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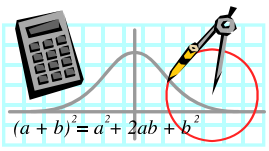
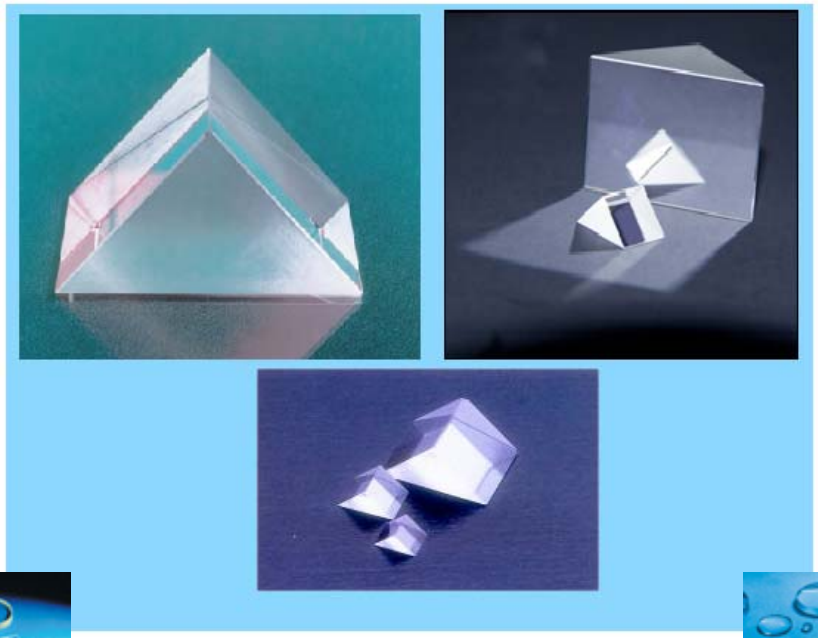
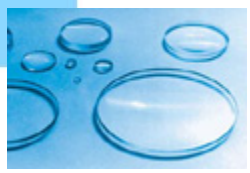
#12067
GEOMETRY 2:
SURFACE AREA OF SOLIDS

BENCHMARK MEDIA, 2006
Grade Level: 7–10
23 Minutes







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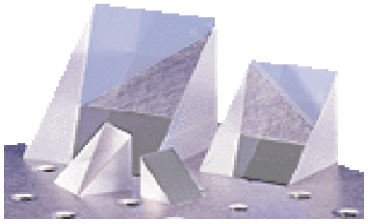
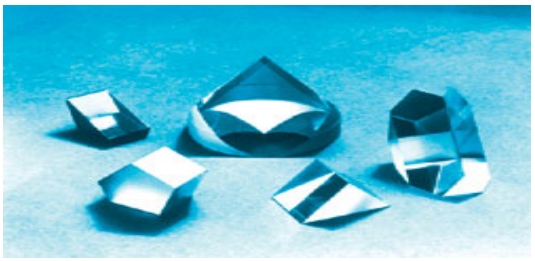
#10806 VOCABULARY BUILDERS IN SIGN LANGUAGE: MATH
#12066 GEOMETRY 1: AREAS OF PARALLELOGRAMS, TRAPEZOIDS, TRIANGLES, CIRCLES AND CIRCUMFERENCE
#12068 GEOMETRY 3: VOLUME OF SOLIDS





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MATH SERIES 2.

GEOMETRY, Part 2: Surface Area of Solids

23 Minutes

Distributed by BENCHMARK MEDIA

FOR USE IN: Mathematics

LEVEL: Grades 7-9

EDUCATIONAL ADVISOR: Richard Albero, Math Instructor, Briarcliff Manor High School, MS Educational Psychology, MS Physics

EDUCATIONAL OBJECTIVES:
To help students understand:
right prisms
using standard units of measurement
calculating the surface area of right prisms: rectangular, circular (cylinder), and triangular
calculating the surface area of a: cone, pyramid, and sphere

BACKGROUND INFORMATION:
Geometry is a branch of mathematics that involves studying the shape, size, and position of lines, angles, curves, and figures. The name *geometry* comes from two Greek words meaning *earth* and *to measure.* The earliest uses of geometry included measuring lengths and areas of land. Most scholars believe that the ancient Egyptians and Babylonians were the first people to use geometry extensively.

Geometric shapes fill the world around us. For example, honeybees build their honeycombs in a pattern of hexagons, and earthworms are shaped like cylinders. Most houses and buildings have walls shaped like rectangles, and many bridges have supports shaped like triangles. By knowing something about geometry, we can better understand and appreciate our world.

Geometry has many practical uses. To construct stable and attractive buildings, architects and carpenters, for example, must understand the characteristics of geometric objects.

Navigators of airplanes, ships, and spacecraft rely on geometric ideas to chart and follow a set course. Artists, designers, engineers, and photographers also use geometric principles in their work.

BEFORE SHOWING THE VIDEO

In Geometry Part 1, we learned how to calculate *the areas of two dimensional shapes*: parallelograms, trapezoids, and triangles; and the circumference and area of circles.

In this video, Geometry Part 2, we will be calculating *the surface areas of solids* (3 dimensional) figures, such as right prisms: rectangular, triangular, and circular (cylinder); and some non-right prisms, such as: four sided pyramids, cones, and spheres. We will be using the formulas for the area of two dimensional shapes learned in Geometry Part 1 to calculate the two dimensional surface area of various shapes found on the surface area of solids, shapes such as parallelograms, trapezoids, triangles, and circles, and then add up those areas to find the total surface area.

In Geometry Part 3, we will be calculating *the volume of solids*, such as the right prisms: rectangular, triangular, and circular (cylinder); and certain non-right prisms, such as: four sided pyramids, cones, and spheres.

CONTENT OF THE VIDEO

The formulas are reviewed, which were learned in Geormetry Pt. 1 for the areas of two dimensional shapes: parallelograms, trapezoids, and triangles; and for the circumference and area of circles.

Right prisms are solid shapes whose end faces are at right angles to their sides, and they are named for the shape of their end faces.

Triangular Right Prism

The **total surface area** of a **triangular right prism,** is calculated by the formulas for calculating the area of the 2 triangular end faces (**A = 1/2 bh** for each triangular end face), and then the three rectangles (**A = bh** for each rectangular side) forming the 3 sides.

Circular Right Prism (a Cylinder)

To find the total surface area of a **circular right prism (a cylinder),** we find the area of the 2 circular end faces with the formula $\mathbf{A = \pi r^2}$, and the curved side which unfolds to show a rectangular shape, with the formula, **A = bh.**

Rectangular Right Prism

A **rectangular right prism,** or box, has 6 rectangular sides and each opposite side is the same size. The rectangular formula, **A = bh,** is used to find the areas of the 3 different size rectangles, then multiply each by two, and finally add all to find the total surface area.

Non-Right Prism Shapes.

Four-sided Pyramid

For a **four sided pyramid,** the area of **one triangular face** is calculated using $\frac{\mathbf{A - bh}}{\mathbf{2}}$.

The result multiplied by 4 equals the area of all 4 sides. The area of **the rectangular base** is calculated using the formula **A = bh.** The total surface area of the 4 sided pyramid is the addition of the areas of the 4 sides and the base.

Cone

The total surface area of a **cone** is the area of the curved surface calculated with the formula $\mathbf{A = \pi rs}$ where **s** is the length of the curved side; plus the area of the circular base, which is found with the familiar formula $\mathbf{A = \pi r^2}$.

Sphere

Finally, the formula used to find the total surface area of a **sphere** is $\mathbf{TSA = 4\ \pi r^2}$

AFTER SHOWING THE VIDEO

The students may be asked to recall and review the following key concepts in the video:

- What determines the names given to different right prisms?
- What characteristics do all right prisms have in common?
- How is the height of a triangle measured?
- How is the surface area of a triangle calculated?
- What is the formula for the circumference of a circle? Explain pi.
- How is the total surface area of a cylinder calculated? When the curved side of a cylinder is unfolded what shape is it?
- How is the total surface area of a rectangular right prism calculated?
- How is the total surface area of a four sided pyramid calculated?
- How is the total surface area of a cone calculated?

- How is the total surface area of a sphere calculated?

Some practice problems:
1. A can of soup is 5 inches tall with a diameter of 3 inches. How much paper is needed for the labels of 1,000 cans? How much metal is needed?

2. Draw a rectangular right prism which is 4 inches wide, 8 inches long and 3 inches high. What is its total surface area?

3. A top of a greenhouse is to be in the shape of a triangular right prism. The triangular end face is 6 ft high, and its base length is 16 ft. The height (length between end faces) is 36 ft. How much glass will be needed to build it?

4. The curved side of a cylindrical hot water heater tank is 60 in high, and the circular end face has a diameter of 20 in. What size must the insulation be to cover the curved side only?

Math Series 1, consists of 10 videos:
ALGEBRA: A Piece of Cake Part 1
ALGEBRA: A Piece of Cake Part 2
SLOPES: That's a Bit Steep!
PERCENTAGES: That Make Sense
LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 1
LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 2
INTEGER OPERATIONS: Into the Negative Zone Part 1 Adding and Subtracting
INTEGER OPERATIONS: Into the Negative Zone Part 2 Multiplying and Dividing
FACTORING IS FANTASTIC Part 1: Common Factors
FACTORING IS FANTASTIC Part 2: Quadratic Trinomials

Math Series 2, consists of 12 videos:
PROBABILITY, Parts 1 & 2
RATIOS
TRIGONOMETRY, Parts 1 & 2
STATISTICS Parts 1 & 2
PROBLEM SOLVING Parts 1 & 2
GEOMETRY Parts 1, 2, &3