

Name: _____

Date: _____



VOLUME AND SURFACE AREA OF PRISMS

N-GEN MATH[®] 8



We live in a three-dimensional world and need to deal with solids (things with three dimensions) often in math, science, and real-world scenarios. One of the most common solids is the **prism**.

PRISMS

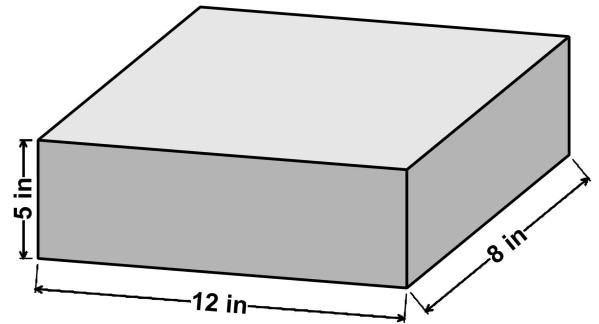
Prisms are three-dimensional solids that have **parallel polygon bases** that are **identical** and all other faces (known as lateral) are parallelograms.

A common type of prism is the **right rectangular** prism (or box as we often call it).

Exercise #1: A right rectangular prism is shown below. Answer the following questions.

(a) What is the **volume** of this prism?

(b) How many faces does this prism have? What kind of shapes are they?



(c) Draw each of the distinct faces of this prism and label with dimensions below. Find the area of each. Then find the **surface area**.

What is the total surface area of this prism?

Prisms are very simple. The summary of their volume and surface area formulas are shown below.

VOLUME AND SURFACE AREA OF RIGHT PRISMS

The **volume** of a right prism is given by: $V = B \cdot h$ where B is the area of the base and h is the height of the prism. In the case of a rectangular prism this becomes: $V = l \cdot w \cdot h$. The **surface area** will be the sum of the areas of all of its faces.



Exercise #2: A right triangular prism is shown below. Its base is a right triangle, whose legs are 3 cm and 4 cm in length. The height of the prism is 8 cm.

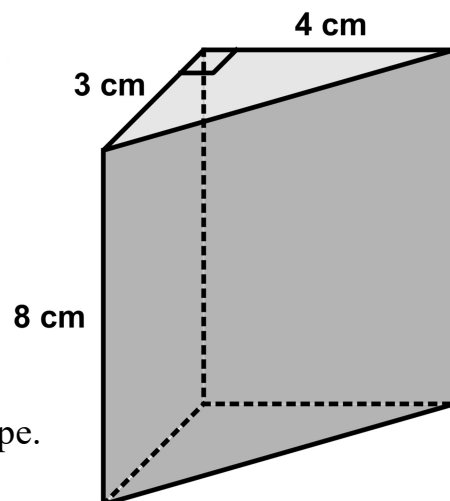
(a) What is the area of the base of the prism?

(b) What is the volume of the prism?

(c) How many faces does the solid have? List the number and type.

(d) How can we find the missing width of the front face? Find width.

(e) Draw each face below, find its area and then find the total surface area.

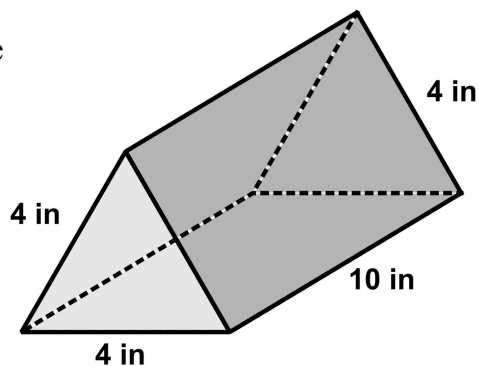


Exercise #3: A prism has an equilateral triangle with side lengths of 4 inches as its base. Its length is 10 inches as shown.

(a) Use the Pythagorean Theorem to find the height of the equilateral triangle to the nearest hundredth of an inch.

(b) Find the area of the base of the prism.

(c) Find the volume of the prism.



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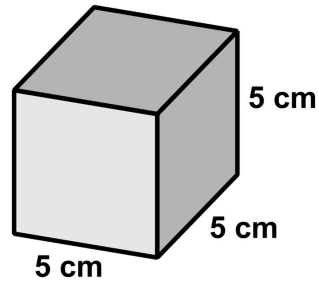
VOLUME AND SURFACE AREA OF PRISMS

N-GEN MATH[®] 8 HOMEWORK

FLUENCY

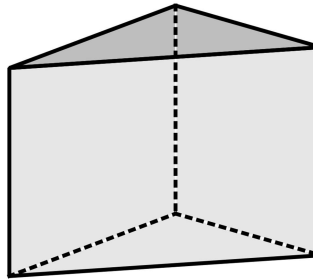
1. Which of the following is the surface area, in square centimeters, of the cube shown whose edge lengths are all 5 centimeters?

- (1) 25
- (2) 75
- (3) 125
- (4) 150



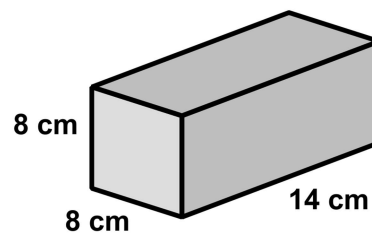
2. The triangular right prism shown below has a triangular base whose perimeter is 22.4 inches and whose area is 15.2 inches. If its height is 9.7 inches, then which of the following is its volume in cubic inches?

- (1) 47.3
- (2) 147.44
- (3) 217.28
- (4) 3,302.656



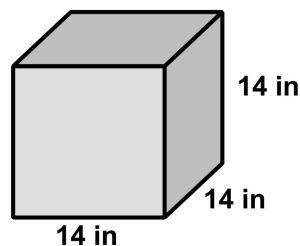
3. Which expression below would properly calculate the surface area, in square centimeters, of the right rectangular prism shown below?

- (1) $2 \cdot 8^2 + 4 \cdot 8 \cdot 14$
- (2) $8^2 + 8 \cdot 14$
- (3) $8^2 \cdot 14$
- (4) $4 \cdot 8^2 + 2 \cdot 8 \cdot 14$



4. How many cubes that measure 2 inches by 2 inches by 2 inches could fit into the cube shown below?

- (1) 7
- (2) 49
- (3) 343
- (4) 471

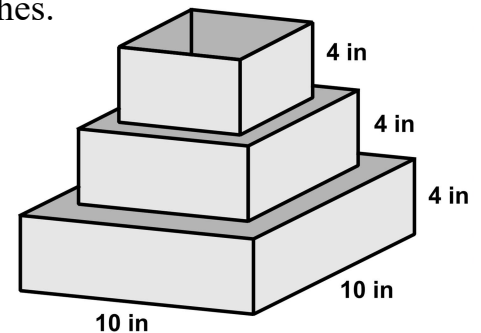




USING YOUR MATH

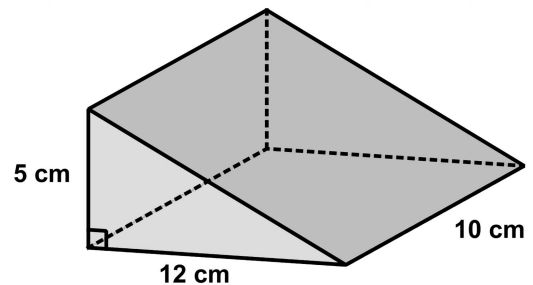
5. A company makes a set of three boxes that sit within one another (shown separated below). Each has a square base. The base of each smaller box has side lengths 2 inches shorter than the one it sits within. All boxes have a common height of 4 inches.

What is the total volume that can be held by the three boxes when separated?



6. The right triangular prism shown below has right triangles as its bases with dimensions shown.

(a) Find the volume of this prism.

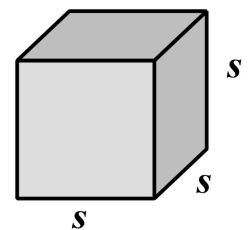


(b) Find the surface area of this prism. This will involve having to use the Pythagorean Theorem.

REASONING

7. A generic cube is shown below with its edge lengths given by the variable s (for side length of the square face).

(a) What is the area of a single face of this cube in terms of s ? (b) How many faces are there?



(c) Write an equation for the surface area, SA, of the cube in terms of s .

