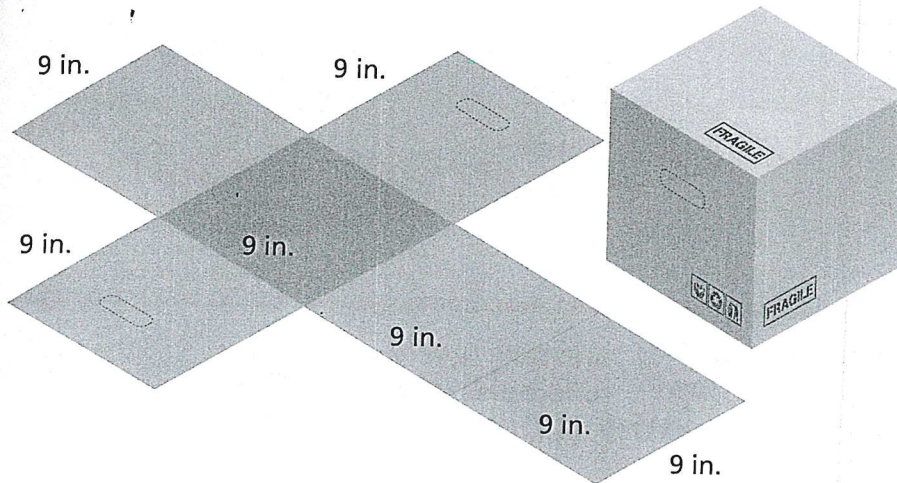


Solve & Discuss It!



ACTIVITY

Marianne orders boxes to pack gifts. When they arrive, she finds flat pieces of cardboard as shown below. Marianne needs to cover each face of the boxes with green paper. What is the least amount of paper needed to cover each box? Explain.



Lesson 7-6 Find Surface Areas of Prisms



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I can...

draw a net of a prism and use it to find the prism's surface area

1 MAFS.6.G.1.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. Also 6.EE.1.2a, 6.EE.1.2c, 6.EE.2.6

MAFS.K12.MP.1.1, MP.3.1, MP.5.1, MP.6.1

Make Sense and Persevere What solid figure does this net represent?

Focus on math practices

Make Sense and Persevere Suppose Marianne has only one large sheet of green paper that is 15 inches by 30 inches. Is the area of this sheet of paper great enough to cover all of the faces of one box? Explain.



EXAMPLE 1

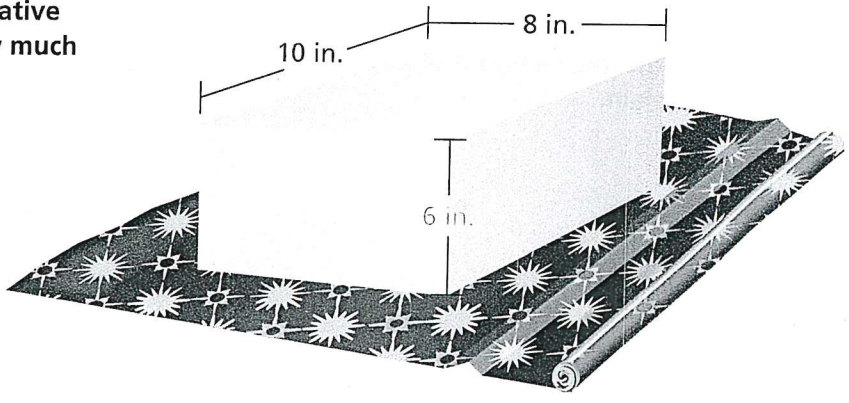


Find the Surface Area of a Rectangular Prism

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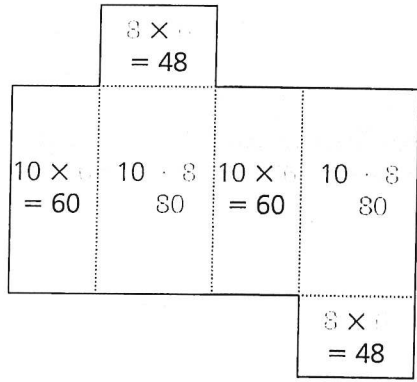


Kelly wants to cover a shoebox with decorative paper without overlapping the paper. How much paper will she need to cover the box?



Use Appropriate Tools Would a net help you find the surface area (SA) of the rectangular prism?

ONE WAY Draw a net of the shoebox and find the area of each face.



Add the areas. Kelly needs 376 square inches of paper to cover the box.

ANOTHER WAY Use a formula to find the total surface area (SA) of the shoebox.

- length (ℓ) = 10 inches
- width (w) = 8 inches
- height (h) = 6 inches

$$\begin{aligned}
 SA &= 2(\ell w) + 2(wh) + 2(\ell h) \\
 &= 2(10 \cdot 8) + 2(8 \cdot 6) + 2(10 \cdot 6) \\
 &= 2(80) + 2(48) + 2(60) \\
 &= 376
 \end{aligned}$$

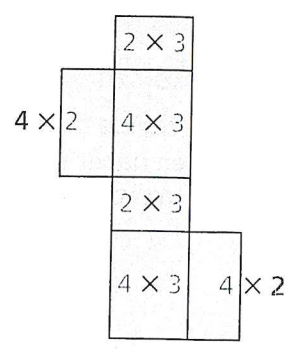
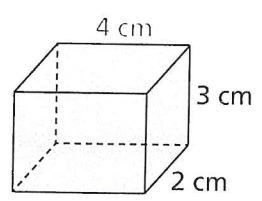
The area of each face in the net is calculated in the formula.

Kelly needs 376 square inches of paper to cover the box.

Try It!

Use the net and the formula to find the surface area of the prism.

$$SA = 2(\ell w) + 2(wh) + 2(\ell h)$$



Convince Me! Why are ℓw , wh , and ℓh each multiplied by 2 in the formula?



EXAMPLE 2



Find the Surface Area of a Cube



ACTIVITY



ASSESS

Sam built a storage cube out of plywood. How many square meters of plywood did Sam use for the cube?

Draw a net of the cube.

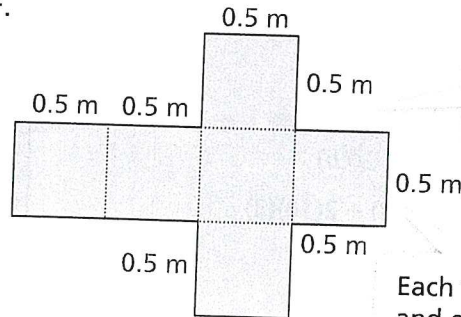
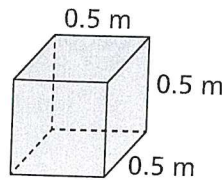
The formula for the area of one square is $A = s^2$. Because there are 6 equal squares in the net, the formula for the surface area of a cube is $SA = 6s^2$. Use the formula to find the surface area.

$$SA = 6(0.5)^2$$

$$SA = 6(0.25)$$

$$SA = 1.5$$

Sam used 1.5 m² of plywood to build the cube.



Be Precise Remember to express surface area in square units.

There are 6 same-size squares in the net.

Each face is a square, and each side s has a length of 0.5 m.

EXAMPLE 3



Find the Surface Area of a Triangular Prism

Find the surface area of the triangular prism.

Use the net to find the area of each face of the prism. Then add the areas.

$$\text{Area of triangular bases: } A = \frac{1}{2}bh = \frac{1}{2}(12)(9) = 54$$

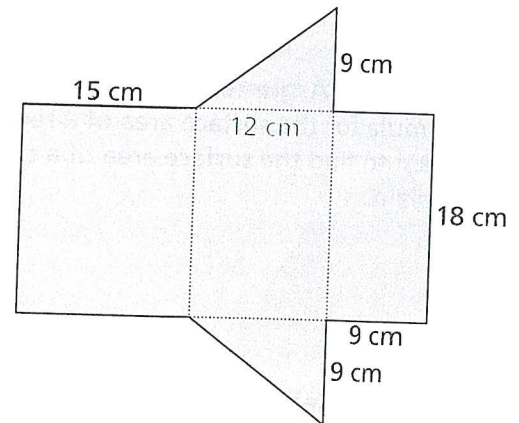
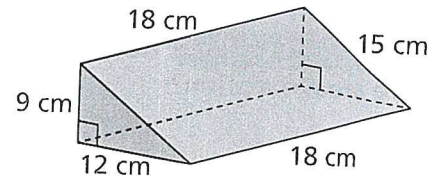
$$\text{Area of bottom: } A = \ell w = 12(18) = 216$$

$$\text{Area of back: } A = \ell w = 9(18) = 162$$

$$\text{Area of sloped face: } A = \ell w = 18(15) = 270$$

$$SA = 2(54) + 216 + 162 + 270 = 756$$

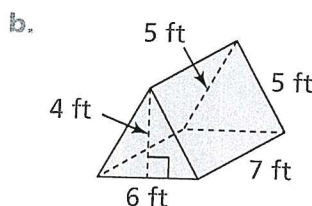
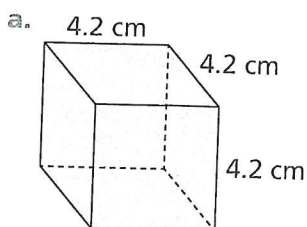
The surface area of the triangular prism is 756 cm².



There are 2 triangular bases.

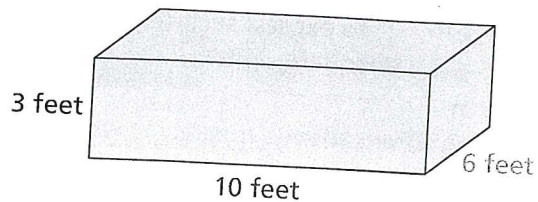
Try It!

Find the surface area of each prism.





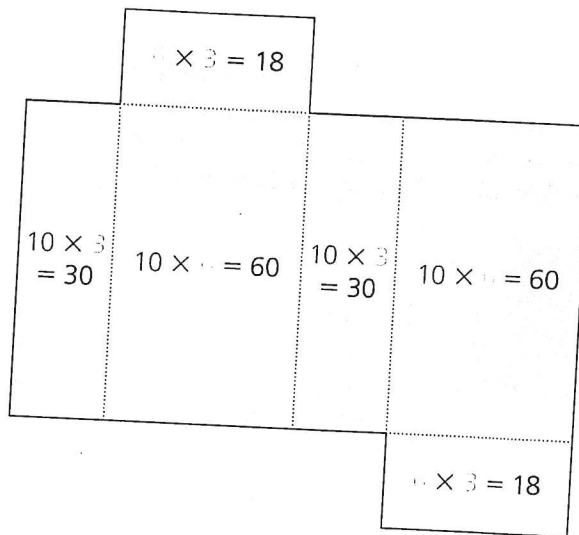
To find the surface area of a prism, use a net or a formula.



Rectangular Prism

$$\begin{aligned}
 SA &= 2(lw) + 2(wh) + 2(lh) \\
 &= 2(10)(6) + 2(6)(3) + 2(10)(3) \\
 &= 2(60) + 2(18) + 2(30) \\
 &= 216
 \end{aligned}$$

The surface area is 216 ft².



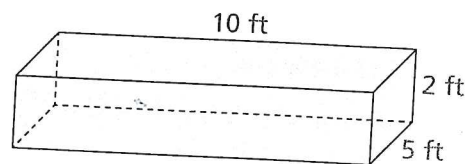
Do You Understand?

- Essential Question** How can you find the surface area of a prism?
- Construct Arguments** Could you use the formula for the surface area of a rectangular prism to find the surface area of a cube? Explain.
- Look for Relationships** Which faces of a rectangular prism always have the same area?
- Generalize** What does it mean to find surface area?

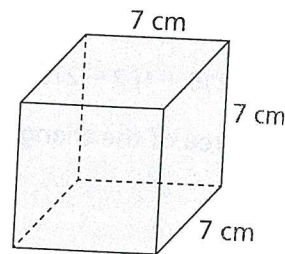
Do You Know How?

In 5–7, find the surface area of each prism.

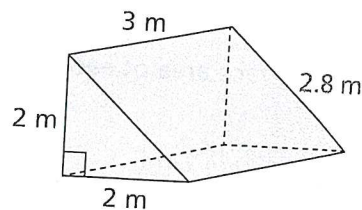
5.



6.



7.



Name: _____



PRACTICE



TUTORIAL

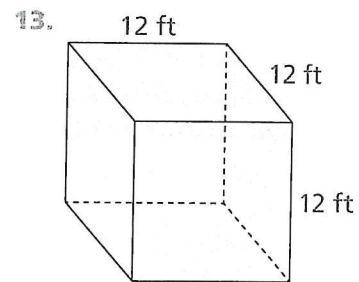
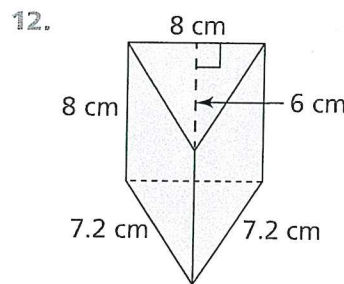
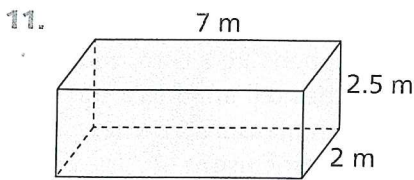
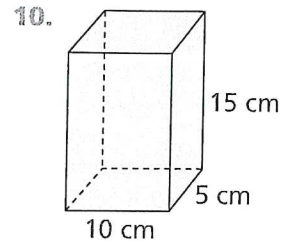
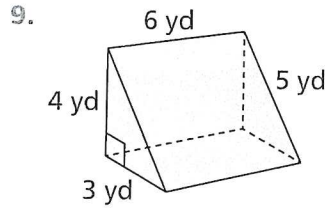
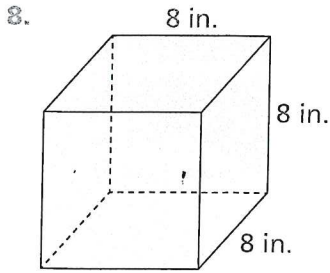
Practice & Problem Solving



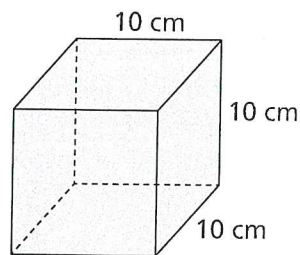
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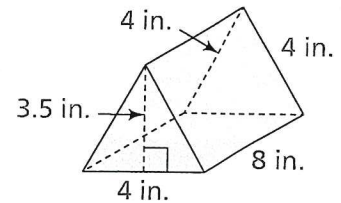
In 8–13, find the surface area of each prism.



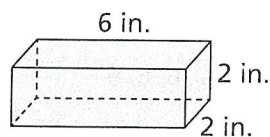
14. **Critique Reasoning** Jacob says that the surface area of the cube is less than $1,000 \text{ cm}^2$. Do you agree with Jacob? Explain.



15. You want to wrap a paperweight shaped like the triangular prism shown. How many square inches of wrapping paper do you need to completely cover the prism?



16. Sasha has 2 blocks of clay shaped like the rectangular prism below. She joins them to form a rectangular prism with a length of 12 inches. What is the surface area of the larger prism?

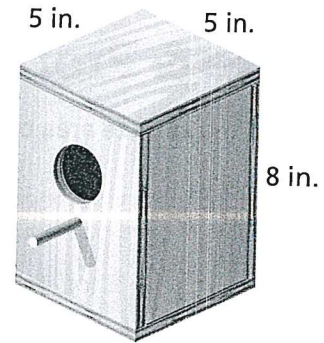


17. A rectangular prism has a length of 12 cm, a height of 6 cm, and a width of 4 cm. Use the formula $SA = 2(lw) + 2(wh) + 2(lh)$ to find the surface area of the rectangular prism.



In 18 and 19, use the diagram of the birdhouse.

18. Kali wants to build this birdhouse. She bought a 24-inch by 48-inch sheet of plywood. Does Kali have enough wood to make the birdhouse? Explain.



19. **Reasoning** Kali decides to paint the birdhouse. She has a pint of paint that covers 32.5 ft^2 of surface. How can you tell that Kali has enough paint without calculating?


20. Use the formula $SA = 2\ell w + 2\ell h + 2wh$ to find the surface area for a rectangular prism with a length, ℓ , of 2.3 inches; a width, w , of 1.1 inches; and a height, h , of 3 inches.

21. **Make Sense and Persevere** Justine wants to wrap a shipping box shaped like a rectangular prism. The box is 28 inches tall and has a square base with sides that each measure 2 inches. How much paper will Justine use?


22. **Higher Order Thinking** Margaret wants to cover a footrest in the shape of a rectangular prism with cotton fabric. The footrest is 18 inches by 12 inches by 10 inches. Margaret has 1 square yard of fabric. Can she completely cover the footrest? Explain.

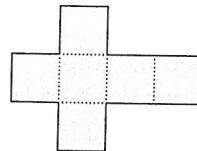
23. A cube has a surface area of 486 in.^2 . Can the length of each side of the cube be 11 in.? Explain.

Assessment Practice

24. Using nets, find the surface area, in square feet, of a rectangular prism with a height of 2 feet, a length of 4.2 feet, and a width of 2.5 feet.  6.G.1.4



25. The surface area of a cube is 273.375 square feet. The net of the prism is shown.  6.G.1.4



What are the possible dimensions of the cube in feet?

- (A) 6, 6, 6
(B) 6, 6.75, 6.75
(C) 6.5, 6.5, 6.5
(D) 6.75, 6.75, 6.75

