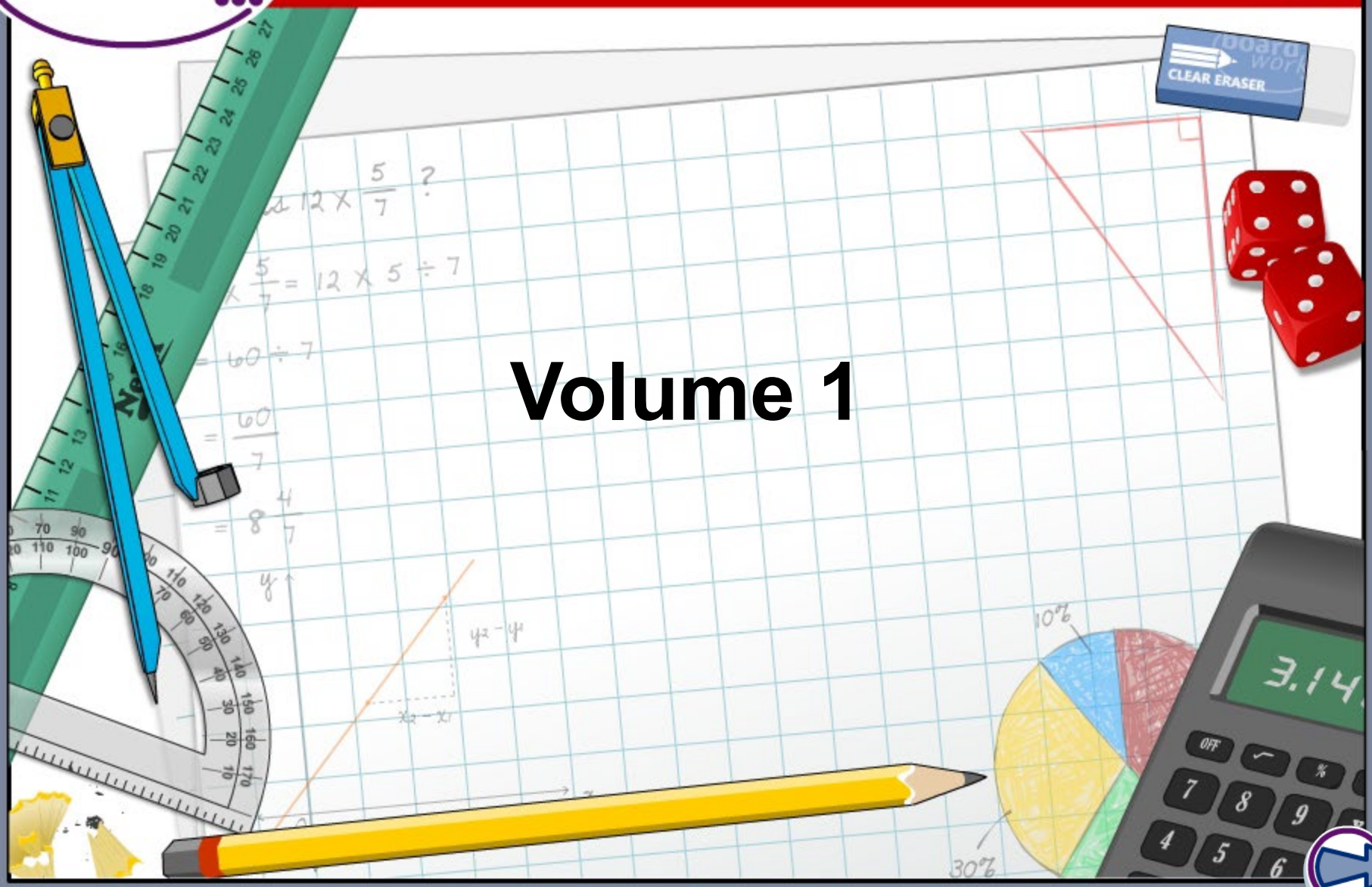


Volume 1

Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

8) Look for and express regularity in repeated reasoning.

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

Volume

The amount of space that a three-dimensional object takes up is called its **volume**.

Volume is measured in cubic units.

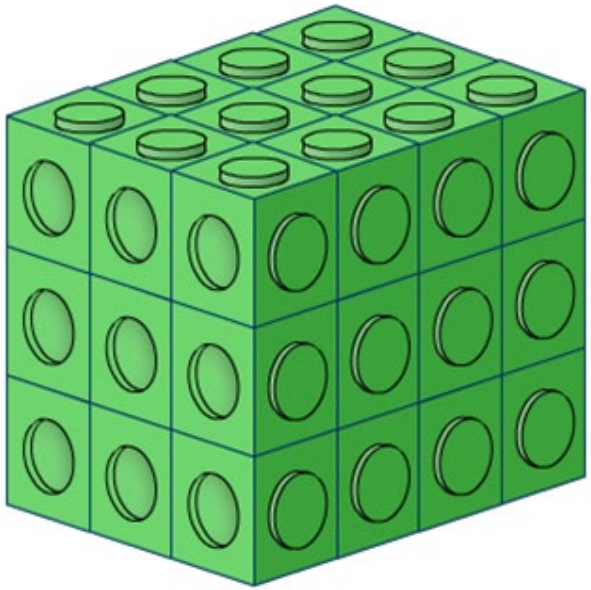
We can use $in.^3$, ft^3, yd^3, mi^3, mm^3, cm^3, m^3 or km^3.

The ^{3} tells us that there are three dimensions–length, width and height.

Liquid volume or **capacity** is measured in milliliters, liters, fluid ounces, pints or gallons.

Volume of a rectangular prism

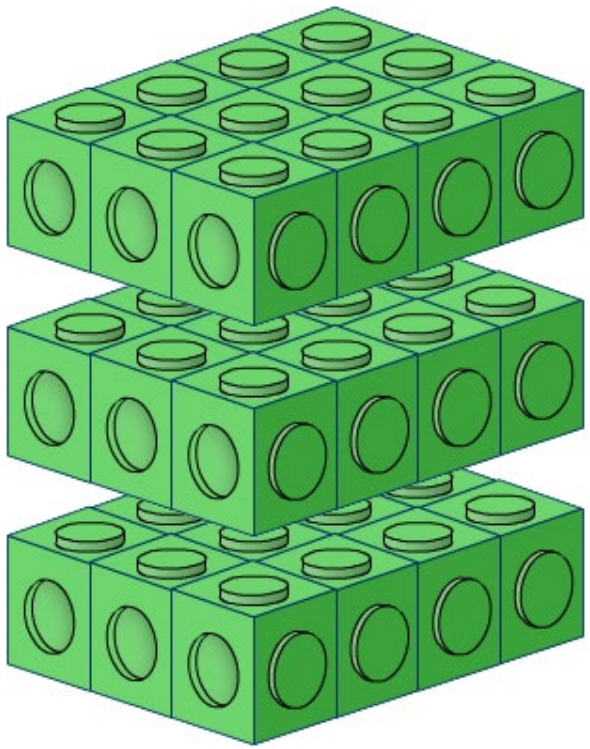
The following prism is made out of interlocking cubes.



How many cubes does it contain?

Volume of a rectangular prism

One way to figure this out is to divide the prism into layers.



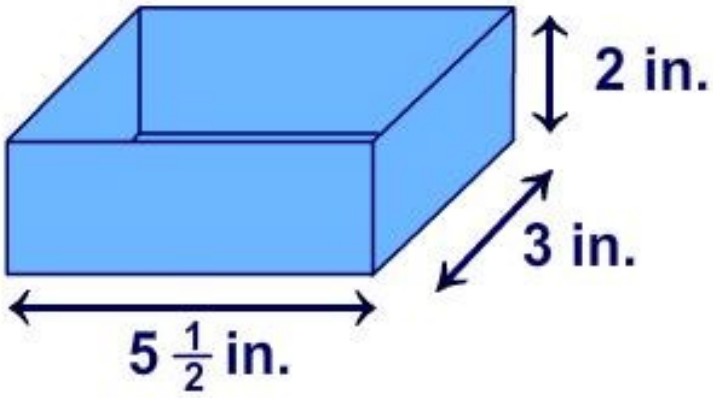
The number of cubes in each layer can be found by multiplying the number of cubes along the length by the number of cubes along the width.

3 × 4 = 12 cubes in each layer

There are three layers altogether, so the total number of cubes in the prism = 3 × 12 = **36 cubes**.

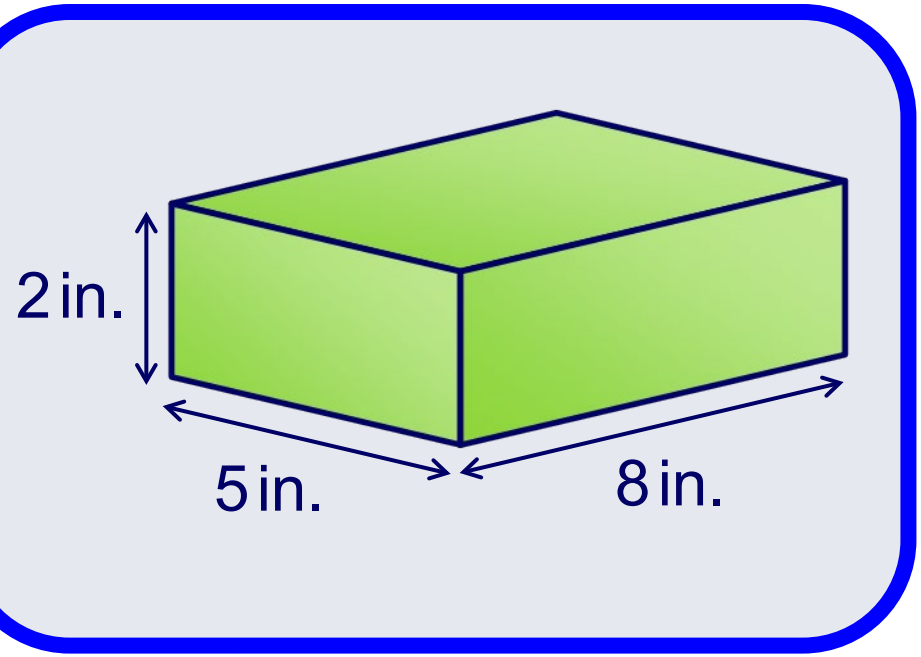
Methods of finding volume

How many unit cubes would fit inside this box?



Volume of a rectangular prism

Kimberly is taking fudge to a class party, and she needs to know how many pieces will fit in this box. If each piece of fudge is a 1-inch cube, how many can she take?



How many layers could she fit into the box? **2 layers**

How many pieces would fit in each layer?

$5 \times 8 =$ **40**

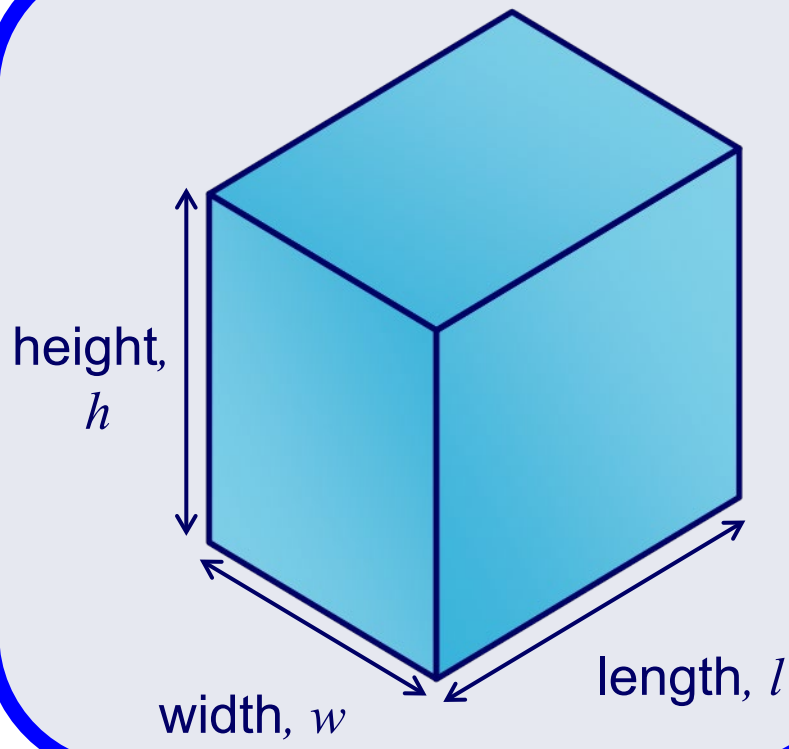
How many pieces would fit into the box in total?

$40 \times 2 =$ **80**

She could take **80** pieces of fudge to the party.

Volume of a rectangular prism

Can you think of a formula we could use to find the volume of a rectangular prism?



Area of the base × height

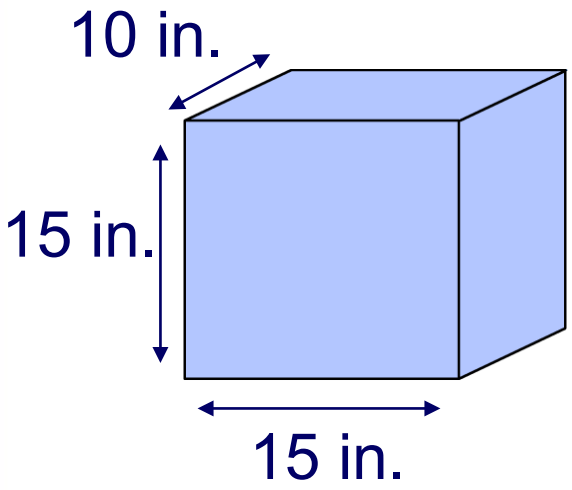
The area of the base
= length × width

So:

Volume of a rectangular prism
= length × width × height
= lwh

Comparing volumes

These boxes cost the same amount. Which one would give a greater volume for the same price?



Box A

Volume of Box A

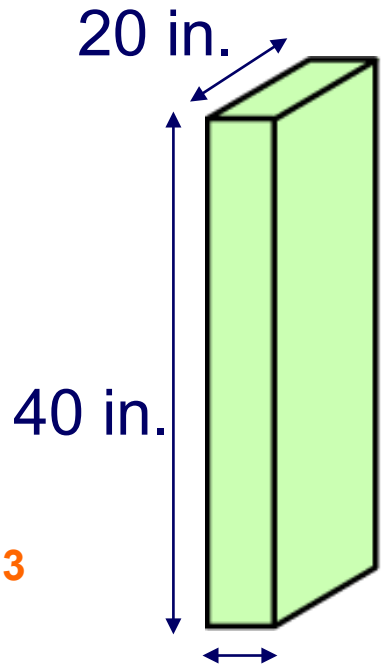
$V = lwh = 10 \times 15 \times 15$

$= 2250 \text{ in.}^3$

Volume of Box B

$V = lwh =$

$20 \times 2\frac{1}{2} \times 40 = 2000 \text{ in.}^3$

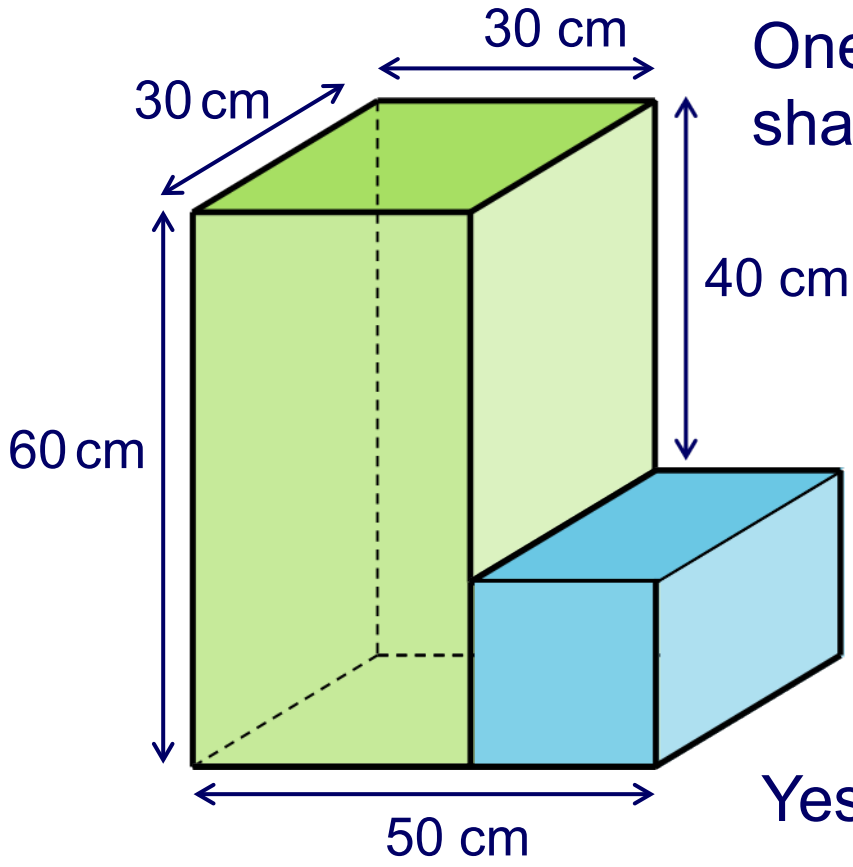


Box B

Box A would give you a larger box for the same price.

Volume of a complex prism

Josh needs to take this box on an airplane. If the size limit is 80,000 cm^3, will he be able to take the box?



One way to find out is to think of the shape as two prisms joined together.

Volume of the green prism
$= 60 \times 30 \times 30 = 54000\ cm^3$

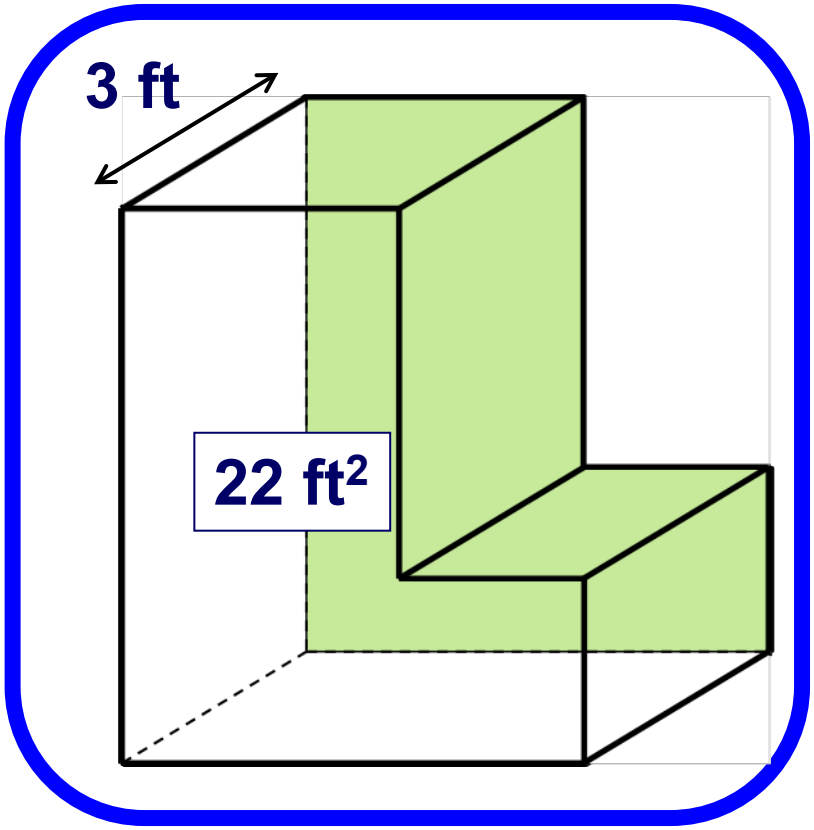
Volume of the blue prism
$= 30 \times 20 \times 20 = 12000\ cm^3$

Total volume
$= 54000 + 12000 =$ **66,000 cm^3**

Yes, he will be able to take the box.

Volume of a complex prism

A prism is a 3-D shape with the same cross section throughout its length.



We can think of this prism as lots of L-shaped surfaces running along the length of the shape.

Volume of a prism

= area of cross section × length

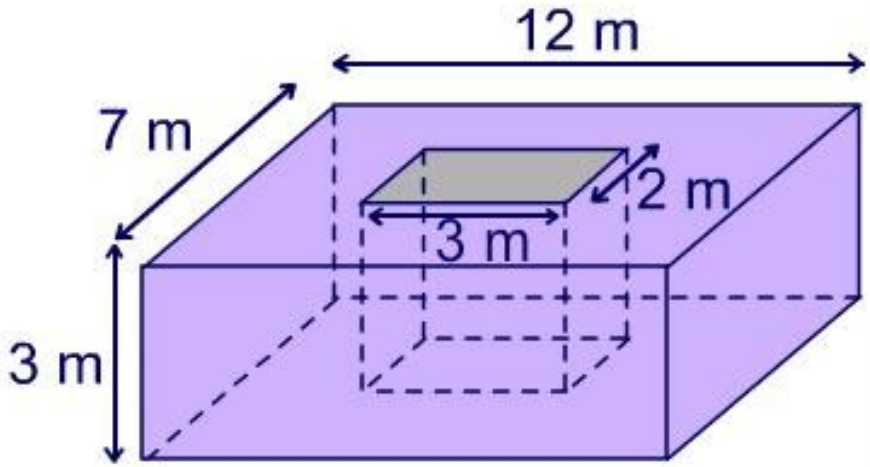
If the cross section has an area of 22 ft² and the length is 3 ft:

Volume of L-shaped prism =

22 × 3 = **66 ft³**

Volume of a prism

Monique's basement, and the pillar in the center, have the measurements shown below. How many cubic meters of storage space does she have?



Volume of a prism

Can you solve these problems using volume?

Press **"start"** to begin.

start