English Spanish

6.6 Surface Areas of Composite Solids

Essential Question How can you find the surface area of a composite solid?

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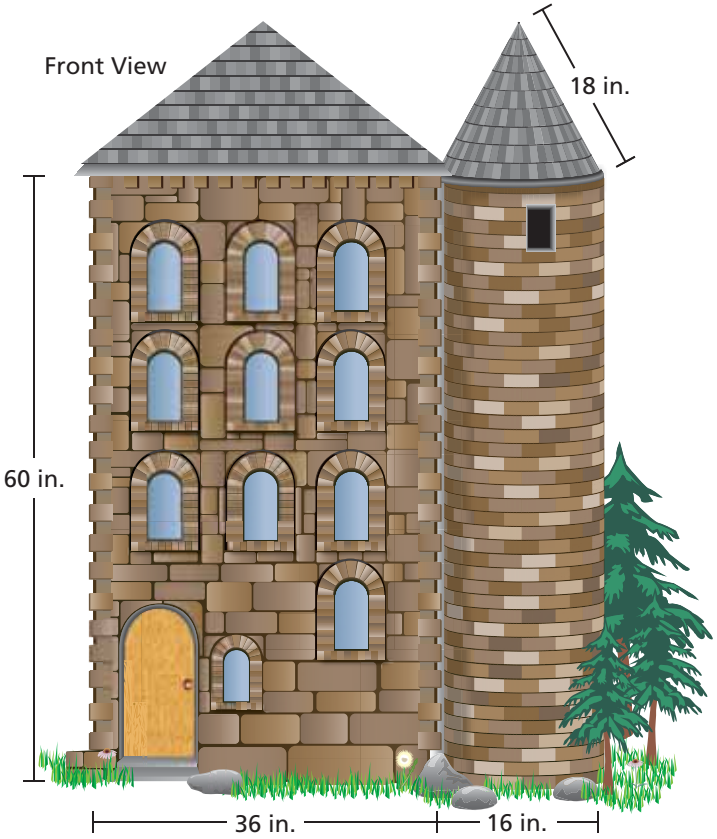
1 ACTIVITY: Finding a Surface Area

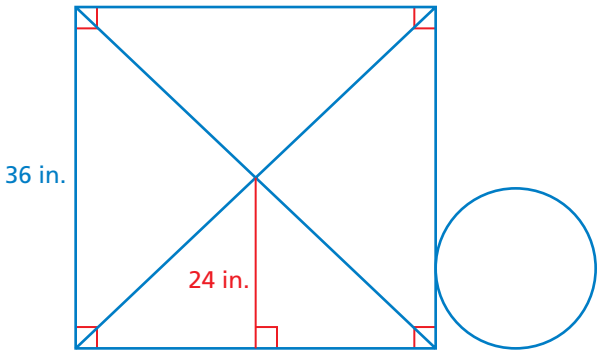
Work with a partner. You are manufacturing scale models of old houses.

a. Name the four basic solids of this composite figure.

b. Determine a strategy for finding the surface area of this model. Would you use a scale drawing? Would you use a net? Explain.



Many castles have cylindrical towers with conical roofs. These are called turrets.



Top View

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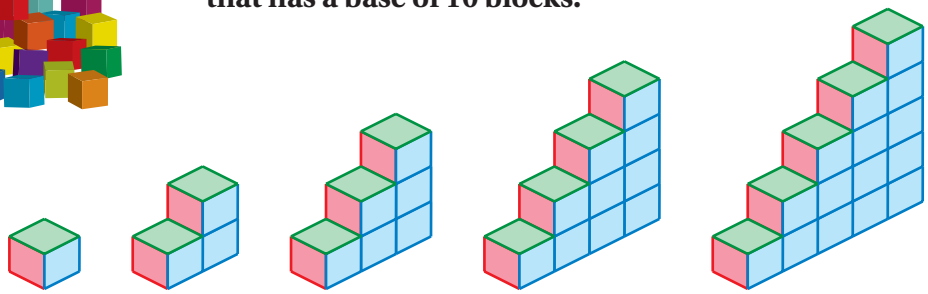
2 ACTIVITY: Finding and Using a Pattern

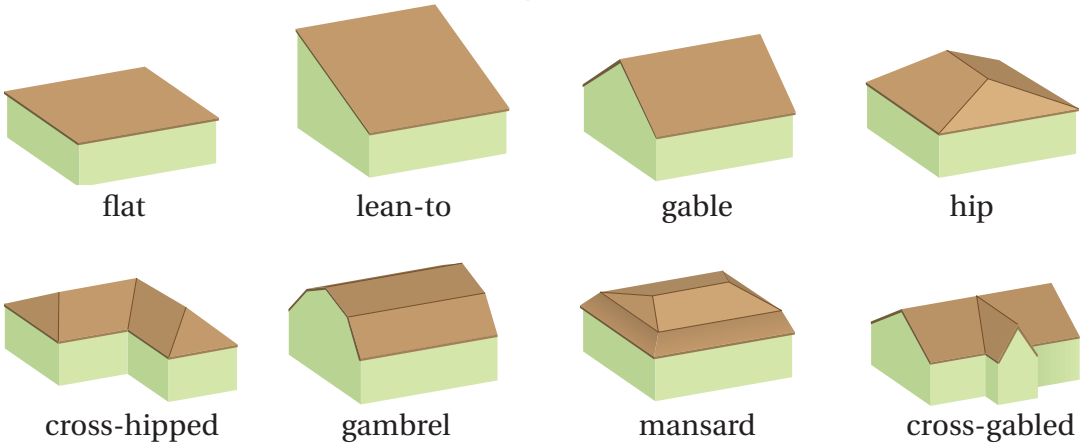
Work with a partner.

- **Find the surface area of each figure.**
- **Use a table to organize your results.**
- **Describe the pattern in the table.**
- **Use the pattern to find the surface area of the figure that has a base of 10 blocks.**



3 ACTIVITY: Finding and Using a Pattern

Work with a partner. You own a roofing company. Each building has the same base area. Which roof would be cheapest? Which would be the most expensive? Explain your reasoning.



What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you find the surface area of a composite solid?

5. Design a building that has a turret and also has a mansard roof. Find the surface area of the roof.

Practice Use what you learned about the surface area of a composite solid to complete Exercises 6–8 on page 286.

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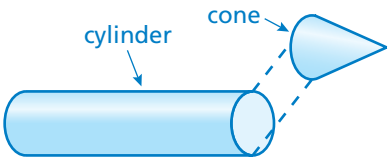
6.6 Lesson

Check It Out Lesson Tutorials BigIdeasMath.com

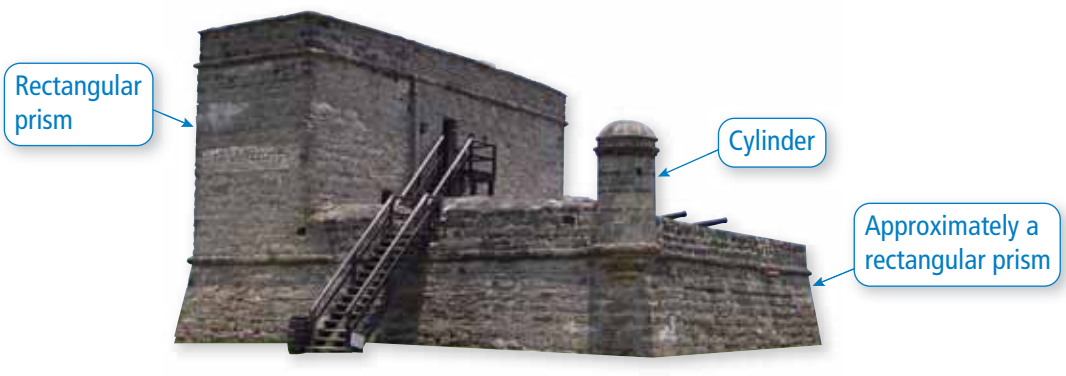
Key Vocabulary
composite solid, *p. 284*

A **composite solid** is a figure that is made up of more than one solid.



EXAMPLE 1 Identifying Solids

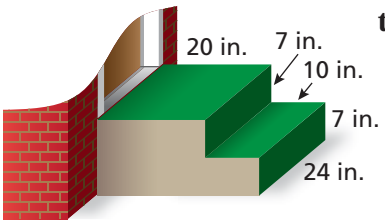
Identify the solids that make up Fort Matanzas.



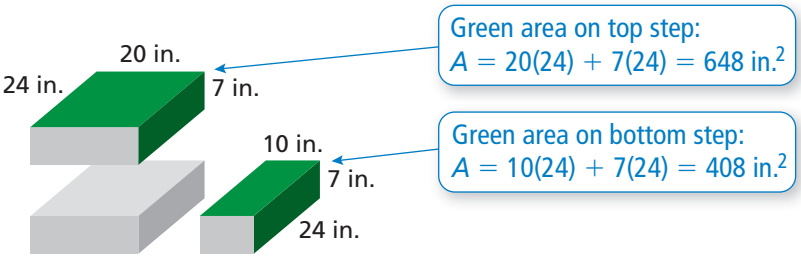
EXAMPLE 2 Standardized Test Practice

You painted the steps to an apartment green. What is the surface area that you painted?

Ⓐ 210 in.^{2} Ⓑ 408 in.^{2} Ⓒ 648 in.^{2} Ⓓ 1056 in.^{2}



Find the area of each green face.



You painted $648 + 408 = 1056$ square inches.

∴ The correct answer is Ⓓ.

On Your Own

Now You're Ready
Exercises 3–5

1. **WHAT IF?** In Example 2, you also painted the sides of the steps green. What is the surface area that you painted?

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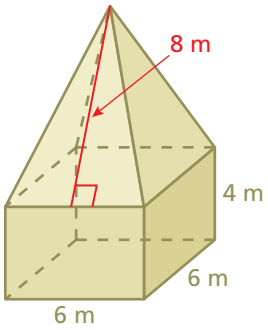
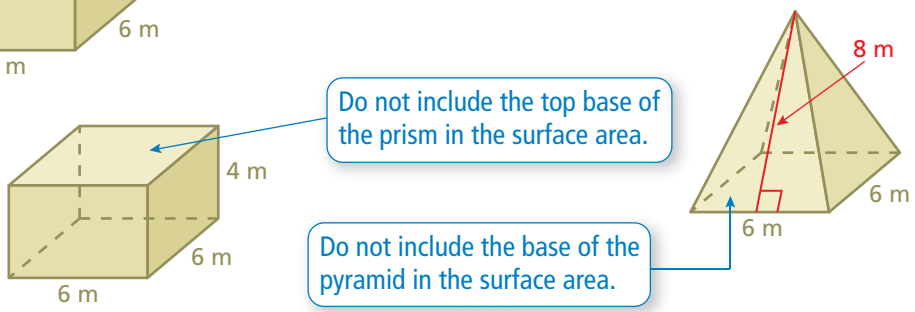
EXAMPLE 3 Finding the Surface Area of a Composite Solid



Find the surface area of the composite solid.

The solid is made up of a square prism and a square pyramid. Use the surface area formulas for a prism and a pyramid, but do not include the areas of the sides that overlap.



Square prism

$S = \ell w + 2\ell h + 2wh$ Write formula.

$= 6(6) + 2(6)(4) + 2(6)(4)$ Substitute.

$= 36 + 48 + 48$ Multiply.

$= 132$ Add.

Square pyramid

$S =$ areas of lateral faces Write formula.

$= 4\left(\frac{1}{2} \cdot 6 \cdot 8\right)$ Substitute.

$= 96$ Multiply.

Find the sum of the surface areas: $132 + 96 = 228$.

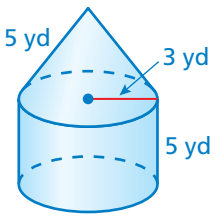
∴ The surface area is 228 square meters.

On Your Own

Now You're Ready
Exercises 6–11

Identify the solids that make up the composite solid. Then find the surface area. Round your answer to the nearest tenth.

2.



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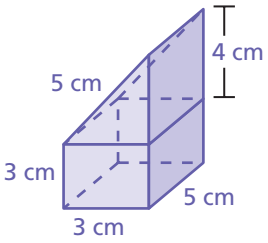

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6.6 Exercises

Check It Out
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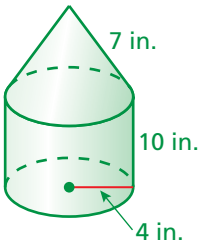
Vocabulary and Concept Check

1. **OPEN-ENDED** Draw a composite solid formed by a triangular prism and a cone.
2. **REASONING** Explain how to find the surface area of the composite solid.



Practice and Problem Solving

Identify the solids that form the composite solid.

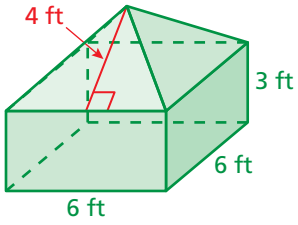
1 3.

4.

5.

Identify the solids that form the composite solid. Then find the surface area. Round your answer to the nearest tenth.

2 3 6.



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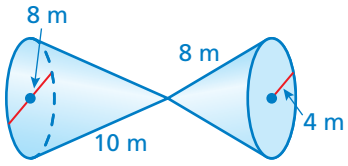

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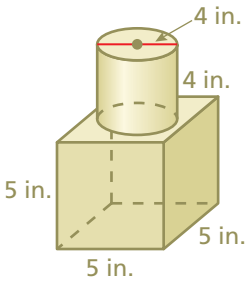

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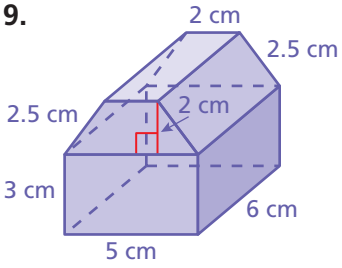

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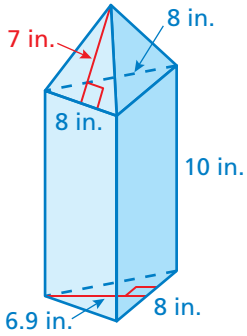

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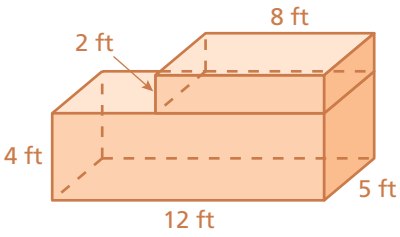
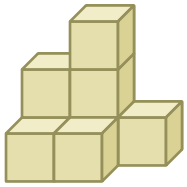


12. **OPEN-ENDED** The solid is made using eight cubes with side lengths of 1 centimeter.



a. Draw a new solid using eight cubes that has a surface area less than that of the original solid.

b. Draw a new solid using eight cubes that has a surface area greater than that of the original solid.

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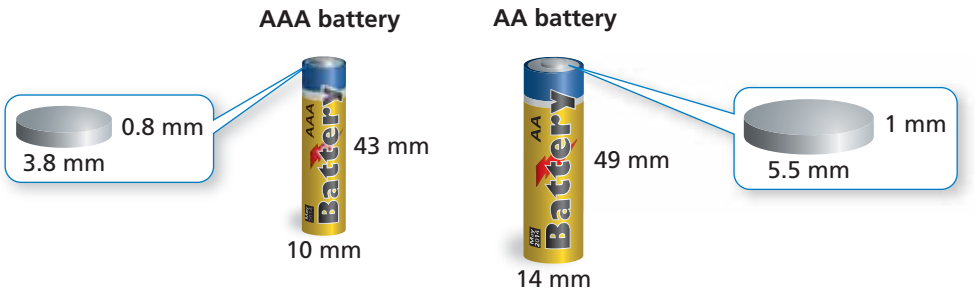
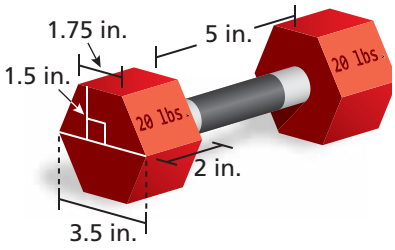
13. **BATTERIES** What is the percent increase in the surface area of the AAA battery to the AA battery? Round your answer to the nearest tenth of a percent.

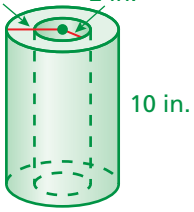




14. **BARBELL** The diameter of the handle of a barbell is 1 inch. The hexagonal weights are identical. What is the surface area of the barbell?

REASONING **Find the surface area of the solid. Round your answer to the nearest tenth.**

15.



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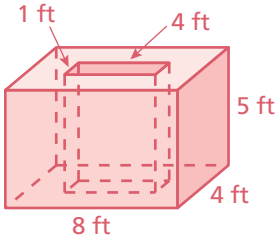

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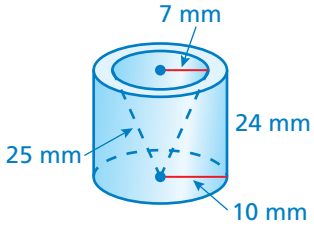
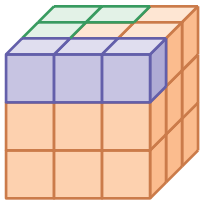


18. Critical Thinking The cube is made with 27 identical cubes. All cubes that cannot be seen are orange. Is the surface area of the solid formed without the purple cubes *greater than*, *less than*, or *equal to* the surface area of the solid formed without the green cubes? Explain your reasoning.

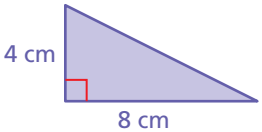


Fair Game Review What you learned in previous grades & lessons

Find the area. SKILLS REVIEW HANDBOOK

19.

20.



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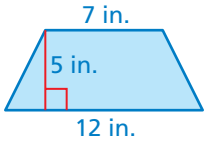

22. **MULTIPLE CHOICE** A cliff swallow nest is 86 meters above a canyon floor. The elevation of the nest is −56 meters. What is the elevation of the canyon floor? SECTION 2.4

(A) −142 (B) −30 (C) 30 (D) 142