

# Volumes of Musical Math

*Fifth Grade + Math and Music*

## CORE SUBJECT AREA

Math

## ART FORM + ELEMENTS

Music

Expression

## MSCCR STANDARDS

CCSS.MATH.CONTENT.5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

CCSS.MATH.CONTENT.MD.C.3.A. A cube with side length 1 unit, called “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.

CCSS.MATH.CONTENT.5.MD.C.4. Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and improvised units.

## MSCCR CREATIVE STANDARDS

MU:Pr4.3.5.a Demonstrate and explain how intent is conveyed through interpretive decisions and expressive qualities such as dynamics, temp, timbre, and articulation/style.)

## DURATION

60 minutes

## OBJECTIVE

TSW measure the volume of solid figures by counting unit cubes.

TSW demonstrate dynamics of volume in music by creating a cubic representation.

## MATERIALS NEEDED

Cube block manipulatives

Paper

Pencil

Container with numbers 1-30 written on slips of paper

Chart that displays what level of volume each number of cubes stands for

## VOCABULARY

Volume (mathematics)

Volume (music)

Expression

Piano

Forte

Fortissimo

Mezzo-forte

Mezzo-piano

Pianissimo

## RECOMMENDED RESOURCES

Overhead projector

Cubic figure example found at

<https://www.opened.com/homework/5-md-4measurevolumes-by-counting-unit-cubes-using-cubic-cm/3691266>

Loud orchestra music found at <https://www.youtube.com/watch?v=Z4TEcMaEgcs>



MISSISSIPPI STATE UNIVERSITY  
MERIDIAN



Soft orchestra music found at  
<https://www.youtube.com/watch?v=Lr7pENHcoXg>

Volume of music video found at <https://www.youtube.com/watch?v=VIETXp--5pY>

## LESSON SEQUENCE

### Introduction

- TTW begin by asking the students “what are some things that contain volume?”
  - TSW offer various answers.
- TTW explain to the students that volume is the total space taken up by the length, width, and height of an object.
  - TTW explain that volume gives depth to objects that would otherwise be flat.
- TTW display the second cubic figure found at <https://www.opened.com/homework/5-md4-measure-volumes-by-counting-unit-cubes-using-cubic-cm/3691266>.
  - TTW explain to the students that this figure does not have an equal height or length throughout the entire figure, and therefore, one cannot multiply to find the answer.
  - TTW asks the students some ways they could find the volume of this figure instead.
- TTW explain to the students that they can find the volume of the figure by counting the number of one-inch cubes that the figure is made up of.
- TT and the student will work together to calculate the area of the figure.
  - TTW guide the students in determining the length and width of each level and multiplying to find each level’s volume, then adding the different levels to discover the final volume of the figure.

### Transition

- TTW explain to the students that music also contains volume.
  - TTW explain to the student that volume is the dynamics of sound in music, such as how loud or soft the music is.
  - TTW explain to the students that volume in music adds depth to a piece of music by affecting a listener’s emotions, just like 3D volume adds depth to an otherwise flat shape.
  - TTW explain that volume is part expression in music.
- TTW play the music clip found at <https://www.youtube.com/watch?v=Z4TEcMaEqcs> to the students.
  - TTW explain to the students that this music starts out soft but progresses to being loud.
  - TTW also explain that this music is forte, which is when music is of a loud dynamic.
  - The teachers and the students will discuss the emotions they felt when listening to the loud piece of music.

- TTW play the music clip found at <https://www.youtube.com/watch?v=Lr7pENHcoXg> from around 0:00-1:00.
  - TTW explain to the students that this music is piano, which is music that has a soft volume.
- TTW play the video found <https://www.youtube.com/watch?v=VIETXp> from 0:00 until 3:00 to familiarize the students with the six basic volume levels.
- TTW explain that volume in music is similar to volume of 3D figures because, as volume in music increases, the music gets louder, just like size increases as the volume of a 3D figure increases.

## Description

- TTW display a chart with the different levels of volume written on them.
  - Each level of volume will have a different numerical value that it represents.
  - The levels will be represented as the following:
    1. Fortissimo = 26-30
    2. Forte = 21-25
    3. Mezzo-forte = 16-20
    4. Mezzo-piano = 11-15
    5. Piano = 6-10
    6. Pianissimo = 0-5
- TTW break the students into pairs of two.
  - TTW bring around a container with the numbers 1-30 written on slips of paper inside it.
  - Each student will choose a number.
- TTW distribute cube block manipulatives to the student.
  - TSW turn away from their partner and will use their cubes to represent the volume level that they selected from the container.
  - TSW determine which musical dynamic the volume level represents (es. If TS drew number 17, their creation would represent mezzo-forte).
  - TSW have ten minutes to complete this activity.
- TSW turn back to their partners.
  - TSW use the cube counting method TT modelled on the board to determine what the volume their partner's creation is.
  - TSW use paper and pencil to work out the different steps.
  - TSW tell their partner what dynamic of volume their creation represent.
- As the students tell their partner the level of volume their cubes represent, they will say it in a voice that reflects that level of volume (ex. If a student's cube represents forte, TS will say "forte!")

## SOURCES

- Cubic figure example found at <https://www.opened.com/homework/5-md-4-measurevolumes-by-counting-unit-cubes-using-cubic-cm/3691266>
- Loud orchestra music found at <https://www.youtube.com/watch?v=Z4TEcMaEcs>
- Soft orchestra music found at <https://www.youtube.com/watch?v=Lr7pENHcoXg>
- Volume of music video found at <https://www.youtube.com/watch?v=VIETXp--5pY>