

Geometry Unit 4: Volume

Bronx Early College Academy

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31 October - 18 November 2022

4.1 Nets	31 October
4.2 Rectangular prisms	1 November
4.3 Solve for a side	3 November
4.4 Surface area	4 November

Learning Target: I can fold nets into 3-dimensional solids

HSG.CO.C.9 Prove theorems about lines and angles

4.1 Monday 31 October

Do Now

1. Review your Deltamath assignments
2. Check your Jumprope scores
3. Set a study goal
4. Answer survey in Google Classroom, "Mark as Done"

Lesson: Nets, Deltamath classwork practice

Homework: Area formulas review problem set

Learning Target: I can calculate the volume of a *rectangular prism*

HSG.CO.C.9 Prove theorems about lines and angles

4.2 Tuesday 1 November

Do Now

1. Find the area of a rectangle 4 inches by 6 inches
2. Find the length of a rectangle 7 inches wide with an area of 63 square inches

Lesson: Prism definitions, volume formula

Homework: Deltamath practice

A prism is a polyhedron, a 3-dimensional shape

Solid A 3-dimensional object

Face A flat surface of a geometric solid

Edge A line segment where two faces meet

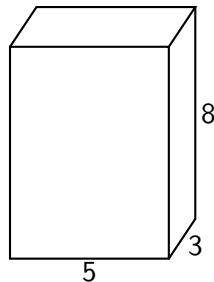
Vertex A point where edges meet

Prism A solid with two identical, parallel, bases and uniform cross section

Base Flat shapes that form the top and bottom or ends of a prism

Lateral face The sides of a prism, which are parallelograms

Cross section The shape of a plane's intersection with a solid



Common types of prisms, named by their base

Rectangular Bases are rectangles (or squares)

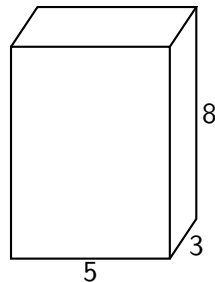
Triangular Triangular base

Hexagonal Six-sided base, a hexagon

Cylinder Solid with two parallel circles as bases

Right Lateral faces are a right angles to the base

Oblique Slanted



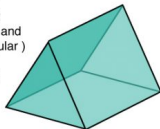
Math Monks prisms page

Prism Shapes



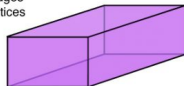
Triangular

- 5 faces (2 triangular and 3 rectangular)
- 9 edges
- 6 vertices



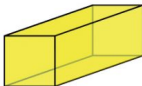
Rectangular

- 6 faces (all rectangular)
- 12 edges
- 8 vertices



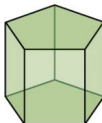
Square

- 6 faces (2 squares and 4 rectangular)
- 12 edges
- 8 vertices



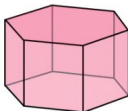
Pentagonal

- 7 faces (2 pentagonal and 5 rectangular)
- 15 edges
- 10 vertices



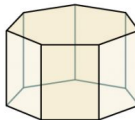
Hexagonal

- 8 faces (2 hexagonal and 6 rectangular)
- 18 edges
- 12 vertices



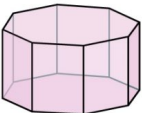
Heptagonal

- 9 faces (2 Heptagonal and 7 rectangular)
- 19 edges
- 14 vertices



Octagonal

- 10 faces (2 octagonal and 8 rectangular)
- 24 edges
- 16 vertices



Trapezoidal

- 6 faces (2 trapezoidal and 4 rectangular)
- 12 edges
- 8 vertices



Volume is a measure of space, the number of unit cubes a solid contains

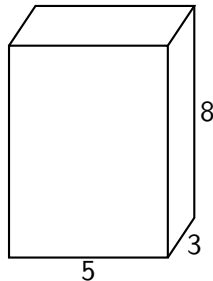
Given the area of the base B and height h ,
the volume of a prism is $V = B \times h$

Rectangular $V = l \times w \times h$

Square $V = s^2 \times h$

Triangular $V = \frac{1}{2}(l \times w \times h)$

Cylinder $V = \pi r^2 \times h$



Learning Target: I can solve for a missing parameter

HSG.CO.C.9 Prove theorems about lines and angles

4.3 Thursday 3 November

Do Now

1. Find the area of a circle with radius $r = 10$, in terms of π
2. Find the radius of a circle with area $A = 49\pi$

Lesson: Using algebra to solve problems, Deltamath practice

Homework: Handout practice with volume calculations

Muhammad ibn Musa al-Khwarizmi - the “father” of algebra

Persian 780 - 847 AD worked in Baghdad during the “Islamic golden age”

Algebra Mathematics with symbols (named after al-Khwarizmi’s book, al-jabra)

Algorithm Logical steps to solve a problem (comes from his name)

Unknown A symbol or letter representing a number, x , y , a , π , θ

“reduction” Cancellation of like terms on opposite sides of the equation



“Solve for x ” or “isolate the variable”

The algorithm developed by al-Khwarizmi

Operation Combine two numbers (multiplication or addition, for example)

Identity 0 for addition, 1 for multiplication.

$$a + 0 = a \text{ and } a \times 1 = a$$

Inverse Two values that make the identity for an operation.

$$a + (-a) = 0 \text{ and } a \times \frac{1}{a} = 1$$

$$a = b \iff a + c = b + c$$

Multiplying and dividing fractions

Rational numbers those that can be expressed as fractions, $\frac{p}{q} \in \mathbb{Q}$

Numerator The top number in a fraction, *dividend*, p

Denominator *Divisor*, bottom number in a fraction, q

Reciprocal The multiplicative inverse

Division Means to multiply by the reciprocal. $a \div b = \frac{a}{b} = a \times \frac{1}{b}$

To multiply fractions, multiply the numerators and denominators

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

To divide fractions, multiply by the reciprocal

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{a \times d}{b \times c}$$

Learning Target: I can calculate the surface area of a rectangular prism

HSG.CO.C.9 Prove theorems about lines and angles

4.4 Friday 4 November

Do Now

1. Find the volume of a rectangular prism 4 inches by 6 inches by 3.5 inches
2. Find the volume of a triangular prism with base 6 inches wide by 5 inches tall by 10 inches high

Lesson: Surface area definition, formula

Homework: Deltamath practice