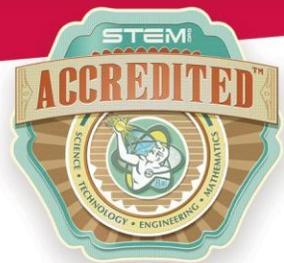


# Measurement – Area, Surface Area & Volume



## 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.

## Texas Essential Knowledge & Skills (TEKS)

### Math 6.8 C-D - Expressions, equations, and relationships.

*The student applies mathematical process standards to use geometry to represent relationships and solve problems. The student is expected to:*

- (C) write equations that represent problems related to the area of rectangles, parallelograms, trapezoids, and triangles and volume of right rectangular prisms where dimensions are positive rational numbers; and
- (D) determine solutions for problems involving the area of rectangles, parallelograms, trapezoids, and triangles and volume of right rectangular prisms where dimensions are positive rational numbers.

### Math 7.9 A, D - Expressions, equations, and relationships.

*The student applies mathematical process standards to solve geometric problems.*

- (A) solve problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and triangular pyramids;
- (D) solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net

**21<sup>st</sup> Century Skills**  
*www.p21.org*

**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

**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  $\text{cm}^2$  to  $\text{in}^2$ .



## 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  $\times$  WIDTH  $\times$  LENGTH.

The **volume** of the Rubik's Cube is: \_\_\_\_\_ cubic centimeters (cm<sup>3</sup>).

### 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: \_\_\_\_\_ cm<sup>2</sup>

Area of Back: \_\_\_\_\_ cm<sup>2</sup>

Area of Right Face: \_\_\_\_\_ cm<sup>2</sup>

Area of Left Face: \_\_\_\_\_ cm<sup>2</sup>

Area of Top: \_\_\_\_\_ cm<sup>2</sup>

Area of Bottom: \_\_\_\_\_ cm<sup>2</sup>

The **total surface area** of my Rubik's Cube is \_\_\_\_\_ cm<sup>2</sup>.

### SECTION IV - CHALLENGE

Convert the area of each face from cm<sup>2</sup> to in<sup>2</sup>. Use the scale 2.54 cm in 1 in

How many cm<sup>2</sup> are in one in<sup>2</sup>? \_\_\_\_\_ in<sup>2</sup>

The area of one of the faces is \_\_\_\_\_ in<sup>2</sup>

Therefore, the surface area of the cube is \_\_\_\_\_ in<sup>2</sup>

What would be the **volume** of the Rubik's Cube, in cubic inches? \_\_\_\_\_ in<sup>3</sup>



## Measurement Lesson

# 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 (cm<sup>3</sup>).

### 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 cm<sup>2</sup>

Area of Back: 32.49 or 32.5 cm<sup>2</sup>

Area of Right Face: 32.49 or 32.5 cm<sup>2</sup>

Area of Left Face: 32.49 or 32.5 cm<sup>2</sup>

Area of Top: 32.49 or 32.5 cm<sup>2</sup>

Area of Bottom: 32.49 or 32.5 cm<sup>2</sup>

The **total surface area** of my Rubik's Cube is 194.94 or 195 cm<sup>2</sup>.

### SECTION IV - CHALLENGE

Convert the area of each face from cm<sup>2</sup> to in<sup>2</sup>. Use the scale 2.54 cm in 1 in

How many cm<sup>2</sup> are in one in<sup>2</sup>? 6.4516 in<sup>2</sup>

The area of one of the faces is 5.04 in<sup>2</sup>

Therefore, the surface area of the cube is 30.24 in<sup>2</sup>

What would be the **volume** of the Rubik's Cube, in cubic inches? 128.02 in<sup>3</sup>