

Mathematics Reference Sheet

Conversions

U.S. Customary

1 foot = 12 inches
1 yard = 3 feet
1 mile = 5280 feet
1 acre \approx 43,560 square feet
1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 231 cubic inches
1 pound = 16 ounces
1 ton = 2000 pounds
1 cubic foot \approx 7.5 gallons

U.S. Customary to Metric

1 inch = 2.54 centimeters
1 foot \approx 0.3 meter
1 mile \approx 1.61 kilometers
1 quart \approx 0.95 liter
1 gallon \approx 3.79 liters
1 cup \approx 237 milliliters
1 pound \approx 0.45 kilogram
1 ounce \approx 28.3 grams
1 gallon \approx 3785 cubic centimeters

Time

1 minute = 60 seconds
1 hour = 60 minutes
1 hour = 3600 seconds
1 year = 52 weeks

Temperature

$$C = \frac{5}{9}(F - 32)$$

$$F = \frac{9}{5}C + 32$$

Metric

1 centimeter = 10 millimeters
1 meter = 100 centimeters
1 kilometer = 1000 meters
1 liter = 1000 milliliters
1 kiloliter = 1000 liters
1 milliliter = 1 cubic centimeter
1 liter = 1000 cubic centimeters
1 cubic millimeter = 0.001 milliliter
1 gram = 1000 milligrams
1 kilogram = 1000 grams

Metric to U.S. Customary

1 centimeter \approx 0.39 inch
1 meter \approx 3.28 feet
1 kilometer \approx 0.62 mile
1 liter \approx 1.06 quarts
1 liter \approx 0.26 gallon
1 kilogram \approx 2.2 pounds
1 gram \approx 0.035 ounce
1 cubic meter \approx 264 gallons

Number Properties

Commutative Properties of Addition and Multiplication

$$a + b = b + a$$

$$a \cdot b = b \cdot a$$

Associative Properties of Addition and Multiplication

$$(a + b) + c = a + (b + c)$$

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

Addition Property of Zero

$$a + 0 = a$$

Multiplication Properties of Zero and One

$$a \cdot 0 = 0$$

$$a \cdot 1 = a$$

Distributive Property:

$$a(b + c) = ab + ac$$

$$a(b - c) = ab - ac$$

Properties of Equality

Addition Property of Equality

$$\text{If } a = b, \text{ then } a + c = b + c.$$

Subtraction Property of Equality

$$\text{If } a = b, \text{ then } a - c = b - c.$$

Multiplication Property of Equality

$$\text{If } a = b, \text{ then } a \cdot c = b \cdot c.$$

Multiplicative Inverse Property

$$n \cdot \frac{1}{n} = \frac{1}{n} \cdot n = 1, n \neq 0$$

Division Property of Equality

$$\text{If } a = b, \text{ then } a \div c = b \div c, c \neq 0.$$

Squaring both sides of an equation

$$\text{If } a = b, \text{ then } a^2 = b^2.$$

Cubing both sides of an equation

$$\text{If } a = b, \text{ then } a^3 = b^3.$$

Properties of Inequality

Addition Property of Inequality
If $a > b$, then $a + c > b + c$.

Subtraction Property of Inequality
If $a > b$, then $a - c > b - c$.

Multiplication Property of Inequality
If $a > b$ and c is positive, then $a \cdot c > b \cdot c$.
If $a > b$ and c is negative, then $a \cdot c < b \cdot c$.

Division Property of Inequality
If $a > b$ and c is positive, then $a \div c > b \div c$.
If $a > b$ and c is negative, then $a \div c < b \div c$.

Properties of Exponents

Product of Powers Property: $a^m \cdot a^n = a^{m+n}$

Quotient of Powers Property: $\frac{a^m}{a^n} = a^{m-n}$, $a \neq 0$

Power of a Power Property: $(a^m)^n = a^{mn}$

Power of a Product Property: $(ab)^m = a^m b^m$

Zero Exponents: $a^0 = 1$, $a \neq 0$

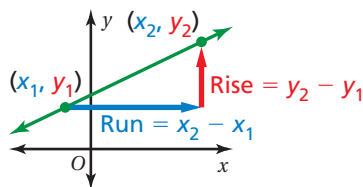
Negative Exponents: $a^{-n} = \frac{1}{a^n}$, $a \neq 0$

Slope

$$m = \frac{\text{rise}}{\text{run}}$$

$$= \frac{\text{change in } y}{\text{change in } x}$$

$$= \frac{y_2 - y_1}{x_2 - x_1}$$



Equations of Lines

Slope-intercept form
 $y = mx + b$

Standard form
 $ax + by = c$, $a, b \neq 0$

Point-slope form
 $y - y_1 = m(x - x_1)$

Pythagorean Theorem

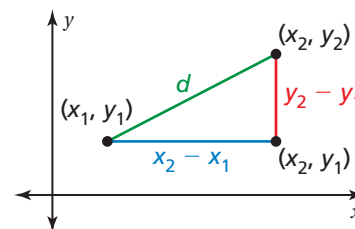
$$a^2 + b^2 = c^2$$

Converse of the Pythagorean Theorem

If the equation $a^2 + b^2 = c^2$ is true for the side lengths of a triangle, then the triangle is a right triangle.

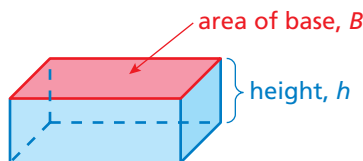
Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



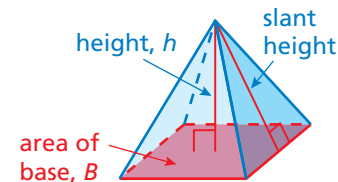
Formulas in Geometry

Prism



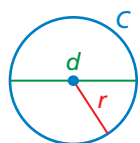
$S = \text{areas of bases} + \text{areas of lateral faces}$
 $V = Bh$

Pyramid



$S = \text{area of base} + \text{areas of lateral faces}$
 $V = \frac{1}{3}Bh$

Circle



$C = \pi d$ or $C = 2\pi r$
 $A = \pi r^2$
 $\pi \approx \frac{22}{7}$, or 3.14

Cylinder



$V = Bh = \pi r^2 h$
 $S = 2\pi r^2 + 2\pi r h$

Cone



$V = \frac{1}{3}Bh = \frac{1}{3}\pi r^2 h$

Sphere



$V = \frac{4}{3}\pi r^3$

