Study the following.

volume (definition 1) (**vol**-yuhm) - a measure of how much space is in the inside of a solid figure. It is a measure of three-dimensional space. (The volume of the box is a measure of the space inside the box.)

unit cube (**yoo**-nit **kyoob**) - a cube that has all sides one unit long. One unit means one inch, one cm, one foot, etc. (The child's wooden alphabet block was a unit cube because it was one inch on all sides.) (The sugar cube was a unit cube because it was one centimeter on all sides.)

volume (definition 2) – the number of unit cubes that fit into the space on the inside of a solid. (The number of unit cubes that fit into the box was 75 so the volume was 75.)

$inches^3$ – the small 3 is called the exponent and means "cubed".

cube (**kyoob**) – the word cube refers to the solid called a cube. It also refers to the exponent of a 3 for the units for volume. (The volume was 27 $cm^{3(\textbf{cubed})}$ so 27 unit **cubes** fit into the space.)

V – a capital V stands for volume.

Say each word out loud and write it in the blank.

volume_____
cube_____

Write each definition in your own words.

volume (definition 1)

unit cube

volume (definition 2)

cube

Write two sentences using each word.

volume (the first definition)
1.

2.

volume (the second definition)
1.

2.

unit cube
1.

2.

cube
1.

2.

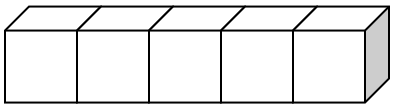
Matching.

volume	a measure of how much space is inside a solid
unit cube	the number of unit cubes that fit into the space inside a solid.
volume	A cube that has all sides one unit long
^{3}	the exponent, and means “cubed”
cube	volume
V	refers to a solid. It also refers to the exponent of a ^{3}.

Study the following.

One way to find the volume is to count the cubes that fit into the solid.

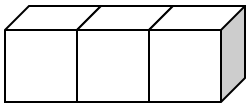
Example: What is the volume if each cube is in cm on all sides?



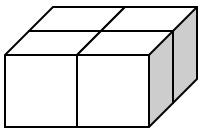
There are 5 cubes, so the volume $V = 5\ cm^3$.

Find the volume if each cube is one centimeter on all sides. Remember to include the units in your answer.

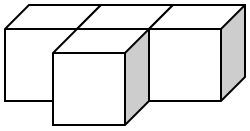
1. V = _____



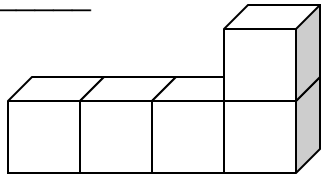
2. V = _____



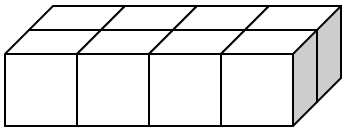
3. V = _____



4. V = _____



5. V = _____



Fill in the blanks.

If the units for volume are inches^3, then the unit cube is _____ on each side.

If the units for volume are feet^3, then the unit cube is _____ on each side.

If the units for volume are meters^3, then the unit cube is _____ on each side.

If the units for volume are centimeters^3, then the unit cube is _____ on each side.

Study the following.

The units for volume can be written three ways.

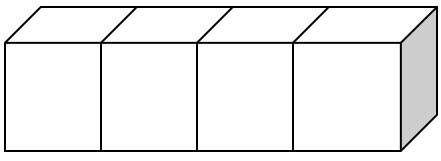
units^3 can also be written **cubic units**, or **units cubed**.

Example: **inches^3** can be written **cubic inches** or **inches cubed**.

Find the volume and write the units three different ways.

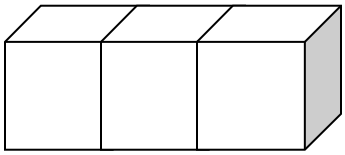
1. V = _____
   V = _____
   V = _____

One cube is 1 foot on each side.



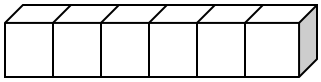
2. V = _____
   V = _____
   V = _____

One cube is 1cm on each side.



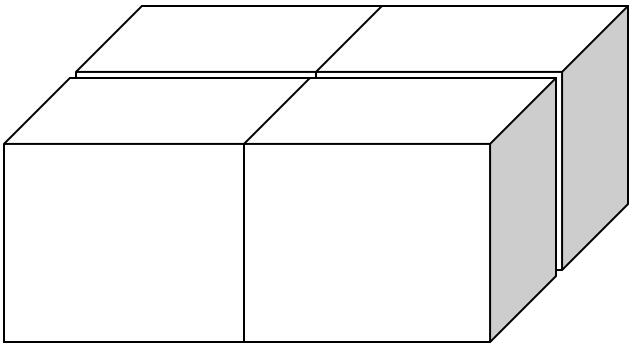
3. V = _____
   V = _____
   V = _____

One cube is 1 yard on each side.



4. V = _____
   V = _____
   V = _____

One cube is 1 inch on each side.

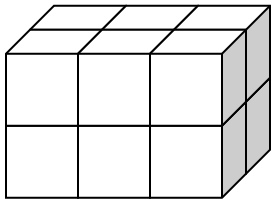


Study the following.

To find the area of a box shaped solid (a cube, a square prism, or a rectangular prism) you can multiply instead of adding up all the unit cubes.

You first multiply the length times the width of the bottom layer. Then you multiply that by the height.

Example: Find the volume if each cube is one inch on all sides.

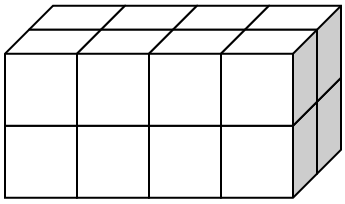


Bottom layer: Multiply length (3) times width (2) = 6. This gives you 6 unit cubes on the bottom layer.

Then multiply 6 times the height (2) to get 12. This gives you the unit cubes on all the layers. The answer is V = 12 inches^3.

Find the volume using multiplication.

1. V = _____

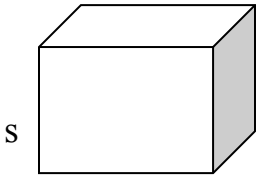


each cube is one cm on each side.

Study the following.

The following shows how to label cubes and box shapes (square or rectangular prisms) with their dimensions.

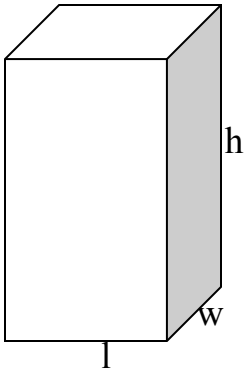
Cube



s = side
Since all sides are the same, only one is labeled.

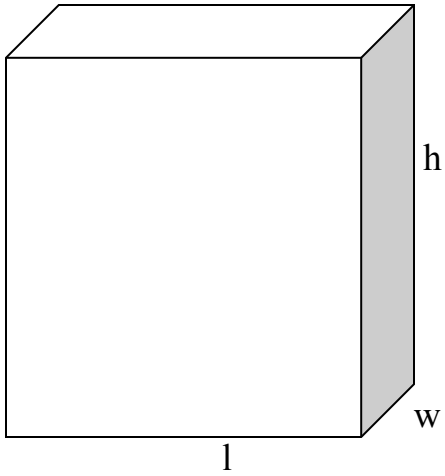
Square prism

l = length
w = width
h = height



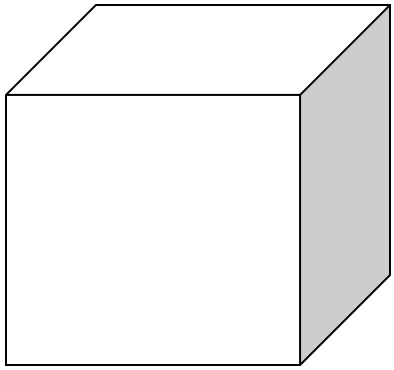
Rectangular prism

l = length
w = width
h = height

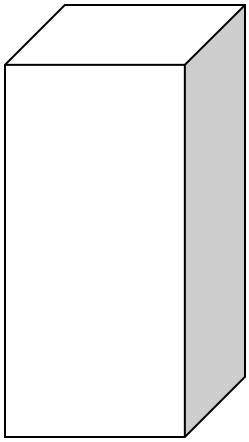


Label the following with their dimensions.

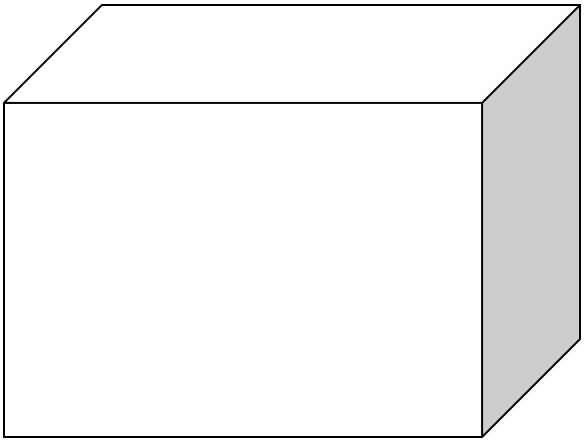
1. cube



2. square prism



3. rectangular prism



Study the following.

The formulas for volume for cubes, square prisms, and rectangular prisms are as follows.

Cube	$V = s^3$
Square prism	$V = l \times w \times h$
Rectangular prism	$V = l \times w \times h$

Notes on using these formulas.

A number cubed means multiply the number times itself and then times itself again.
Examples: s^3 means $s \times s \times s$
4^3 means $4 \times 4 \times 4$

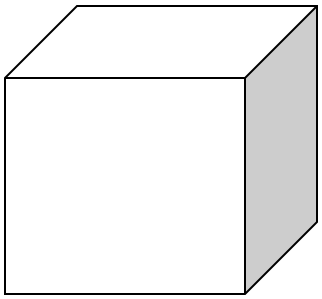
You can multiply in any order.
Example: $2 \times 3 \times 4$
Multiply 2×3 first $= 6 \times 4 = 24$
Or multiply 3×4 first $= 2 \times 12 = 24$
Or multiply 2×4 first $= 8 \times 3 = 24$

Fill in the blanks.

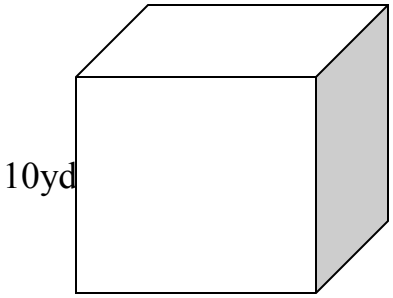
1. 3^3 means _____ and = _____.
2. $4 \times 2 \times 6$ = _____
3. 2^3 means _____ and = _____.
4. the formula for volume of a cube is _____
5. the formula for volume of a rectangular prism is _____.

Use the formula to find the volume of the cubes.

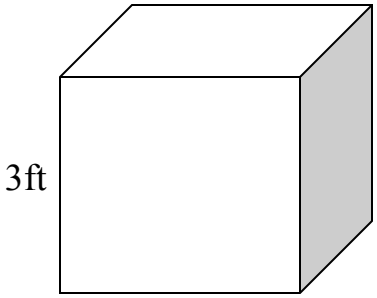
Example: s = 2
The formula for volume is
$V = s^3$
Substitute in the 2 for the s
$V = 2^3$
$V = 2 \times 2 \times 2$
$V = 8\ cm^3$



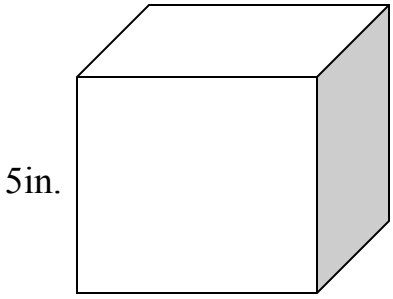
1. V = _____



2. V = _____

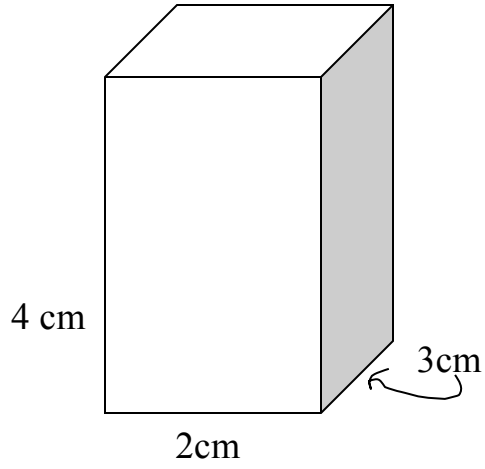


3. V = _____

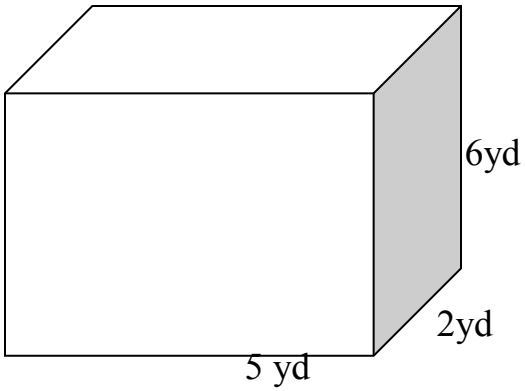


Use the formula to find the volume of the prisms.

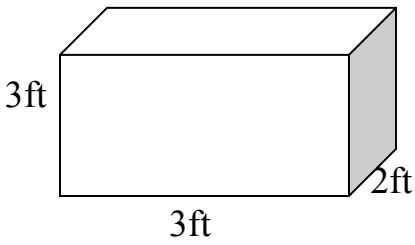
Example: l = 2, w = 3, h = 4
The formula for volume is
$V = l \times w \times h$
Substitute in the 2 for the l,
The 3 for the w,
And the 4 for the h.
$V = 2 \times 3 \times 4$
$V = 24\ cm^3$



1. V = _____



2. V = _____



3. V = _____