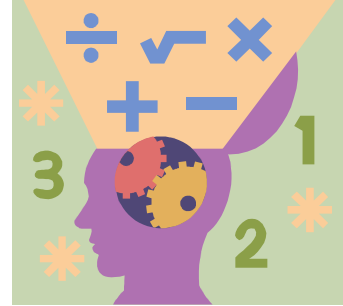# Algebra/Geometry Institute Summer 2009

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**School: H. W. Solomon Middle School**
          **Greenville, MS**

**Grade Level:  8th**

## 1. Teaching objective(s)

Mississippi Mathematics Framework- 4c  The student will use formulas and or appropriate measuring tools to find the volume of figures.
This lesson:  The student will use a formula to find the volume of rectangular prisms.

## 2.  Instructional Activities

### Introduction/Guided Practices

- Bell Ringer:  Students take a few minutes to brainstorm and jot down what they think volume means.  * After the allotted time is over, the teacher will ask for volunteers to discuss their interpretation of volume. (Many of student's responses will correspond to volume as "loudness", like turning up the volume of the radio.) The teacher will write several responses on the board and discuss them with the class.  Ask students, "Do they know the song, "*Rock the Boat"* or "*One in a Million"* by the singer Aaliyah?" Wait on responses and discuss. For those students who are not familiar with the famous artist, the teacher will allow the students to listen to a sample of the artist's music. Teacher will elaborate on Aaliyah's death, by plane crash, explaining how volume, as it relates to mathematics, played a major role in her death.

- Ask students, "Why should we learn about volume?" Teacher will wait on responses and discuss.
- Say, "We need to learn about volume because when we are packaging or bagging assorted items, the space or volume the items occupy must be considered."
- Ask students, "What is volume?" Teacher will allow volunteers to give their response based on what was discussed previously.  Teacher will then give the meaning of volume as it pertains to mathematics.  Say, "Volume is the measure of the inside region of a solid figure and is measured in cubic units."  Tell students in simpler terms, volume is the number of cubic units needed to fill a space.
- Ask students, "What has volume?" Teacher will call on volunteers to give examples of items that have volume.  "How do we use volume?"  Teacher will call on volunteers to give examples of how we use volume daily.  Teacher will

give and petition for examples from student (Examples:  a packed suitcase, a bottle of water, a can of fruit.)

- Say, "Volume applies to a number of figures but today we will only discuss it in relation to the rectangular prism."
- Ask students, "How can we determine volume?"  Tell students to look at and examine the shoe box.  Ask students, "Can they think of a way we can determine the volume of the box?" Discuss responses.  Tell the students we will pack the shoe box with 1"in. cubes to determine the volume. Tell students the number of cubes used to pack the box is the volume of the box. Tell students we can also determine the volume of an object by using a formula.  The formula for volume of a rectangular prism is $V=lwh$, where l is the length, w is the width and h is the height (depth).

length

width
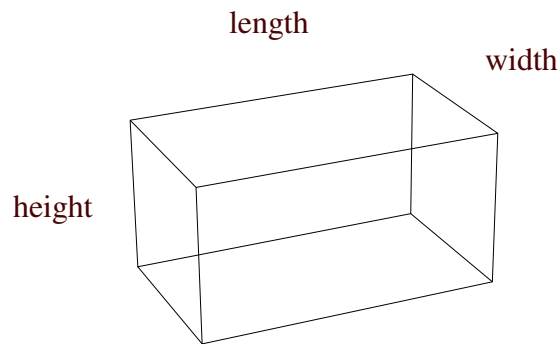
height

- Tell students we will draw a rectangular prism together.  Say, "On the graph paper draw a rectangle that is 8 squares long and 4 squares high."  Ask students, "Are 4 squares our length or our height?" Wait on response and discuss to clear up any misconceptions the students may have. Tell students to find the center of the rectangle.  Tell students to start at the center of the first rectangle and draw another rectangle that is 8 squares long and 4 squares high.  Inform students the rectangles will intersect or overlap one another.  Say, "Connect the upper left corner of the first rectangle to the upper left corner of the second rectangle."  Tell students to repeat this process with the remaining three corners.  Say, "This is our finish product and it is a rectangular prism."  Clear up any misconceptions the students may have.  Teacher will model drawing the rectangular prism as the directions are given.
- Say, "Let's use the formula for the volume of a rectangular prism in the following examples."

Example 1

length 5cm        height 3cm
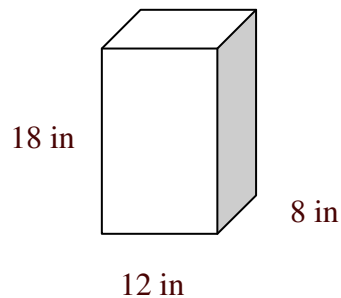
width 3cm
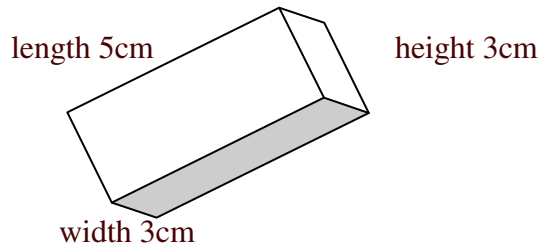
Volume=lwh

V= 5cm*3cm*3cm

V=45cm$^3$

- Say, while pointing to the cm$^3$, "How did we get this?" Wait on responses. Discuss with the students that we obtained this cubic unit because we are multiplying three units of centimeters.  *Remind students that volume is always measured in cubic units

- Say, "Let's try one more."

Example 2

18 in

8 in

12 in

V=lwh

V=12in*8in*18in

V=96in$^2$*18in

V=1728in$^3$

Teacher will observe and probe the students with questions to check for understanding.

## Independent Practices

- Say, "Let's try these fun activities."

Activity 1
- Say, "Using clay, you will make a model of a circle. You will then reshape the circle into a rectangular prism. You will then find the volume of your rectangular prism to the nearest centimeter by measuring the sides with a ruler and calculating the volume."  Tell students that no two prisms in the class will be the same because each of one of them will shape and pack the clay differently.
- Say, "Does everyone understand the directions? Are there any questions?"

Teacher will monitor students' progress and provide assistance when needed. When the students are finished the teacher will allow volunteers to come, show and discuss their findings with the class.

Activity 2
- Say, "Let's try another activity. You will work in pairs at your table. How many is a pair?" Wait on response.
- Say, "One of each of the pair of students will draw a number from the jar. The number drawn is the volume of your group's figure. Using colored tiles/blocks, you are to construct a model that matches the volume you pulled. No pair's model may look the same and you may help your teammate. Once everyone is done we will share with the class. Are there any questions? Does everyone understand?" Wait on response and elaborate if needed. Give students time to build and then let the pairs share with the class.

## Closure

- Ask, "What is volume as it pertains to mathematics?"
- Say," The formula for volume is_____ (length, times width times height)."
- Say, "Volume is always measured in _____ (cubic units)." Wait on responses
- Ask, "What did you enjoy most about today's lesson?"

## 3 Materials and Resources

**Materials**    Colored 1 inch cubes    Shoe box
Rulers    Clay
CD Player    Aaliyah's CDs
Jar    Numbered pieces of paper
Graph paper

**Resource**s    Charles, Randall. *Mississippi Transition to Algebra*. Prentice Hall. 2009. Pgs. 379-384.
Grober, Keith. *Mississippi MCT2 Coach Gold Edition*, Grade 7. Triumph Learning. 2008, Pgs. 164-169.
Grober, Keith. *Mississippi MCT2 Coach Gold Edition*, Grade 8. Triumph Learning. 2008, Pgs. 152-157.
http//.www.edhelper.com

## 4    Assessment

Teacher observations
Student questions and participation
Assessment (Attachment 1)
Assessment Key (Attachment 2)

Assessment

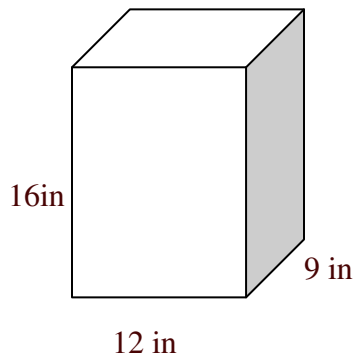Directions: Read each problem carefully.  Answer each question. Show your work.

1.  A refrigerator is 30 inches wide, 30 inches deep and 5 feet 6 inches tall.  Which is closest to the volume of the refrigerator in cubic feet?

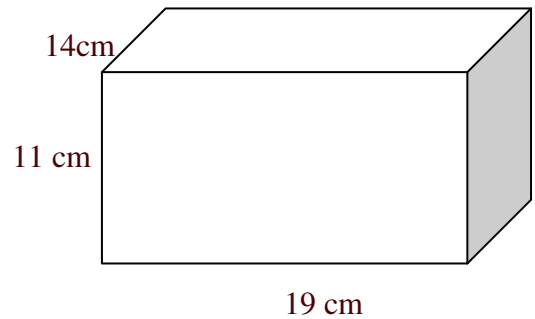a. 10.5 ft$^3$     b. 34ft$^3$          c. 55ft$^3$          d. 75ft$^3$

2.  Carrie has a box that is shaped like a rectangular prism.  It is 12 inches long, 8 inches wide and 10 inches high.  Draw and label the figure. What is the volume of the box?

3.  Calculate the volume of the figures below.

A.

16in

12 in

9 in

B.

14cm

11 cm

19 cm

4.  In your own words, write the meaning of volume as it relates to mathematics.

_____

_____

5.  What is volume always measured in?  _____

Assessment Key

Directions: Read each problem carefully.  Answer each question. Show your work.

1.  A refrigerator is 30 inches wide, 30 inches deep and 5 feet 6 inches tall.  Which is closest to the volume of the refrigerator in cubic feet?

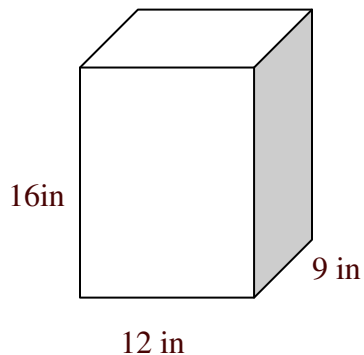a. 10.5 ft$^3$      b. 34ft$^3$          c. 55ft$^3$           d. 75ft$^3$

   30 inches = 2 feet 6 inches = 2.5 feet
   5 feet 6 inches = 5.5 feet
   Volume = (2.5)(2.5)(5.5)= 34.375 ft$^3$

2.  Carrie has a box that is shaped like a rectangular prism.  It is 12 inches long, 8 inches wide and 10 inches high.  Draw and label the figure. What is the volume of the box?
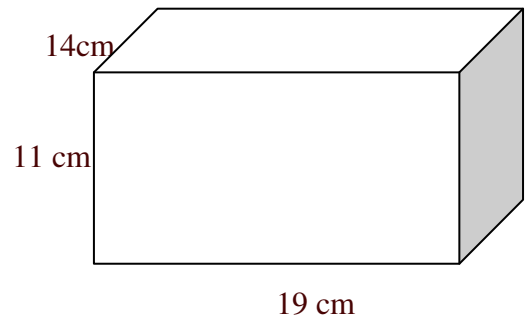
Drawings will vary.  Volume is 960 in$^3$.

3.  Calculate the volume of the figures below.

A.

16in

9 in

12 in

Volume is 1728 in$^3$

B.

14cm

11 cm

19 cm

Volume is 2926 cm$^3$

4.  In your own words, write the meaning of volume as it relates to mathematics.
Answers will vary

5.  What is volume always measured in?  cubic units