Unit 6 Parent Guide

Lesson 1—What is Volume?--Helpful Hints

*In today's lesson students will review volume and surface area. They will review how to represent volume and surface area, how to find volume and surface area and will also explore the difference between volume and surface area. The information and problems below will help students on their Lesson 1 homework:

Volume:

*the volume of a solid figure is the amount of space occupied by the figure.
*Volume is measured in cubic units (in^3, ft^3, m^3)
*Formula for finding Volume: V = l x w x h
*Real World Situations that show volume: the amount of sand in a sand box, the amount of peanuts in a container, the amount of water in a swimming pool.

Surface Area:

*the surface area of a solid figure is described as the total area of all the faces of a solid figure.
*Surface Area is measured in squared units (in^2, ft^2, m^2)
*Formula for finding Surface Area of a rectangular prism: SA = 2lw + 2wh + 2lh
*Real World Situations that show Surface Area: the amount of wrapping paper on a gift box, the amount of wall space in a room.

--What is the difference between volume and surface area?

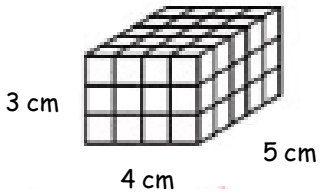
-Volume is the number of cubic units that fit INSIDE an object. Surface Area is the total area of all the flat faces.

Example 1: Finding the Volume of a rectangular prism

Step 1: Write the formula V = l x w x h

Step 2: Identify the length, width and height of the shape

Length = 4 Width = 5 Height = 3



Step 3: Plug in the numbers

V = 4 x 5 x 3

Step 4: Multiply

V = 20 x 3

V = 60

Step 5: Label the units appropriately to show the volume has been found

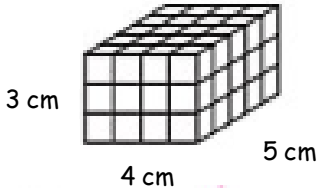
$V = 60\ cm^3$

Example 2: Finding the Surface Area of a rectangular prism

Step 1: Write the formula SA = 2lw + 2wh + 2lh

Step 2: Identify the length, width and height of the shape

Length = 4 Width = 5 Height = 3



Step 3: Plug in the numbers

SA = 2(4 x 5) + 2(5 x 3) + 2(4 x 3)

Step 4: Multiply

SA = 40 + 30 + 24

SA = 94

Step 5: Label the units appropriately to show the surface area has been found

$SA = 94\ cm^2$

*Lesson 2—Fractional Unit Cubes--Helpful Hints

*Today's learning builds off of yesterday's instruction about volume. However, in today's lesson, students will be finding the volume of rectangular prisms that have fractional or decimal values. These problems are solved the same exact way V = l x w x h it just may be that the length, width and height may be fractions or decimals. To help students with this lesson's homework, reminders for multiplying fractions and decimals are below. There is also a hint for number 8 on the homework.

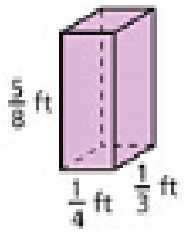
Example: Multiplying a fraction by a fraction-- $\frac{2}{3} \times \frac{3}{4}$

Step 1: Multiply straight across (numerator by numerator and denominator by denominator)

$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$ **or** $\frac{1}{2}$

Example: Volume with fractional sides

Example 1: Finding the Volume of a rectangular prism



Step 1: Write the formula V = l x w x h

Step 2: Identify the length, width and height of the shape

Length = $\frac{1}{4}$ Width = $\frac{1}{3}$ Height = $\frac{5}{8}$

Step 3: Plug in the numbers

V = $\frac{1}{4} \times \frac{1}{3} \times \frac{5}{8}$

Step 4: Multiply numerators by numerators and denominators by denominators

V = $\frac{1}{12} \times \frac{5}{8}$

V = $\frac{5}{96}$

Step 5: Label the units appropriately to show the volume has been found

V = $\frac{5}{96}$ ft³

Example: Multiplying Decimals 8.45 x 3.2 =

Step 1: Set up the problem. Reminder--when you set up a multiplication problem with decimals, the decimals DO NOT need to be lined up. The number with more digits should be placed on top:

8.45
x 3.2

Step 2: Multiply normally (you can ignore the decimals for now)

^{1}
$^{1}\not{1}$
8.45
x 3.2
$^{1\ 1}$
1690
+25350
27040

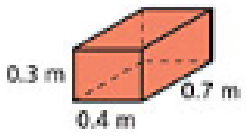
Step 3: Count how many numbers are behind the decimal in the original problem. In this example, there are 3 numbers behind the decimal (the 4, the 5 and the 2).

Step 4: Place the decimal in the answer so that there are 3 numbers behind the decimal point

27.040

Example: Volume with decimal sides

Example 1: Finding the Volume of a rectangular prism



Step 1: Write the formula V = l x w x h

Step 2: Identify the length, width and height of the shape

Length = 0.4 Width = 0.3 Height = 0.7

Step 3: Plug in the numbers
V = .4 x .3 x .7
Step 4: Multiply
V = .12 x .7
V = .084
Step 5: Label the units appropriately to show the volume has been found
V = .084 m^3

Hint for number 8: Students will need to come up with 3 fractions that have numerators that will equal 8 when multiplied and 3 denominators that will equal 100 when multiplied. Students need to come up with 2 different examples of each. For instance: I know that 2, 4 and 1 can be multiplied to make 8 so I will make them my numerators. I also know that 5, 2 and 10 can be multiplied to make 100 so they could be my denominators. ☺

*Lesson 3—Compose Rectangular Prisms with Fractional Edge Lengths--Helpful Hints

*Today students will use what they have learned about volume to solve for the missing height, width or length. Students will also continue to practice finding the volume of shapes that have fractional and decimal edge lengths. Students will need to remember how to multiply mixed numbers and fractions multiplied by whole numbers. Some reminders and examples are described below:

Example: Multiplying with a mixed number-- $\frac{1}{2} \times 2\frac{3}{5}$

Step 1: Before you can multiply, the mixed number must be changed into an improper fraction. To do this, you must take the denominator and multiply it by the whole number. Once you have that answer, you add the numerator and put the sum over the same denominator that you started with.

$2\overset{+3}{\underset{\times 5}{}}$ so... 2x5=10 and 10+3=13 so $2\frac{3}{5}$ as an improper fraction is $\frac{13}{5}$

Step 2: Multiply the two fractions straight across $\frac{1}{2} \times \frac{13}{5} = \frac{13}{10}$

Step 3: Reduce the fraction by dividing the numerator by the denominator 13÷10= $1\frac{3}{10}$

*Note: If there are 2 mixed numbers that must be multiplied together, than you must change each mixed number into an improper fraction (step 1) before multiplying (step 2)

Example: Multiplying a fraction and a whole number-- $\frac{1}{8} \times 24$

Step 1: Make 24 a fraction by placing the whole number 24 over a denominator of 1.
$\frac{1}{8} \times \frac{24}{1}$

Step 2: Multiply across. Numerator times numerator and denominator times denominator.
$\frac{24}{8}$

Step 3: When a fraction is larger on the top, this is called an improper fraction. Improper fractions must be changed to be whole numbers, mixed numbers or proper fractions. To do this take the numerator and divide it by the denominator. 24 ÷8 =3

Step 4: Record answer $\frac{1}{8} \times \frac{24}{1} = 3$

*These steps would be the same steps that you would use when multiplying two fraction amounts when calculating for volume.

*In Lesson 3, students will also learn how to use the volume in order to find one of the shape's edge length. See the story problem and the numbered steps below to help your student solve these types of problems.

Example: A storage tank in the shape of a rectangular prism has a volume of 35 m^3 and a height of 2.5 m. The length of the base of the prism is 3.5 m. What is the width of the base of the storage tank?

**We are NOT looking for the volume in this problem, we already know it…35 m^3. Instead we need to find the WIDTH of the base of the tank. To do so, we must do the inverse (opposite) operation. See below:

Step 1: Write the formula V = l x w x h
Step 2: Identify the measurements that you have
Volume = 35 Length = 3.5 Height = 2.5
Step 3: Plug in the numbers
35 = 3.5 x W x 2.5
Step 4: Multiply what you have
35 = 8.75 x W
Step 5: Solve for W by completing the inverse (opposite) operation
35 ÷ 8.75 = W
Step 6: Label the units appropriately to show the missing side length
Width = 4

*There will be a few problems like this one that students will need to complete on their homework this evening.

*Lesson 4—Volume and Prisms with Fractional Edge Lengths--Helpful Hints

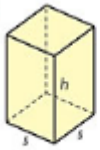
*Today, students will continue to practice finding the volume or unknown side length of prisms with fractional or decimal edge lengths. Today's lesson includes practice problems of skills previously taught in lesson 1-3. Please see other parts of this guide for help with tonight's homework.

*Lesson 5—Write and Solve Equations about Volume--Helpful Hints

*Today students will use what they know about finding the volume or missing side length of an object to help them problem solve real world situations and also write equations for volume. See the hints below for help on the lesson 5 homework.

HINTS for #1-3: These problems are simply asking for students to write an equation to represent the situation. It is not asking students to solve anything. The following problems are similar to #1-3:

8.



$V = s \cdot s \cdot h = s^2h$

In this problem, we do not actually solve anything. Instead, the equation is written to show HOW we could solve it if there were numbers rather than variables. To find the volume I would take s · s · h.

11. A rectangular prism has base of area *M* square units and is *t* units tall. Write an equation relating *M*, *t*, and *V*.

$V = Mt$

In this example, we are again not solving for anything but rather, showing HOW we would solve it. Since the base AREA of M (that is length x width) then all I have left to multiply is t in order to find the volume.

HINTS for #4-8: These problems call for students to do some critical thinking and problem solving. Encourage your student to draw a picture, make a list or diagram to help them think through the problem. All of the problems are multi-step and so drawing a picture, diagram or list could be very beneficial in order to organize all of the information that you have.