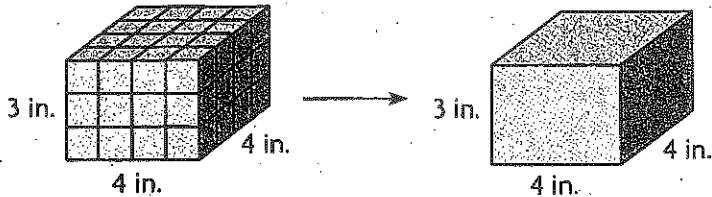Name _____

12.4 Apply Volume Formulas

ALGEBRA

Essential Question How can you use a formula to find the volume of a rectangular prism?

Connect Both prisms show the same dimensions and have the same volume.

3 in.
4 in.
4 in.

3 in.
4 in.
4 in.

Unlock the Problem Real World

Mike is making a box to hold his favorite DVDs. The length of the box is 7 inches, the width is 5 inches and the height is 3 inches. What is the volume of the box Mike is making?

- Underline what you are asked to find.
- Circle the numbers you need to use to solve the problem.

One Way Use length, width, and height.

You can use a formula to find the volume of a rectangular prism.
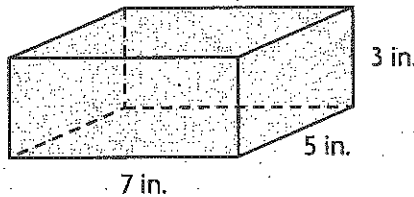
$$Volume = length \times width \times height$$

$$V = l \times w \times h$$

STEP 1 Identify the length, width, and height of the rectangular prism.

length = _____ in.

width = _____ in.

height = _____ in.

3 in.
5 in.
7 in.

STEP 2 Multiply the length by the width.

_____ × _____ = _____

STEP 3 Multiply the product of the length and width by the height.

35 × _____ = _____

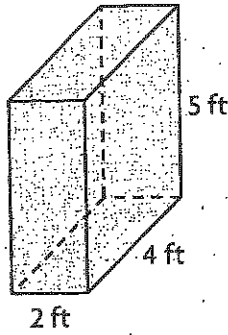So, the volume of Mike's DVD box is _____ cubic inches.

Math Talk
Mathematical Processes

Explain how you can use the Associative Property to group the part of the formula that represents area.
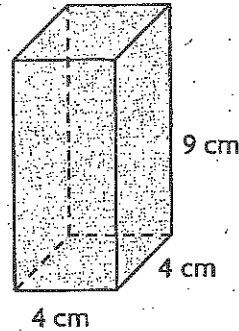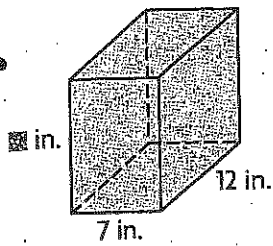
Volume: part2

Find the volume.

☑ 1.

5 ft
4 ft
2 ft

$V =$ _____

☑ 2.

9 cm
4 cm
4 cm

$V =$ _____

Find the unknown measurement.

3.
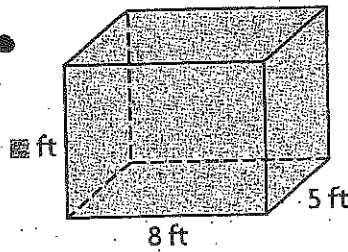
⬛ in.
12 in.
7 in.

$V = 840$ cu in.

⬛ = _____ in.

4.

⬛ ft
5 ft
8 ft

$V = 240$ cu ft

⬛ = _____ ft

5.

⬛ ft
3 ft
5 ft

$V = 90$ cu ft

⬛ = _____ ft

6.

⬛ cm
9 cm
4 cm

$V = 180$ cu cm

⬛ = _____ cm

7.

⬛ cm
5 cm
10 cm

$V = 500$ cu cm

⬛ = _____ cm

8.

⬛ in.
4 in.
4 in.
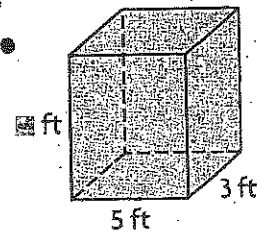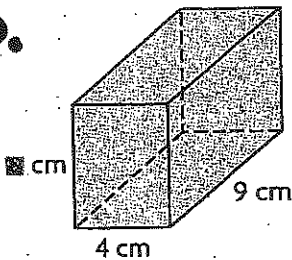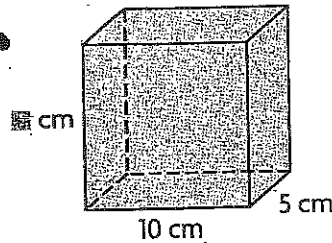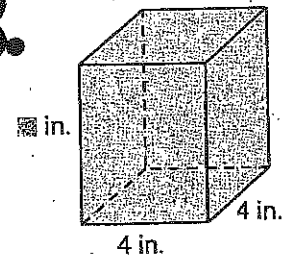
$V = 80$ cu in.

⬛ = _____ in.

9. A cube shaped block of cheese has side lengths of 6 inches. The block of cheese is cut into smaller pieces. Each piece has a volume of 1 cubic inch. How many pieces of cheese will there be?
   a. 18 pieces
   b. 36 pieces
   c. 216 pieces
   d. 72 pieces

10. How can you find the volume of a cube if you know the area of the base is 25 square cm?

11. Callie uses a rectangular baking pan with a base measuring 12 square inches. Callie pours batter in the pan so that it is 2 inches deep. The finished cake will be 3 times as tall as the batter. What is the volume of the finished cake?

12. The volume of cube A is 64 cubic feet. What is the volume of cube B if its side lengths are half the length of cube A's sides?
   a. 8 cubic feet
   b. 32 cubic feet
   c. 16 cubic feet
   d. 4 cubic feet

13. Kyle is designing a box for sugar cubes. Each sugar cube has a volume of 1 cubic inch. Kyle wants to have 12 cubes in each layer. If he wants to fit 60 cubes in each box, how tall should the box be?

14. Jen uses centimeter cubes to make a bed for her doll. The bed is in the shape of a rectangular prism. She wants the length of the prism to be 15 cm. The width should be 5 cm and the height 5 cm. How many centimeter cubes does Jen need?

15. The volume of a rectangular prism is 40 cubic feet. The height of the prism is 10 feet. What is the area of the base of the prism? **Explain**.

16. Adayn stores his favorite CDs in a box like the one shown below. What is the volume of the box?
   a. 750 cm^3
   b. 150 cm^3
   c. 1,050 cm^3
   d. 1,150 cm^3

7 cm
10 cm
15 cm
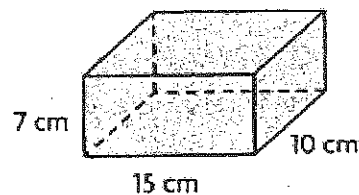
17. Golf balls are packed in cardboard boxes that are 2 inches long, 2 inches wide, and 2 inches tall. The boxes are then packed into larger container that are 20 inches long, 30 inches wide, and 20 inches tall. How many golf balls can fit in the larger container?

20 in.

2 in.

30 in.

20 in.
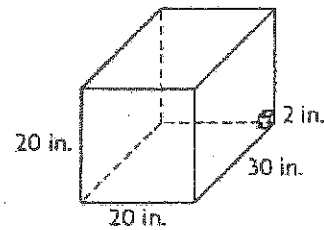
18. Mallorie packs two small suitcases each with a length of 2 feet, a width of 2 feet, and a height of 1 foot. What is the difference between their combined volume and the volume of one large suitcase with a length of 4 feet, a width of 3 feet, and a height of 2 feet?

   a. 20 cubic feet
   b. 16 cubic feet
   c. 19 cubic feet
   d. 14 cubic feet

19. Griffin measured his aquarium using a small fish food box. The box has a base area of 6 inches and a height of 4 inches. Griffin found that the volume of his aquarium is 3,456 cubic inches. How many boxes of fish food could fit in the aquarium? **Explain** your answer.

20. Jason has forty 1-centimeter cubes. He builds a rectangular prism with 6 cubes in the bottom layer. He wants to have the fewest cubes left over. How many layers can Jason make?