Chapter 11

School-Home Letter

Dear Family,

Throughout the next few weeks, our math class will be learning about surface area and volume. We will also be exploring nets of solid figures.

You can expect to see homework that provides practice in calculating the volume of prisms.

Here is a sample of how your child was taught to find the volume of a prism.

Vocabulary

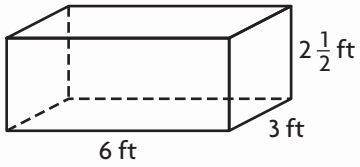
net An arrangement of two-dimensional figures that can be folded to form a three-dimensional figure.

surface area The total area of all the faces and surfaces of a solid figure.

volume The number of cubic units needed to fill a given space.

MODEL Solve Volume Problems

Find the volume of the prism.



STEP 1

Write the formula.

$V = l \times w \times h$

STEP 2

Substitute 6 for l, 3 for w, and $2\frac{1}{2}$ for h.

$V = 6 \times 3 \times 2\frac{1}{2}$

STEP 3

Change mixed numbers to improper fractions. Then multiply.

$V = 6 \times 3 \times \frac{5}{2}$

$V = 45$

So, the volume is 45 ft^3.

Tips

Choosing Units

The surface area of a solid figure is always expressed in square units, such as square meters (m^2) or square inches ($in.^2$). The volume of a solid figure is always expressed in cubic units, such as cubic meters (m^3) or cubic inches ($in.^3$).

Activity

Cut open an empty cereal box and lay it flat to create a net for the box. Measure the length and width of each rectangle in the net, find the area of each rectangle, and add these areas to find the surface area of the box. You can then tape the box back together and calculate its volume.

Capítulo 11

Carta para la casa

Vocabulario

modelo plano Una presentación de figuras bidimensionales que puede doblarse para formar una figura tridimensional.

área total El área de todas las caras y superficies de un cuerpo geométrico.

volumen El número de unidades cúbicas necesario para llenar un espacio dado.

Querida familia,

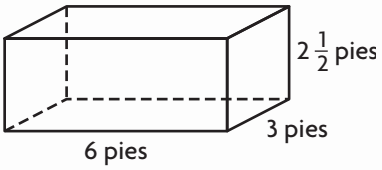
Durante las próximas semanas, en la clase de matemáticas aprenderemos sobre área y volumen. También aprenderemos sobre modelos planos de figuras geométricas.

Llevaré a la casa tareas para practicar el cálculo del volumen de prismas.

Este es un ejemplo de la manera como aprenderemos a hallar el volumen de un prisma.

MODELO Resolver problemas de volumen

Halla el volumen del prisma.



PASO 1

Escribe la fórmula.

$V = l \times w \times h$

PASO 2

Reemplaza l con 6, w con 3, y h con $2\frac{1}{2}$.

$V = 6 \times 3 \times 2\frac{1}{2}$

PASO 3

Convierte los números mixtos en fracciones impropias. Luego multiplica.

$V = 6 \times 3 \times \frac{5}{2}$

$V = 45$

Por tanto, el volumen es 45 pies^3.

Pistas

Elegir unidades

El área total de un cuerpo geométrico siempre se expresa en unidades cuadradas, como metros cuadrados (m^2) o pulgadas cuadradas (pulgs.^{2}). El volumen de un cuerpo geométrico siempre se expresa en unidades cúbicas, como metros cúbicos (m^3) o pulgadas cúbicas (pulgs.^{3}).

Actividad

Abra una caja vacía de cereal y extiéndala sobre una mesa, para crear un modelo plano para la caja. Mida la longitud y la anchura de cada rectángulo del modelo plano, halle el área de cada rectángulo y sume estas áreas para hallar el área total de la caja. Después, vuelva a armar la caja usando cinta adhesiva y calcule su volumen.

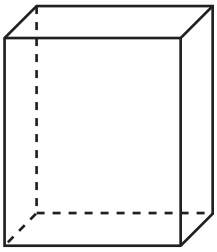
Name _____

Three-Dimensional Figures and Nets

COMMON CORE STANDARD—6.G.4
Solve real-world and mathematical problems involving area, surface area, and volume.

Identify and draw a net for the solid figure.

1.



Net

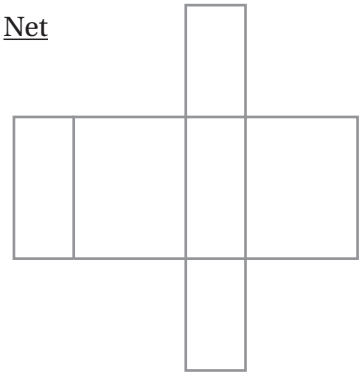
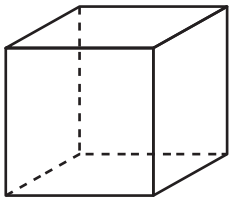


figure: rectangular prism

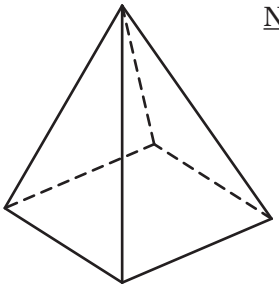
2.



Net

figure: _____

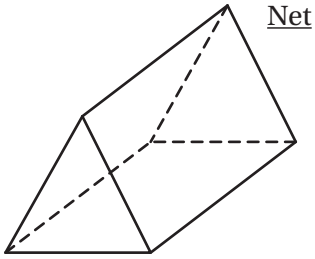
3.



Net

figure: _____

4.



Net

figure: _____

Problem Solving

5. Hobie's Candies are sold in triangular-pyramid-shaped boxes. How many triangles are needed to make one box?

_____

6. Nina used plastic rectangles to make 6 rectangular prisms. How many rectangles did she use?

_____

Lesson Check (6.G.4)

1. How many vertices does a square pyramid have?

2. Each box of Fred's Fudge is constructed from 2 triangles and 3 rectangles. What is the shape of each box?

Spiral Review (6.EE.7, 6.EE.9, 6.G.1, 6.G.3)

3. Bryan jogged the same distance each day for 7 days. He ran a total of 22.4 miles. The equation $7d = 22.4$ can be used to find the distance d in miles he jogged each day. How far did Bryan jog each day?

4. A hot-air balloon is at an altitude of 240 feet. The balloon descends 30 feet per minute. What equation gives the altitude y, in feet, of the hot-air balloon after x minutes?

5. A regular heptagon has sides measuring 26 mm and is divided into 7 congruent triangles. Each triangle has a height of 27 mm. What is the area of the heptagon?

6. Alexis draws quadrilateral $STUV$ with vertices $S(1, 3)$, $T(2, 2)$, $U(2, -3)$, and $V(1, -2)$. What name best classifies the quadrilateral?

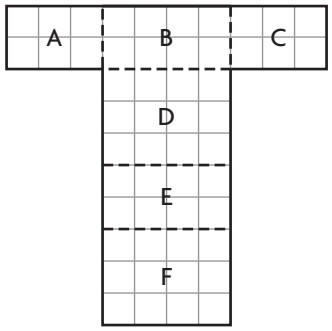
Name _____

Explore Surface Area Using Nets

COMMON CORE STANDARD—6.G.4
Solve real-world and mathematical problems involving area, surface area, and volume.

Use the net to find the surface area of the rectangular prism.

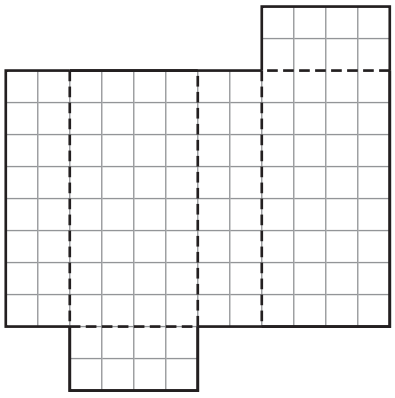
1.



A: 6 squares
B: 8 squares
C: 6 squares
D: 12 squares
E: 8 squares
F: 12 squares

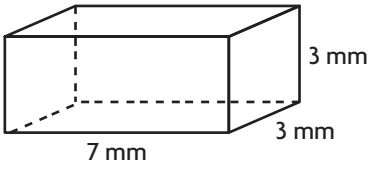
52 square units

2.

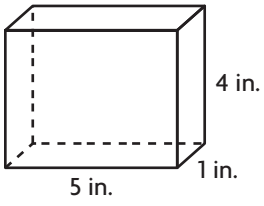


Find the surface area of the rectangular prism.

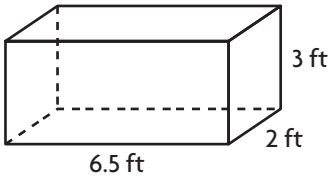
3.



4.



5.



Problem Solving Real World

6. Jeremiah is covering a cereal box with fabric for a school project. If the box is 6 inches long by 2 inches wide by 14 inches high, how much surface area does Jeremiah have to cover?

7. Tia is making a case for her calculator. It is a rectangular prism that will be 3.5 inches long by 1 inch wide by 10 inches high. How much material (surface area) will she need to make the case?

Lesson Check (6.G.4)

1. Gabriela drew a net of a rectangular prism on centimeter grid paper. If the prism is 7 cm long by 10 cm wide by 8 cm high, how many grid squares does the net cover?

2. Ben bought a cell phone that came in a box shaped like a rectangular prism. The box is 5 inches long by 3 inches wide by 2 inches high. What is the surface area of the box?

Spiral Review (6.EE.5, 6.EE.9, 6.G.1, 6.G.4)

3. Katrin wrote the inequality $x + 56 < 533$. What is the solution of the inequality?

4. The table shows the number of mixed CDs y that Jason makes in x hours.

Mixed CDs				
Hours, x	2	3	5	10
CDs, y	10	15	25	50

Which equation describes the pattern in the table?

5. A square measuring 9 inches by 9 inches is cut from a corner of a square measuring 15 inches by 15 inches. What is the area of the L-shaped figure that is formed?

6. Boxes of Clancy's Energy Bars are rectangular prisms. How many lateral faces does each box have?

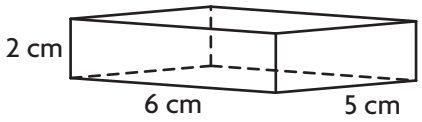
Name _____

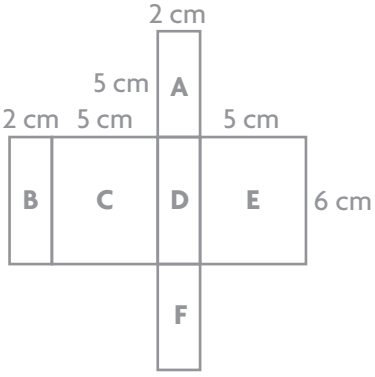
Surface Area of Prisms

COMMON CORE STANDARD—6.G.4
Solve real-world and mathematical problems involving area, surface area, and volume.

Use a net to find the surface area.

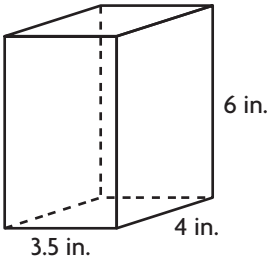
1.



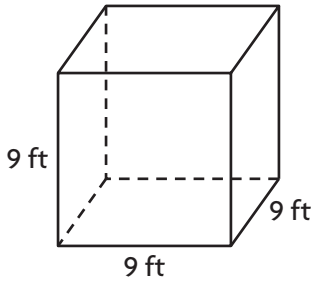


Area of A and F = $2 \times (5 \times 2) = 20$ cm^2
Area of B and D = $2 \times (6 \times 2) = 24$ cm^2
Area of C and E = $2 \times (6 \times 5) = 60$ cm^2
S.A.= 20 cm^2 + 24 cm^2 + 60 cm^2 = 104 cm^2

2.



3.



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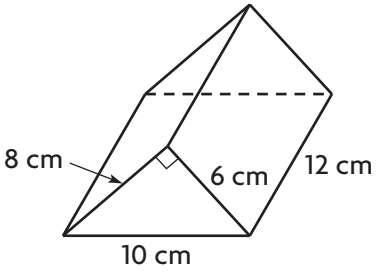


Problem Solving Real World

5. A shoe box measures 15 in. by 7 in. by $4\frac{1}{2}$ in. What is the surface area of the box?

6. Vivian is working with a styrofoam cube for art class. The length of one side is 5 inches. How much surface area does Vivian have to work with?

Lesson Check (6.G.4)

1. What is the surface area of a cubic box that contains a baseball that has a diameter of 3 inches?

2. A piece of wood used for construction is 2 inches by 4 inches by 24 inches. What is the surface area of the wood?

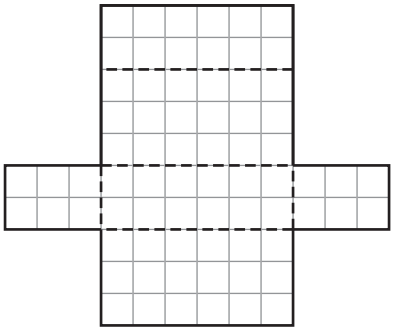
Spiral Review (6.EE.9, 6.G.1, 6.G.4)

3. Detergent costs $4 per box. Kendra graphs the equation that gives the cost y of buying x boxes of detergent. What is the equation?

4. A trapezoid with bases that measure 8 inches and 11 inches has a height of 3 inches. What is the area of the trapezoid?

5. City Park is a right triangle with a base of 40 yd and a height of 25 yd. On a map, the park has a base of 40 in. and a height of 25 in. What is the ratio of the area of the triangle on the map to the area of City Park?

6. What is the surface area of the prism shown by the net?



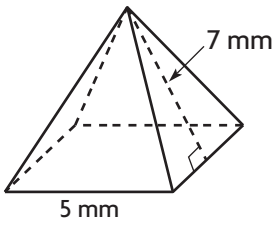
Name _____

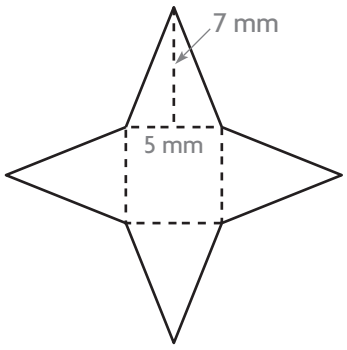
Surface Area of Pyramids

COMMON CORE STANDARD—6.G.4
Solve real-world and mathematical problems involving area, surface area, and volume.

Use a net to find the surface area of the square pyramid.

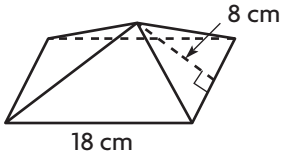
1.





$$\text{Base: } A = 5^2 = 25 \text{ mm}^2$$
$$\text{Face: } A = \frac{1}{2}(5)(7)$$
$$= 17.5 \text{ mm}^2$$
$$S.A. = 25 + 4 \times 17.5$$
$$= 25 + 70$$
$$= 95 \text{ mm}^2$$

2.



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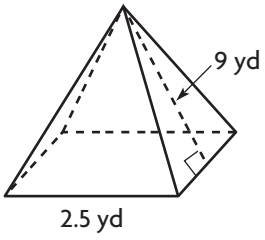
3.



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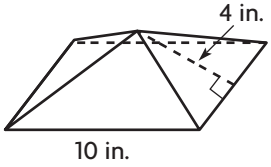
4.



_____

Problem Solving

5. Cho is building a sandcastle in the shape of a triangular pyramid. The area of the base is 7 square feet. Each side of the base has a length of 4 feet and the height of each face is 2 feet. What is the surface area of the pyramid?

_____

6. The top of a skyscraper is shaped like a square pyramid. Each side of the base has a length of 60 meters and the height of each triangle is 20 meters. What is the lateral area of the pyramid?

_____

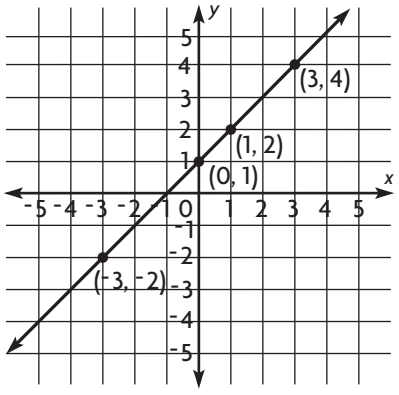
Lesson Check (6.G.4)

1. A square pyramid has a base with a side length of 12 in. Each face has a height of 7 in. What is the surface area of the pyramid?

2. The faces of a triangular pyramid have a base of 5 cm and a height of 11 cm. What is the lateral area of the pyramid?

Spiral Review (6.EE.9, 6.G.1, 6.G.3, 6.G.4)

3. What is the linear equation represented by the graph?



4. A regular octagon has sides measuring about 4 cm. If the octagon is divided into 8 congruent triangles, each has a height of 5 cm. What is the area of the octagon?

5. Carly draws quadrilateral *JKLM* with vertices $J(^{-}3, 3)$, $K(3, 3)$, $L(2, ^{-}1)$, and $M(^{-}2, ^{-}1)$. What is the best way to classify the quadrilateral?

6. A rectangular prism has the dimensions 8 feet by 3 feet by 5 feet. What is the surface area of the prism?

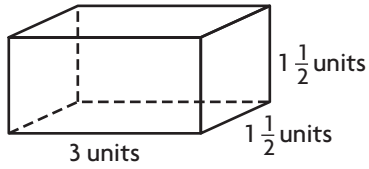
Name _____

Fractions and Volume

COMMON CORE STANDARD—6.G.2
Solve real-world and mathematical problems involving area, surface area, and volume.

Find the volume of the rectangular prism.

1.



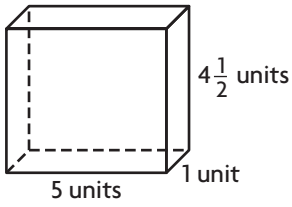
Number of cubes with side length $\frac{1}{2}$ unit: 54

$54 \div 8 = 6$ with a remainder of 6

$54 \div 8 = 6 + \frac{6}{8} = 6\frac{3}{4}$

Volume $= 6\frac{3}{4}$ cubic units

2.



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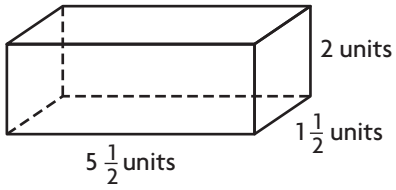

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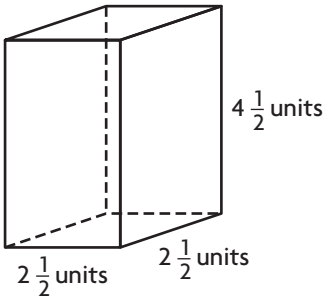


_____ _____ _____

Problem Solving Real World

5. Miguel is pouring liquid into a container that is $4\frac{1}{2}$ inches long by $3\frac{1}{2}$ inches wide by 2 inches high. How many cubic inches of liquid will fit in the container?

6. A shipping crate is shaped like a rectangular prism. It is $5\frac{1}{2}$ feet long by 3 feet wide by 3 feet high. What is the volume of the crate?

_____ _____

Lesson Check (6.G.2)

1. A rectangular prism is 4 units by $2\frac{1}{2}$ units by $1\frac{1}{2}$ units. How many cubes with a side length of $\frac{1}{2}$ unit will completely fill the prism?

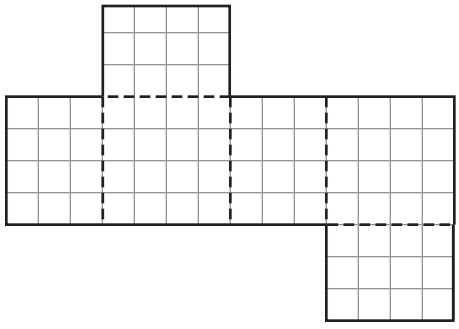
2. A rectangular prism is filled with 196 cubes with $\frac{1}{2}$-unit side lengths. What is the volume of the prism in cubic units?

Spiral Review (6.G.1, 6.G.4)

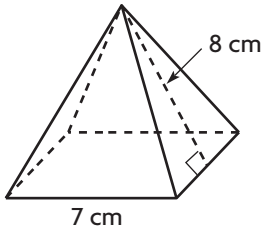
3. A parallelogram-shaped piece of stained glass has a base measuring $2\frac{1}{2}$ inches and a height of $1\frac{1}{4}$ inches. What is the area of the piece of stained glass?

4. A flag for the sports club is a rectangle measuring 20 inches by 32 inches. Within the rectangle is a yellow square with a side length of 6 inches. What is the area of the flag that is not part of the yellow square?

5. What is the surface area of the rectangular prism shown by the net?



6. What is the surface area of the square pyramid?



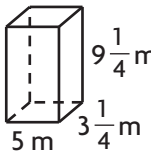
Name _____

Volume of Rectangular Prisms

COMMON CORE STANDARD—6.G.2
Solve real-world and mathematical problems involving area, surface area, and volume.

Find the volume.

1.

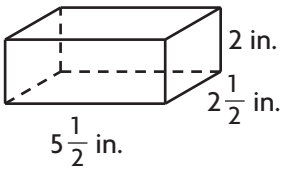


$V = lwh$

$V = 5 \times 3\frac{1}{4} \times 9\frac{1}{4}$

$V = 150\frac{5}{16}\ m^3$

2.



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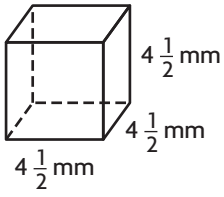
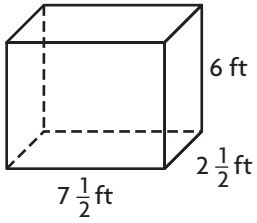


4.



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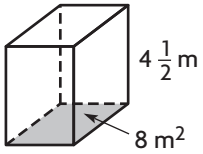

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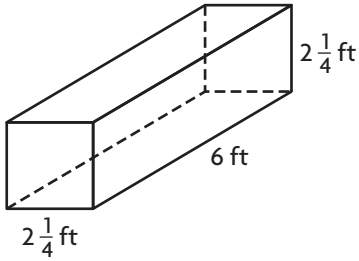

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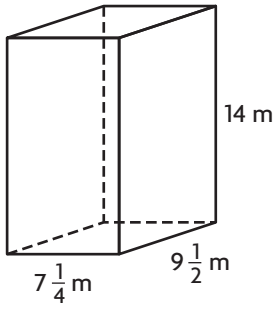

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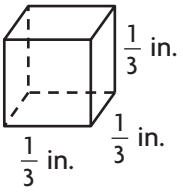

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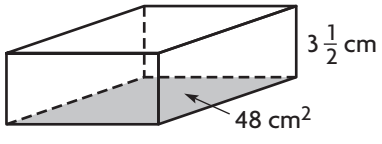


Problem Solving

10. A cereal box is a rectangular prism that is 8 inches long and $2\frac{1}{2}$ inches wide. The volume of the box is 200 $in.^3$. What is the height of the box?

11. A stack of paper is $8\frac{1}{2}$ in. long by 11 in. wide by 4 in. high. What is the volume of the stack of paper?

Lesson Check (6.G.2)

1. A kitchen sink is a rectangular prism with a length of $19\frac{7}{8}$ inches, a width of $14\frac{3}{4}$ inches, and height of 10 inches. Estimate the volume of the sink.

2. A storage container is a rectangular prism that is 65 centimeters long and 40 centimeters wide. The volume of the container is 62,400 cubic centimeters. What is the height of the container?

Spiral Review (6.G.1, 6.G.2, 6.G.4)

3. Carrie started at the southeast corner of Franklin Park, walked north 240 yards, turned and walked west 80 yards, and then turned and walked diagonally back to where she started. What is the area of the triangle enclosed by the path she walked?

4. The dimensions of a rectangular garage are 100 times the dimensions of a floor plan of the garage. The area of the floor plan is 8 square inches. What is the area of the garage?

5. Shiloh wants to create a paper-mâché box shaped like a rectangular prism. If the box will be 4 inches by 5 inches by 8 inches, how much paper does she need to cover the box?

6. A box is filled with 220 cubes with a side length of $\frac{1}{2}$ unit. What is the volume of the box in cubic units?

Name _____

Problem Solving • Geometric Measurements

COMMON CORE STANDARD—6.G.4
Solve real-world and mathematical problems involving area, surface area, and volume.

Read each problem and solve.

1. The outside of an aquarium tank is 50 cm long, 50 cm wide, and 30 cm high. It is open at the top. The glass used to make the tank is 1 cm thick. How much water can the tank hold?

$l = 50 - 2 = 48$, $w = 50 - 2 = 48$,
$h = 30 - 1 = 29$
$V = l \times w \times h$
$= 48 \times 48 \times 29$
$= 66{,}816$

66,816 cm^3

2. Arnie keeps his pet snake in an open-topped glass cage. The outside of the cage is 73 cm long, 60 cm wide, and 38 cm high. The glass used to make the cage is 0.5 cm thick. What is the inside volume of the cage?

_____

3. A gift box measures 14 in. by 12 in. by 6 in. How much wrapping paper is needed to exactly cover the box?

_____

4. A display number cube measures 20 in. on a side. The sides are numbered 1–6. The odd-numbered sides are covered in blue fabric and the even-numbered sides are covered in red fabric. How much red fabric was used?

_____

5. The caps on the tops of staircase posts are shaped like square pyramids. The side length of the base of each cap is 4 inches. The height of the face of each cap is 5 inches. What is the surface area of the caps for two posts?

_____

6. A water irrigation tank is shaped like a cube and has a side length of $2\frac{1}{2}$ feet. How many cubic feet of water are needed to completely fill the tank?

_____

Lesson Check (6.G.4)

1. Maria wants to know how much wax she will need to fill a candle mold shaped like a rectangular prism. What measure should she find?

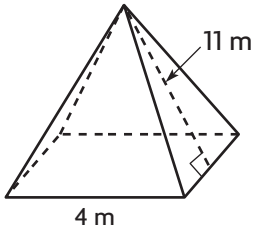
2. The outside of a closed glass display case measures 22 inches by 15 inches by 12 inches. The glass is $\frac{1}{2}$ inch thick. How much air is contained in the case?

Spiral Review (6.G.1, 6.G.2, 6.G.3, 6.G.4)

3. A trapezoid with bases that measure 5 centimeters and 7 centimeters has a height of 4.5 centimeters. What is the area of the trapezoid?

4. Sierra has plotted two vertices of a rectangle at (3, 2) and (8, 2). What is the length of the side of the rectangle?

5. What is the surface area of the square pyramid?



6. A shipping company has a rule that all packages must be rectangular prisms with a volume of no more than 9 cubic feet. What is the maximum measure for the height of the a box that has a width of 1.5 feet and a length of 3 feet?