Measurement – Area, Surface Area & Volume

National Standards

Instructional programs for Measurement grades 6th-8th should enable all students to:

- Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.

Common Core State Standards

CCSS.MATH.CONTENT.6.G.A.2

Geometry, Grade 6 - Solve real-world and mathematical problems involving area, surface area, and volume.

Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

CCSS.MATH.CONTENT.7.G.B.6

Geometry, Grade 7 - Draw construct, and describe geometrical figures and describe the relationships between them

Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms

21st Century Skills

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Learning and Innovation Skills
Critical Thinking and Problem Solving

- Exercising sound reasoning in understanding
- Understanding the interconnections among systems
- Framing, analyzing and synthesizing information in order to solve problems and answer questions

Life and Career Skills
Initiative & Self-Direction

- Defining, prioritizing and completing tasks without direct oversight
- Utilizing time efficiently and managing workload

Leadership & Responsibility

- Using interpersonal and problem-solving skills to influence and guide others toward a goal

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Objective	*In this activity students will study measurement, rounding to the nearest centimeter, and find the area, surface area, and volume of a Rubik's Cube.*

Materials

1 for each student or small group of students
- Rubik's Cube
- Calculators
- Centimeter Rulers

1 for each student
- Measurement Activity Sheet

Procedure

1. Divide class into groups of three and distribute rulers, calculators, and activity sheets.

2. Review the concepts of surface area, volume, and measuring to the nearest centimeter.

3. Each group will measure the dimensions of their Rubik's Cube to the nearest centimeter and calculate the volume and surface area of the cube by completing the activity sheet.

Notes to Teacher

- This lesson will take approximately one 45-minute class period.

- Students who finish early and seek a challenge can convert their answers from cm² to in².

Measurement Lesson

Name_____Date_____

SECTION I - DIRECTIONS

Use a centimeter ruler to find the following measurements of your Rubik's Cube. Round the measurements to the nearest centimeter. Next convert the centimeter measurement to inches. **Remember there are 2.54 cm in 1 in.**

HEIGHT: _____ cm = _____ in

WIDTH: _____ cm = _____ in

LENGTH: _____ cm = _____ in

SECTION II - DIRECTIONS

Use the measurements of your Rubik's Cube to calculate the volume of the cube. Volume is found by multiplying the HEIGHT x WIDTH x LENGTH.

The **volume** of the Rubik's Cube is: _____ cubic centimeters (cm³).

SECTION III - DIRECTIONS

To find the area of each face, multiply the length and the width of each face. Then, find the surface area of your Rubik's Cube by adding the areas of the six faces.

Area of Front:_____ cm²   Area of Back:_____ cm²

Area of Right Face:_____ cm²   Area of Left Face:_____ cm²

Area of Top:_____ cm²   Area of Bottom:_____ cm²

The **total surface area** of my Rubik's Cube is _____ cm².

SECTION IV - CHALLENGE

Convert the area of each face from cm² to in². Use the scale 2.54 cm in 1 in

How many cm² are in one in²?   _____ in²

The area of one of the faces is   _____ in²

Therefore, the surface area of the cube is   _____ in²

What would be the **volume** of the Rubik's Cube, in cubic inches?   _____ in³

KEY

Name_____Date_____

SECTION I - DIRECTIONS

Use a centimeter ruler to find the following measurements of your Rubik's Cube. Round the measurements to the nearest centimeter. Next convert the centimeter measurement to inches. **Remember there are 2.54 cm in 1 in.**

HEIGHT: _5.7_____ cm = _2.24 or 2.2_____ in

WIDTH: _5.7_____ cm = _2.24 or 2.2_____ in

LENGTH: _5.7_____ cm = _2.24 or 2.2_____ in

SECTION II - DIRECTIONS

Use the measurements of your Rubik's Cube to calculate the volume of the cube. Volume is found by multiplying the HEIGHT x WIDTH x LENGTH.

The **volume** of the Rubik's Cube is: _____185.193 or 185.2_____ cubic centimeters (cm³).

SECTION III - DIRECTIONS

To find the area of each face, multiply the length and the width of each face. Then, find the surface area of your Rubik's Cube by adding the areas of the six faces.

Area of Front: ___32.49 or 32.5___ cm²   Area of Back: ___32.49 or 32.5___ cm²

Area of Right Face: ___32.49 or 32.5___ cm²   Area of Left Face: ___32.49 or 32.5___ cm²

Area of Top: ___32.49 or 32.5___ cm²   Area of Bottom: ___32.49 or 32.5___ cm²

The **total surface area** of my Rubik's Cube is ___194.94 or 195___ cm².

SECTION IV - CHALLENGE

Convert the area of each face from cm² to in². Use the scale 2.54 cm in 1 in

How many cm² are in one in²?   ___6.4516___ in²

The area of one of the faces is   ___5.04___ in²

Therefore, the surface area of the cube is   ___30.24___ in²

What would be the **volume** of the Rubik's Cube, in cubic inches?   ___128.02___ in³