IN ON FIGURES

ANSWERS FOR EXERCISES

LESSON 1: WHERE IS THE GEOMETRY? ANSWERS

ANSWERS

7.G.1 7.G.6	3.	Here is one example. Fashion designers use geometry and measurement. For example, they use measurements such as the circumference of a model's waist, legs, arms, and so on to design the waistline of a skirt, the circumference of a pant leg, or the circumference of a shirtsleeve. A lot of planning and geometry go into lining up patterned fabric so that the patterns meet properly when pieces of the fabric are sewn together. Designers also need to use geometry to figure out how much fabric to buy to make a garment based on their design.
7.G.1	4.	9 m
7.G.1	5.	6.5 m
7.G.1 7.G.6	6.	58.5 m^2
7.G.1 7.G.6	7.	14 m^2

LESSON 2: AREA OF REGULAR POLYGONS

ANSWERS

ANSWERS

7.G.6 1. (A) 2.38 m

7.G.6 2. (A) $A = 3a(P \div 2)$

(E) $A = 9as$

7.G.6 3. (C) 58.905 m^2

7.G.6 4. There are 8 triangles that make up the area. Each triangle has a base of 2 cm and a height of 2.4 cm. Find the area of 1 triangle and multiply by 8.

$$\frac{8(2\text{ cm} \bullet 2.4\text{ cm})}{2} = \frac{8 \bullet 4.8\text{ cm}^2}{2} = \frac{38.4\text{ cm}^2}{2} = 19.2\text{ cm}^2$$

Or, use the area formula for a regular polygon.

$$A = a\left(\frac{P}{2}\right) = \frac{2.4\text{ cm}(2\text{ cm} \bullet 8)}{2} = \frac{2.4\text{ cm} \bullet 16\text{ cm}}{2} = \frac{38.4\text{ cm}^2}{2} = 19.2\text{ cm}^2$$

The area of the octagon is 19.2 cm^2.

7.G.6 5. The pentagon can be divided into 5 congruent triangles. Each triangle has a base of 16 cm and a height of 11 cm. So, the area of each triangle is 88 cm^2. Since there are 5 triangles in the pentagon, its area is 440 cm^2.

$$A = \frac{1}{2}bh \bullet s = \frac{16\text{ cm} \bullet 11\text{ cm}}{2} \bullet 5 = \frac{176\text{ cm}^2}{2} \bullet 5 = 88\text{ cm}^2 \bullet 5 = 440\text{ cm}^2$$

or

$$A = a\left(\frac{P}{2}\right) = \frac{11\text{ cm}(16\text{ cm} \bullet 5)}{2} = \frac{11\text{ cm} \bullet 80\text{ cm}}{2} = \frac{880\text{ cm}^2}{2} = 440\text{ cm}^2$$

The area of the pentagon is 440 cm^2.

7.G.6 6. A regular polygon can always be divided into congruent triangles. You can find the area of one of the congruent triangles and then multiply by the number of triangles, making the calculations simpler. In a polygon that is not regular, you can't take the shortcut of finding the area of one triangle and multiplying by the number of triangles to find the total area. You have to divide the polygon into figures (e.g., triangles and rectangles) that you can find the area of. Then you have to find the area of each figure and add the areas together.

LESSON 2: AREA OF REGULAR POLYGONS ANSWERS

7.G.6 **7.** In both cases, the polygon needs to be divided into figures whose areas can be easily calculated (e.g., rectangles and triangles).

7.G.6 **8.** (D) Octagon

7.G.6 **9.** (B) Pentagon

(C) Hexagon

Challenge Problem

7.G.6 **10.** I can enter the known values from the word problem into the formula for the area of a regular polygon. Then I can solve for the unknown value of the apothem.

$$A = a\left(\frac{P}{2}\right)$$

$$1{,}050\ \text{in}^2 = a\left(\frac{120\ \text{in.}}{2}\right)$$

$$1{,}050\ \text{in}^2 = a(60\ \text{in.})$$

$$\frac{1{,}050\ \text{in}^2}{60\ \text{in.}} = a$$

$$a = 17.5\ \text{in.}$$

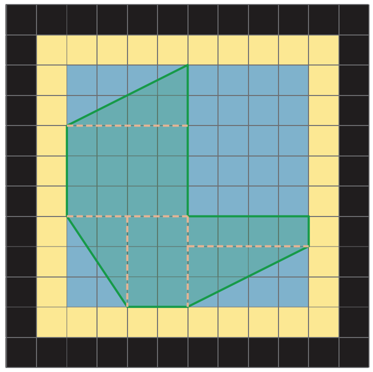
The hexagon has an apothem of 17.5 in.

LESSON 3: CREATE A CITY

ANSWERS

ANSWERS

7.G.6 4. A



LESSON 4: CIRCUMFERENCE

ANSWERS

ANSWERS

7.G.4 **1.** Ⓓ 30-gon

7.G.4 **2.** Ⓑ 31.4 inches

7.G.4 **3.** 1 unit

7.G.4 **4.** Ⓒ 31.4 feet

7.G.4 **5.** $C = 864$ ft

7.G.4 **6.** $r = 1{,}738$ km

7.G.4 **7.** $C = 2\pi r$
$C = 2 \cdot 3.14 \cdot 6$
$C \approx 37.68$

The circumference is about 38 feet.

$38 \div 4 = 9.5$

Marcus can plant 9 rose bushes, with each bush a little more than 4 feet from its neighbors.

7.G.4 **8.** The circumferences would be 62 cm, 62.8 cm, and 62.832 cm. The answer is getting more accurate, but it isn't changing by that much. The difference between 62 cm and 62.8 cm is 8 mm, less than 1 cm. Using 3.1416, the difference is 32 thousandths of a centimeter!

Using string, you would be lucky to measure accurately enough to get close to the 3.14 measurement, and more likely to be close to the 3.1 measurement. I can conclude that a rough approximation of circumference is appropriate in most cases, because you can't measure accurately enough anyway.

LESSON 4: CIRCUMFERENCE

ANSWERS

Challenge Problem

7.G.4 **9.** Since all of the slices are equivalent, each slice will have the same length of crust. So, I can find the circumference by multiplying the length of the crust for 1 slice by 8. Then I can use the circumference to find the diameter. I can divide the diameter in half to find the radius, because the length of each slice is from the crust to the middle of the pizza.

7.75 in. • 8 = 62 in.
$C = \pi d$
3.1 can be used for π since accuracy is not a primary concern.
62 in. ≈ (3.1)d

$$\frac{62\text{ in.}}{3.1} \approx d$$

20 in. ≈ d
The pizza has a diameter of about 20 in., so each slice is about 10 in. long.

LESSON 5: THE AREA OF A CIRCLE

ANSWERS

ANSWERS

7.G.4 1. D $452.16\ \text{m}^2$

7.G.4 2. C 1,256 square meters

7.G.4 3. C $176.6\ \text{ft}^2$

7.G.4 4. $C = 14.44$ cm

7.G.4 5. B less than

7.G.4 6. $A = \pi r^2$

$314\ \text{m}^2 \approx 3.14r^2$
$100\ \text{m}^2 \approx r^2$
$10\ \text{m} \approx r$
$2r = d$
$20\ \text{m} \approx d$

The circle's diameter is approximately 20 m.

7.G.4 7. The area of the square is $100\ \text{ft}^2$ ($10\ \text{ft} \bullet 10\ \text{ft} = 100\ \text{ft}^2$).

The first sprinkler covers $\frac{1}{4}$ of a circle with a radius of 10 ft.

$$A = \frac{\pi r^2}{4}$$
$$\approx \frac{3.14(10\ \text{ft})^2}{4}$$
$$\approx 78.5\ \text{ft}^2$$

The second sprinkler covers a full circle with a radius of 5 ft (half of 10 ft).

$A = \pi r^2$
$A \approx 3.14\ (5\ \text{ft})^2$
$A \approx 3.14 \bullet 25\ \text{ft}^2$
$A \approx 78.5\ \text{ft}^2$

Both sprinklers cover the same area.

LESSON 5: THE AREA OF A CIRCLE

ANSWERS

7.G.4 **8.** Small circle area = $\pi(2 \text{ cm})^2$
$\approx 3.14 \cdot 4 \text{ cm}^2$
$\approx 12.56 \text{ cm}^2$

Large circle area = $\pi(6 \text{ cm})^2$
$\approx 3.14 \cdot 36 \text{ cm}^2$
$\approx 113.04 \text{ cm}^2$

$113.04 \text{ cm}^2 \div 12.56 \text{ cm}^2 = 9$

I disagree with Sophie.

The area will be about 9 times as large, since the area is calculated by using the radius squared.

7.G.4 **9.** The first pool cover has a diameter 2 times the diameter of the second pool cover. So, the radius of the first pool cover is also twice the radius of the second pool cover.

If s is the radius of the second pool cover, then the radius of the first pool cover is $2s$. Since the area of a circle is equal to πr^2, the formula for the area of first pool cover is:
$A = \pi \cdot (2s)^2$

The formula for the area of second pool cover is:
$A = \pi \cdot s^2$

The larger pool cover will have 2^2, or 4, times the area of the smaller one.

LESSON 5: THE AREA OF A CIRCLE

ANSWERS

Challenge Problem

7.G.4 **10.** The area can be divided into three areas: a rectangle and two half circles.

Together the two half circles form one circle.

Since each straight part of the track is 100 m, the circle has a circumference of 200 m.
400 m – 100 m – 100 m = 200 m

I can put the value of 200 m into the formula for circumference of a circle to find the diameter of the circle, which is also the width of the rectangle.

$C = \pi d$
$200 \text{ m} \approx 3.14 \cdot d$

$$\frac{200}{3.14} \approx d$$

$d \approx 63.7$ m

So, the rectangle is about 64 m wide and 100 m long.
The area of the rectangular part of the infield is:
$A = 64 \text{ m} \cdot 100 \text{ m} = 6{,}400 \text{ m}^2$

$d \approx 63.7$ m
$2r \approx 63.7$ m
$r \approx 31.85$ m

The circle has a radius of about 32 m. The area of the two half circles together is:
$A \approx 3.14(32 \text{ m} \times 32 \text{ m}) \approx 3.14 \cdot 1{,}024 \text{ m}^2 \approx 3{,}215.36 \text{ m}^2 \approx 3{,}215 \text{ m}^2$

The total area is the sum of the two areas.
$A = 6{,}400 \text{ m}^2 + 3{,}215 \text{ m}^2 = 9{,}615 \text{ m}^2$

The area of the infield is about 9,615 m^2.

LESSON 6: SCALE DRAWINGS

ANSWERS

ANSWERS

7.G.1 **1.** (B) 48 feet

7.G.1 **2.** 1 : 24

7.G.1 **3.** Since the driver is sitting down, the car is about half the height of the driver. If I assume the driver is about 6 feet tall, then an appropriate estimate of the height of the race car is 3 feet.

7.G.1 **4.** 1 : 5

7.G.1 **5.** (A) 1 cm = 7.5 ft

7.G.1 **6.** 0.00005 mm

7.G.1 **7.** The truck is 64 times as long as the model. Units are not used to show this scale because both units are inches: 1 inch : 64 inches.

3 in. • 64 = 192 in.
192 in. ÷ 12 in./ft = 16 ft

The actual truck is 16 feet long.

7.G.1 **8.** The plane is 80 times as long as the toy.

80 • 8 in. = 640 in.

$$\begin{array}{r} 53 \text{ R4} \\ 12\overline{)640} \\ -\,60 \\ \hline 40 \\ -\,36 \\ \hline 4 \end{array}$$

The actual airplane is 640 in., or 53 ft 4 in. long.

7.G.1
7.G.6 **9.** 18 : 187

LESSON 6: SCALE DRAWINGS

ANSWERS

Challenge Problem

7.G.1 **10.** If the house is 6 inches long in the drawing and each inch represents 8 feet, a proportion can be set up to solve for the unknown actual length of the house.

$$\frac{1\text{ inch}}{8\text{ feet}} = \frac{6\text{ inches}}{x\text{ feet}}$$

$x = 8 \cdot 6 = 48$ feet
The actual house is 48 feet long.
Since the length to width ratio is 3 : 2, a proportion can be set up to solve for the width.

$$\frac{3}{2} = \frac{48\text{ feet}}{x\text{ feet}}$$

$$\frac{3}{2} \times \frac{16}{16} = \frac{48\text{ feet}}{32\text{ feet}}$$

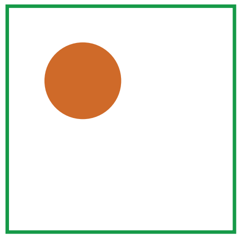
The actual width of the house is 32 feet.

LESSON 7: AREA AND SCALE

ANSWERS

ANSWERS

7.G.1 1. Ⓑ



7.G.1 2. The area of the garden is 1,800 square feet.

7.G.1 3. Sophie can keep the same scale drawing if she indicates that the scale is 1 inch = 6 feet.

7.G.1 4. Ⓒ The area of the new triangle will be 9 times greater than the area of the original triangle.

7.G.1 5. The octagon is regular, so all of its angles are congruent and all of its sides are congruent. These relationships will be true no matter what size the octagon is.

All regular polygons with a given number of sides are similar. Even if the octagon were not regular, in a scale drawing all of the corresponding angles would remain congruent, and the corresponding sides would be proportional.

7.G.1 7.G.4 6. Ⓐ 63.585 ft^2

7.G.1 7.G.6 7. Ⓐ 45.00 ft^2

7.G.1 8. Ⓑ 15 cm

7.G.1 9. Redrawing to a new scale would have no effect on the area of the cabin because the actual cabin would be the same size—just the drawing is changing.

7.G.1 7.G.4 10. $A = 81\pi\ ft^2$

7.G.1 11. Ⓐ 11 centimeters long, 17 centimeters wide

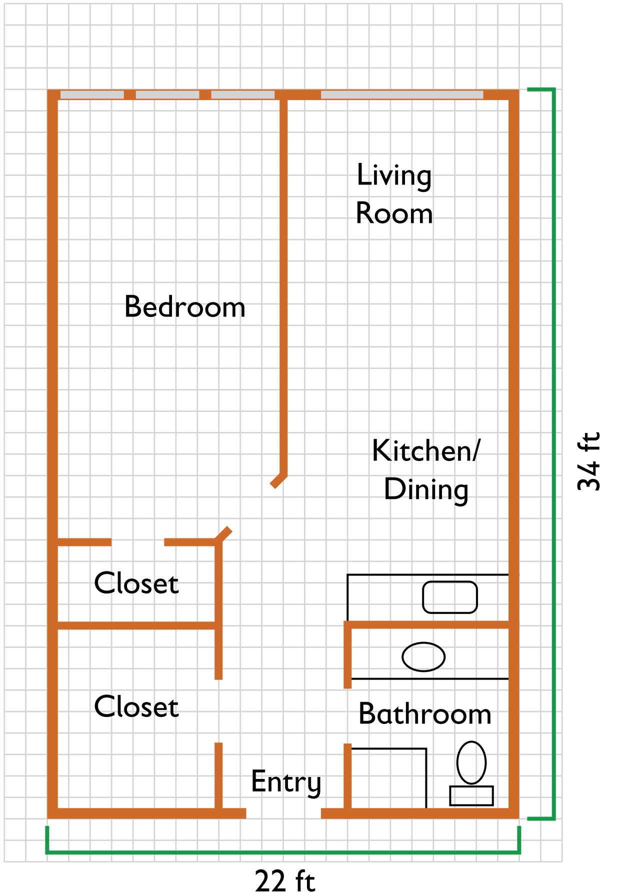
Ⓒ 44 centimeters long, 68 centimeters wide

Ⓔ 5.5 units long, 8.5 units wide

LESSON 7: AREA AND SCALE

ANSWERS

7.G.1 12.



Challenge Problem

7.G.1 13. Most of the sides are not aligned to the grid, so it is difficult to figure out their lengths. However, the bottom sides of each hexagon are aligned to the grid and are clearly 2 cm long for the first one and 3 cm long for the second one. One comparison is all that is needed, since all the other lengths will be proportional.

The bottom side of the left hexagon represents 2 ft. So, in the drawing on the right, 3 cm must represent 2 ft. Dividing 3 cm by 2 gives a scale of 1.5 cm = 1 ft.

LESSON 8: PROJECT WORK DAY 1

ANSWERS

ANSWERS

7.G.1	3.	4.55 in.
7.G.6	4.	C 13,200 ft^2

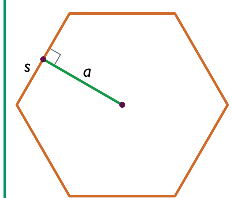
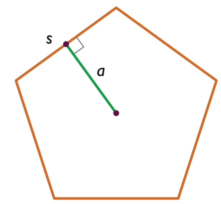
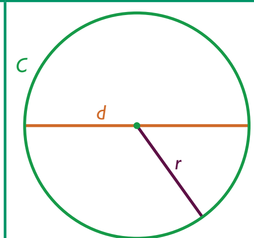
LESSON 9: PUTTING IT TOGETHER I

ANSWERS

ANSWERS

7.G.4
7.G.6

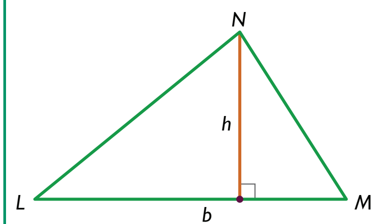
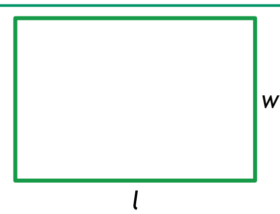
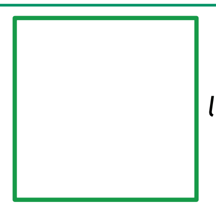
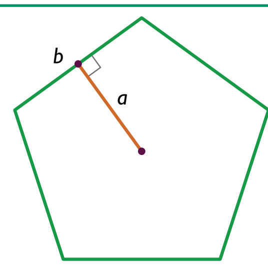
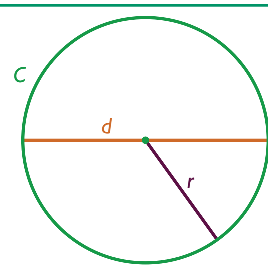
2.

Word or Phrase	Definition	Examples
apothem	Line from the center of a regular polygon to the midpoint of one of the sides; forms a right angle with the side	 
pi (π)	The ratio of a circle's circumference to its diameter; it is an irrational number approximately equal to 3.14 The symbol π is used to represent pi in expressions and equations.	 $\frac{C}{d} = \pi = 3.141592653589793\ldots$

LESSON 9: PUTTING IT TOGETHER I — ANSWERS

7.G.4
7.G.6

3.

Area and Perimeter Formulas for 2-D Figures			
Figure	**Diagram**	**Perimeter/ Circumference Formula**	**Area Formula**
Triangle		$P = LM + MN + NL$	$A = \frac{1}{2}bh$ b = base h = height (or altitude)
Rectangle		$P = l + w + l + w$ $P = 2l + 2w$ l = length w = width	$A = l \cdot w$ l = length w = width
Square		$P = l + l + l + l$ $P = 4l$ l = length	$A = l^2$ l = length
Regular Polygon		$P = bn$ b = base (or side) n = number of sides	$A = \frac{1}{2}aP$ a = apothem P = perimeter
Circle		$C = 2\pi r$ $C = \pi d$ $\pi \approx 3.14$ r = radius d = diameter	$A = \pi r^2$ $\pi \approx 3.14$ r = radius $r^2 = r \cdot r$

LESSON 13: VOLUME OF RIGHT PRISMS

ANSWERS

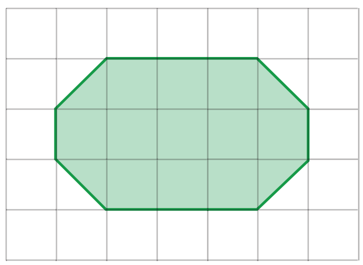
ANSWERS

7.G.6 **1.** Ⓑ 80 m^3

7.G.6 **2.** Each side is 4 meters long.

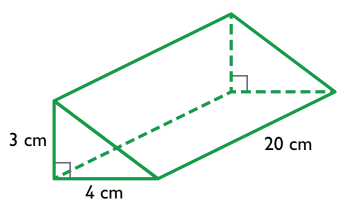
7.G.6 **3.** Ⓑ 4 cm

7.G.6 **4.** Ⓐ

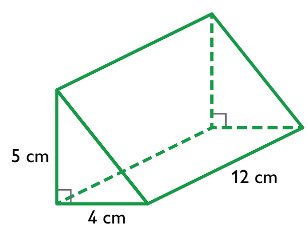


7.G.6 **5.**

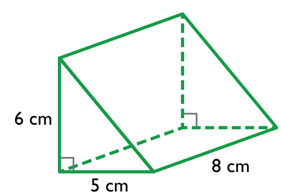
Ⓐ



Ⓒ



Ⓔ



7.G.6 **6.** The volume of the rectangular prism is 60 ft^3 (3 ft • 4 ft • 5 ft = 60 ft^3).
The volume of the octagonal prism is 30 ft^3 (15 ft^2 • 2 ft = 30 ft^3).

Here are two examples.
To make the volumes the same, you could double the height of the octagonal prism, which would double the volume to 60 ft^3.

OR

To make the prism volumes equal you could reduce the rectangular prism by half.
You could do this by reducing the width in half from 4 ft to 2 ft.
The volume would then be: 3 ft • 2 ft • 5 ft = 30 ft^3

LESSON 13: VOLUME OF RIGHT PRISMS

ANSWERS

7.G.6 7. The area of the base must be found first.

$$A = a\left(\frac{P}{2}\right)$$
$$= 1.7\text{ in.}\left(\frac{2\text{ in.} \cdot 6}{2}\right)$$
$$= 1.7\text{ in.} \cdot 6\text{ in.}$$
$$= 10.2\text{ in}^2$$

Now the volume formula can be applied.

$V = Bh$
$= 10.2\text{ in}^2 \cdot 5\text{ in.}$
$= 51\text{ in}^3$

The volume of the regular hexagonal prism is 51 in^3.

Challenge Problem

7.G.6 8. It would be logical to assume that, as for other prisms, the volume is equal to the area of the base multiplied by the height.

Since the radius is given, the area of the base can be found.

$A = \pi r^2$
$\approx 3.14 \cdot (5\text{ m})^2$
$\approx 3.14 \cdot 25\text{ m}^2$
$\approx 78.5\text{ m}^2$

Then you can use the volume formula for a regular prism.

$V = Bh$
$\approx 78.5\text{ m}^2 \cdot 10\text{ m}$
$\approx 785\text{ m}^3$

The volume of the cylinder is about 785 m^3.

LESSON 14: VOLUME OF PYRAMIDS

ANSWERS

ANSWERS

7.G.6 1. (B) 160 m^3

7.G.6 2. Each side of the base is 4 m.

7.G.6 3. (A) A rectangular pyramid with 5 cm width, 10 cm length, and 8 cm height

7.G.6 4. The volume of the prism and the volume of the pyramid could be calculated separately; however, they each have the same base (12 ft × 12 ft) and the same height (6 ft).

So, the area of the base multiplied by the height can be multiplied by $\frac{4}{3}$ ($\frac{3}{3}$ = 1 for the prism + $\frac{1}{3}$ for the pyramid).

$$\begin{aligned}V &= \left(\frac{4}{3}\right)Bh\\ &= \left(\frac{4}{3}\right)(12\text{ ft}\bullet 12\text{ ft})6\text{ ft}\\ &= \left(\frac{4}{3}\right)(144\text{ ft}^2)6\text{ ft}\\ &= \left(\frac{4}{3}\right)864\text{ ft}^3\\ &= 1{,}152\text{ ft}^3\end{aligned}$$

The volume of the pavilion is 1,152 ft^3.

7.G.6 5. (C) 12 m

7.G.6 6. The height of the pyramid is about 90 ft.

7.G.6 7. The volume of the pyramid is 10,805.97 cubic meters.

LESSON 14: VOLUME OF PYRAMIDS

ANSWERS

7.G.6 **8.** Volume of rectangular prism minus the volume of pyramid is equal to

$$Bh - \frac{Bh}{3} = Bh\left(\frac{3}{3} - \frac{1}{3}\right) = \frac{2}{3}Bh = V$$

$$\begin{aligned}
V &= \left(\frac{2}{3}\right)Bh \\
&= \left(\frac{2}{3}\right)(4 \text{ in.} \bullet 6 \text{ in.})5 \text{ in.} \\
&= \left(\frac{2}{3}\right)(24 \text{ in}^2)5 \text{ in.} \\
&= \left(\frac{2}{3}\right)120 \text{ in}^3 \\
&= 80 \text{ in}^3
\end{aligned}$$

The volume of the figure is 80 in^3.

LESSON 14: VOLUME OF PYRAMIDS

ANSWERS

Challenge Problem

7.G.6 **9.** The volume of the whole pyramid, before the slice, can be found using the volume formula for a pyramid.

$$\begin{aligned} V &= \left(\frac{1}{3}\right)Bh \\ &= \left(\frac{1}{3}\right)(10 \text{ in.} \bullet 10 \text{ in.})10 \text{ in.} \\ &= \left(\frac{1}{3}\right)(100 \text{ in}^2)10 \text{ in.} \\ &= \left(\frac{1}{3}\right)1{,}000 \text{ in}^3 \\ &\approx 333 \text{ in}^3 \end{aligned}$$

So, the whole pyramid has a volume of about 333 in^3.
The volume of the top section that is sliced off can be found in the same way.

$$\begin{aligned} V &= \left(\frac{1}{3}\right)Bh \\ &= \left(\frac{1}{3}\right)(5 \text{ in.} \bullet 5 \text{ in.})5 \text{ in.} \\ &= \left(\frac{1}{3}\right)(25 \text{ in}^2)5 \text{ in.} \\ &= \left(\frac{1}{3}\right)125 \text{ in}^3 \\ &\approx 42 \text{ in}^3 \end{aligned}$$

The removed part of the pyramid has a volume of about 42 in^3.
Subtract this volume from the whole volume to find the volume of the remaining figure. $333 \text{ in}^3 - 42 \text{ in}^3 = 291 \text{ in}^3$

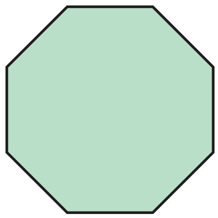
The volume of the truncated pyramid is about 291 in^3.

LESSON 15: SLICING THROUGH SOLIDS

ANSWERS

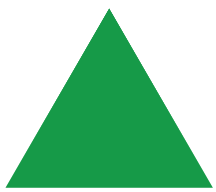
ANSWERS

7.G.3 1. D



7.G.3 2. C A cut perpendicular to a rectangular pyramid base

7.G.3 3. D



7.G.3 4. The surface will be congruent to the surface that it is parallel to, which is the side that is 4 ft long by 5 ft high. You can find the area of the cross section by multiplying the length by the height.

$4 \text{ ft} \cdot 5 \text{ ft} = 20 \text{ ft}^2$

The cross section has an area of 20 ft^2.

7.G.3 5. A 2 feet long, 4 feet wide

7.G.3 6. C A slice passing through *ADJ*

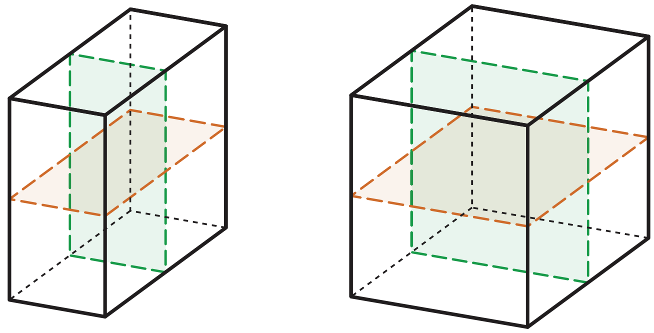
D A slice passing through *EGF*

7.G.3 7. A slice passing through *ADGE* is one example.

LESSON 15: SLICING THROUGH SOLIDS

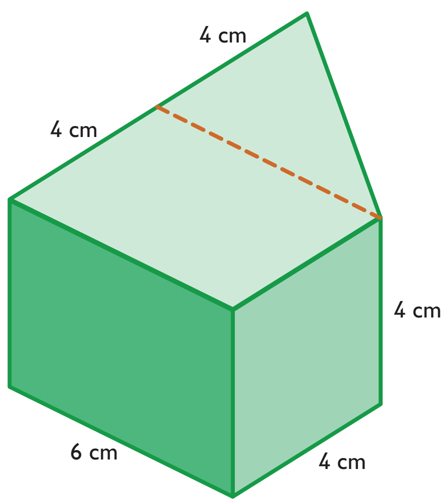
ANSWERS

7.G.3 **8.** Two opposite faces that are perpendicular to the base must be squares. The figure could be a cube (all faces are squares) or a rectangular prism like the illustration with two faces that are squares.



Challenge Problem

7.G.3 **9.** There are several ways to look at the figure and find the volume. One method is to think of the figure as a prism with a height of 4 cm that has been turned on its side. Then the base is the trapezoid, and you can find the area of the base.



Similarly, once the figure has been turned on its side, you can see that it is made up of a rectangular prism (6 cm long, 4 cm wide, with a height of 4 cm), and a triangular prism with the same dimensions. So, you can find the volume of the rectangular prism and then add half that volume for the triangular prism.

$$V = (6 \text{ cm} \cdot 4 \text{ cm} \cdot 4 \text{ cm}) + \frac{1}{2}(6 \text{ cm} \cdot 4 \text{ cm} \cdot 4 \text{ cm})$$
$$= 96 \text{ cm}^3 + 48 \text{ cm}^3$$
$$= 144 \text{ cm}^3$$

The volume of the prism is 144 cm^3.

LESSON 16: SURFACE AREA AND NETS

ANSWERS

ANSWERS

7.G.6 1. Jack needs 24 square feet of wrapping paper.

7.G.6 2. C 76 ft^2

7.G.6 3. $SA = 2lw + 2lh + 2hw$
$= 2(lw + lh + hw)$

If you double all of the dimensions—$2l$, $2w$, $2h$—the new surface area is:

$SA = 2[(2l \cdot 2w) + (2l \cdot 2h) + (2h \cdot 2w)]$
$= 2[(4lw) + (4lh) + (4hw)]$
$= (2 \cdot 4) \cdot (lw + lh + hw)$

If the dimensions change by a factor of 2, the area will change by a factor of 4.

7.G.6 4. A 100 cm^2

7.G.6 5. I can find the area of the base by dividing the volume by the height.

96 in^3 ÷ 8 in. = 12 in^2
Each base must have an area of 12 in^2.
I can find the surface area of the sides of the prism by multiplying the perimeter by the height.

16 in. • 8 in. = 128 in^2
The surface area of the sides is 128 in^2.
To get the total surface area, I add the surface area of the sides to the two bases.

2(12 in^2) + 128 in^2 = 24 in^2 + 128 in^2 = 152 in^2 The total surface area is 152 in^2.

7.G.6 6. C It will increase, but by less than double.

7.G.6 7. Lateral area = 48 m^2

LESSON 16: SURFACE AREA AND NETS — ANSWERS

Challenge Problem

7.G.6 **8.** The area of the bases (circles) can be found because the radius is known.

Area of Bases

$A = 2\pi r^2$
$\approx 2 \cdot 3.14(5 \text{ m} \cdot 5 \text{ m})$
$\approx 2 \cdot 3.14 \cdot 25 \text{ m}^2$
$\approx 157 \text{ m}^2$

The lateral surface will be a rectangle (like a soup can label unrolled). The width of the rectangle is equal to the height of the prism/cylinder (10 m) and the length is the perimeter (circumference) of the base.

Base Perimeter/Circumference

$C = \pi d$
$\approx 3.14 \cdot (2 \cdot 5 \text{ m})$
$\approx 31.4 \text{ m}$

Lateral Surface

$31.4 \text{ m} \cdot 10 \text{ m} \approx 314 \text{ m}^2$

Total Surface Area

$157 \text{ m}^2 + 314 \text{ m}^2 \approx 471 \text{ m}^2$

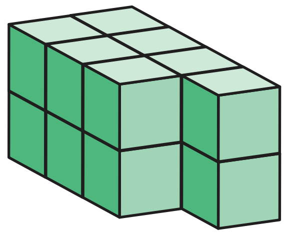
The surface area of the prism is about 471 m^2.

LESSON 17: SURFACE AREA OF 3-D FIGURES

ANSWERS

ANSWERS

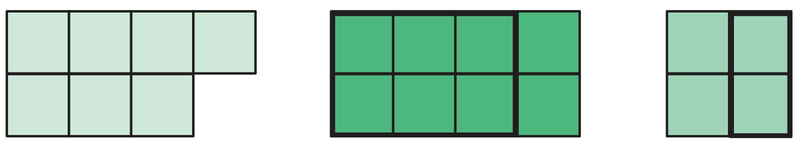
7.G.6 1. D



7.G.6 2. B Top is 5 units wide; side is 2 units high.

7.G.6 3.

Top Front Side



7.G.6 4. B 21 cubic units

7.G.6 5. SA = 34 in^2

7.G.6 6. V = 12 in^3

7.G.6 7. SA = 44 square units

7.G.6 8. The rectangular dimensions are:
26 ft • 10 ft = 260 ft^2

The height of each triangle in the corner is:
10 ft − 8 ft = 2 ft

The base of each triangle in the corner is:
(26 ft − 20 ft) ÷ 2 = 3 ft

The area of each triangular corner is:

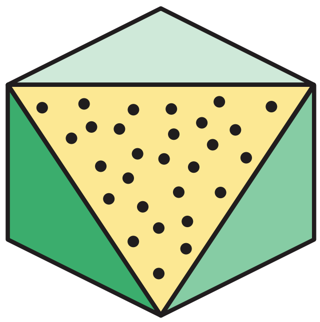
$$\frac{1}{2}bh = \frac{1}{2}(3\text{ ft})(2\text{ ft})$$
$$= 3\text{ ft}^2$$

There are two corners, which makes 6 ft^2.
260 ft^2 – 6 ft^2 = 254 ft^2
The surface area of the front wall is 254 ft^2.

LESSON 17: SURFACE AREA OF 3-D FIGURES — ANSWERS

Challenge Problem

7.G.6 — 9. Looking straight at the yellow dotted surface of the cube, it would look something like this.

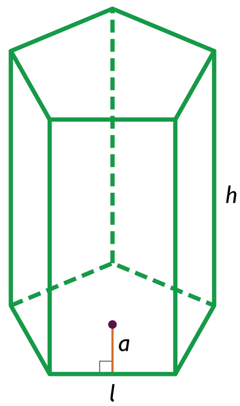
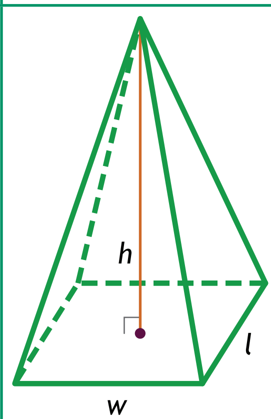
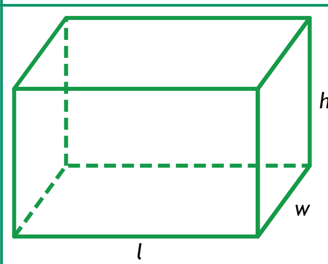


LESSON 19: PUTTING IT TOGETHER 2 ANSWERS

ANSWERS

7.G.6 3.

Surface Area and Volume Formulas for 3-D Figures

Figure	Diagram	Surface Area Formula	Volume Formula
Right Regular Prism		$SA = 2B + n(lh)$ B = area of the base $B = \frac{1}{2}aP$ a = apothem P = perimeter = nl n = number of sides l = length of each side h = height	$V = Bh$ B = area of the base $B = \frac{1}{2}aP$ a = apothem P = perimeter h = height
Regular Pyramid		$SA = B$ + lateral surface area B = area of the base = $l \bullet w$ lateral surface area = sum of all triangular faces	$V = \frac{1}{3}Bh$ B = area of the base = $l \bullet w$ h = height
Rectangular Prism		$SA = 2(lw + lh + wh)$ or $SA = 2lw + 2lh + 2wh$	$V = lwh$ or $V = Bh$ B = area of the base = $l \bullet w$ h = height