ALBERT

Name _____ Date _____

Volume of Rectangular Prisms Worksheet

Grade 5 · Common Core 5.MD.C.5a

> Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

Practice

Builds the skill step by step.

1. A rectangular prism is packed with unit cubes: 3 cubes long, 2 cubes wide and 4 cubes tall. What is its volume?

2. Which expression gives the volume of a rectangular prism?

   A. length × width

   B. length × width × height

   C. length + width + height

   D. 2 × (length + width)

3. A prism has a base area of 12 square units and a height of 5 units. What is its volume?

4. A prism is 5 units long, 5 units wide and 2 units tall. What is its volume?

5. A prism's base is 6 units long and 3 units wide. What is the area of its base?

6. That prism (base 6 by 3) is 4 units tall. What is its volume?

7. Why do (2 × 3) × 4 and 2 × (3 × 4) give the same volume?

   A. Only one of them is a volume.

   B. Multiplication order changes the answer.

   C. They describe the same prism, grouped in different ways.

   D. They are different prisms.

8. A prism is 7 units long, 1 unit wide and 3 units tall. What is its volume?

9. A cube has edges 3 units long. What is its volume?

10. A prism has a base area of 20 square units and a height of 1 unit. What is its volume?

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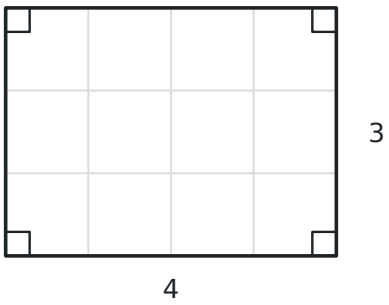
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On Level

Grade-level practice.

1. The figure shows the bottom layer of a prism packed with unit cubes. The prism is 5 layers tall. What is its volume?



2. For that prism (4 by 3, 5 layers), why do (4 × 3) × 5 and 4 × (3 × 5) both give 60?

   A. (4 × 3) × 5 counts layers; 4 × (3 × 5) counts slices from front to back. Both count the same cubes.

   B. One of them is wrong.

   C. They describe different prisms.

   D. Because 4 + 3 + 5 = 12.

3. A prism is 8 units long, 2 units wide and 3 units tall. What is its volume?

4. A prism has a volume of 36 cubic units. Its base is 3 units by 4 units. How tall is it?

5. A prism has a volume of 40 cubic units and a height of 5 units. What is the area of its base?

6. Explain why length × width × height counts the unit cubes in a rectangular prism.

7. Prism A is 2 by 3 by 6 units. Prism B is 3 by 3 by 4 units. What is the difference in their volumes?

8. The product 2 × 5 × 3 is shown as a prism 3 layers tall. How many unit cubes are in each layer?

9. A prism has a base area of 15 square units and a volume of 75 cubic units. How tall is it?

10. A cube has a volume of 64 cubic units. How long is each edge?

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Challenge

Multi-step and word problems that stretch it.

1. How many different rectangular prisms with whole-number edges have a volume of 12 cubic units? (A prism turned a different way counts as the same.)

2. A prism has a volume of 48 cubic units. It is 4 units long and 3 units wide. How tall is it?

3. A prism is 3 by 4 by 5 units. Its height is doubled. What is the new volume?

4. A prism is 2 by 3 by 4 units. Every edge is doubled. What is the new volume?

5. A box is 6 units long and 4 units wide, with a volume of 96 cubic units. How tall is it?

6. Why do a 4 × 6 × 2 prism and a 6 × 2 × 4 prism have the same volume?

   A. They are different shapes.

   B. They don't have the same volume.

   C. Their heights are equal.

   D. Changing the order of factors doesn't change the product.

7. A box has a base of 5 by 4 unit cubes and is 4 layers tall. It holds 3 full layers. How many more cubes fill it?

8. A prism has a base 3 units by 6 units. Its height is twice the width of its base (3 units). What is its volume?

9. A cube has a volume of 125 cubic units. How long is each edge?

10. Mia says a 2 × 3 × 4 prism and a 4 × 3 × 2 prism have different volumes. Explain whether she is right.