

11th Grade Mathematics *Reference Sheet*

 SONLIGHT

11th Grade Mathematics Reference Sheet

GEOMETRIC FORMULAS

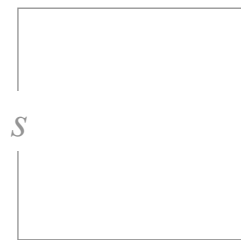
Perimeter of rectangle

$$2l + 2w = P$$



Perimeter of square

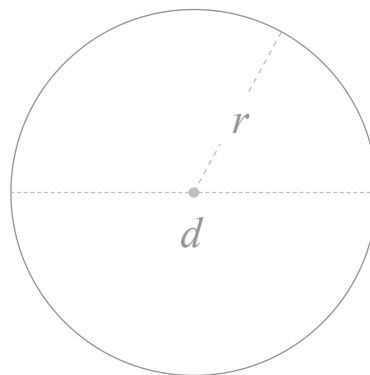
$$4s = P$$



Circumference of circle

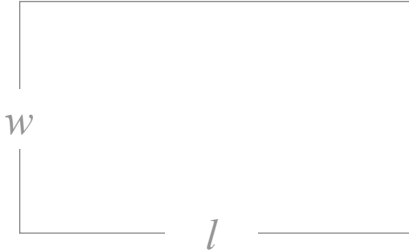
$$2\pi r = C$$

$$\pi d = C$$



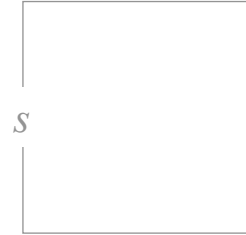
Area of rectangle

$$lw = A$$



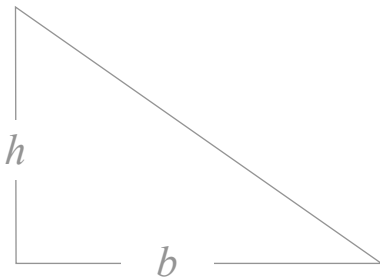
Area of square

$$s^2 = A$$



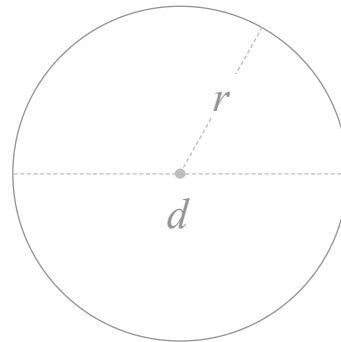
Area of triangle

$$\frac{1}{2}bh = A$$



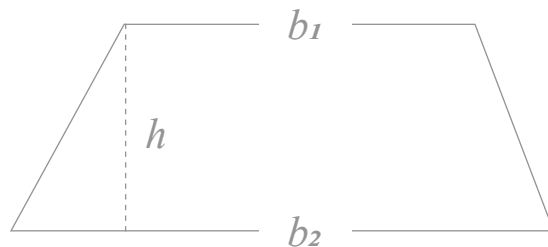
Area of circle

$$\pi r^2 = A$$



Area of trapezoid

$$\frac{1}{2}h(b_1 + b_2) = A$$



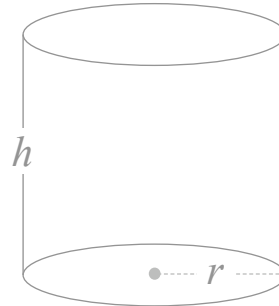
Surface Area of
rectangular prism

$$2B + Ph = SA$$



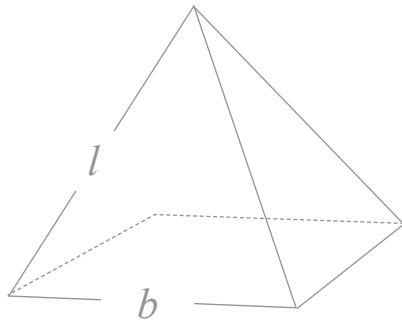
Surface Area of right cylinder

$$2\pi rh + 2\pi r^2 = SA$$



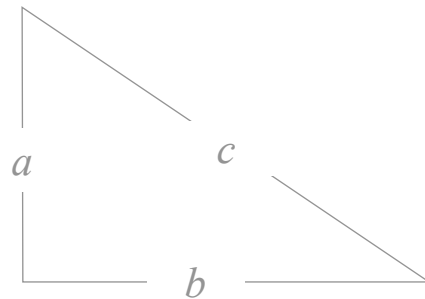
Surface Area of right pyramid

$$\frac{1}{2} l P + 2B = SA$$



Pythagorean Theorem

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



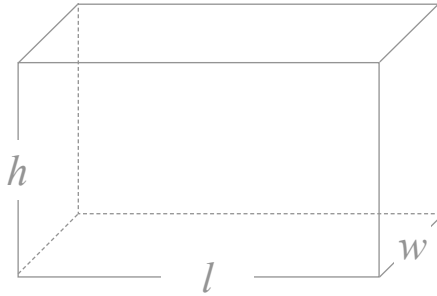
To calculate distance traveled

$$d = rt$$

DISTANCE = RATE x TIME

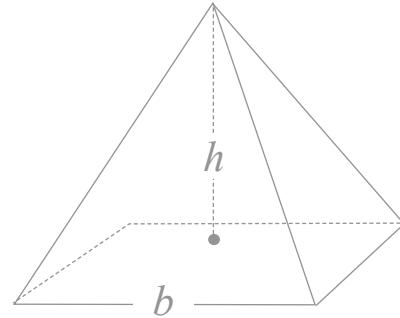
Volume of rectangular prism

$$lwh = V$$



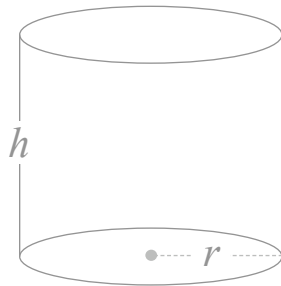
Volume of right pyramid

$$\frac{1}{3}Bh = V$$



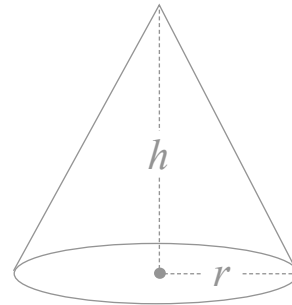
Volume of right cylinder

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



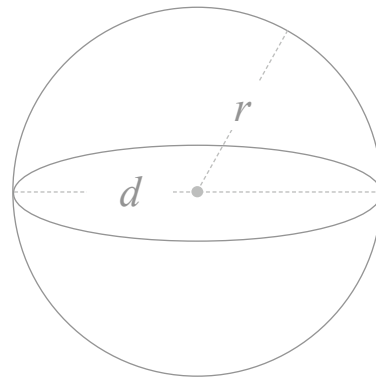
Volume of cone

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



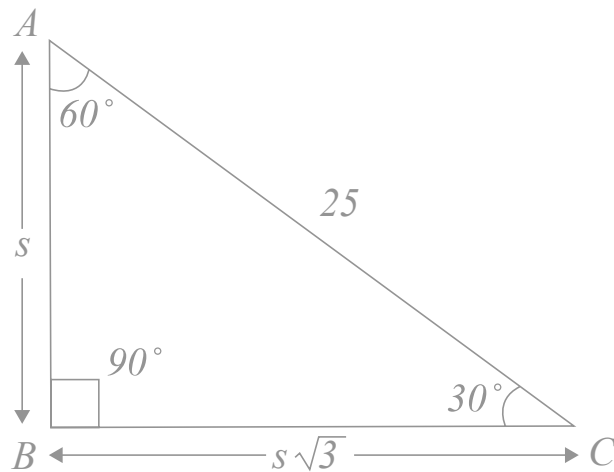
Volume of sphere

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



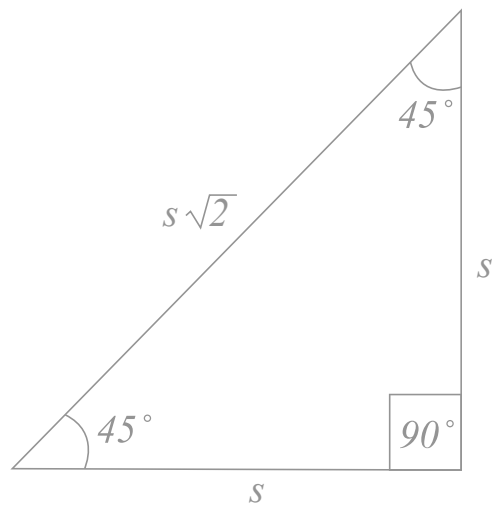
Special Right Triangles
30°-60°-90°

$$s-s\sqrt{3}-2s$$

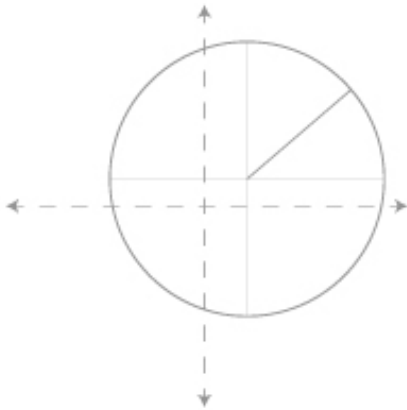


Special Right Triangles
45°-45°-90°

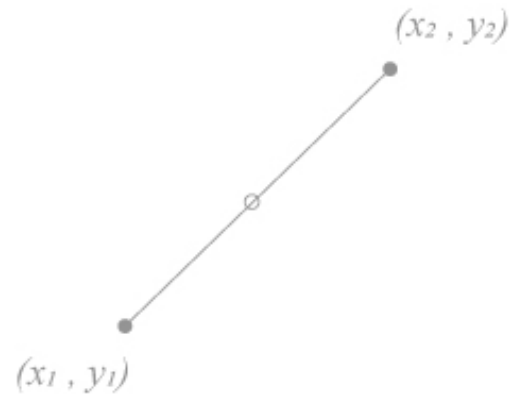
$$s-s-s\sqrt{2}$$



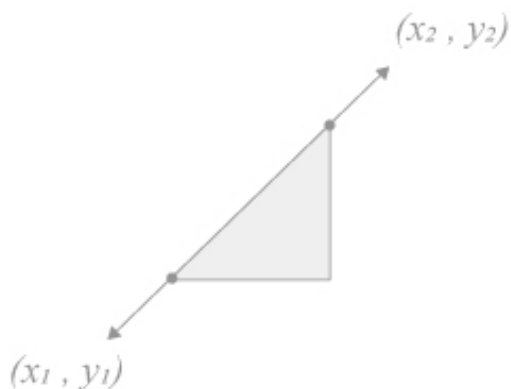
Equation of a Circle
 $(x-h)^2+(y-k)^2=r^2$



Slope Formula
 $m = \frac{y_2 - y_1}{x_2 - x_1}$



Midpoint Formula
 $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$



Distance Formula
 $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

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

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QUADRATIC FORMULA

Quadratic Formula

When $ax^2 + bx + c = 0$, then

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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LOGARITHMS & NATURAL LOGS

Equivalence

$$a^x = y \leftrightarrow \log_a y = x$$

$$e^x = y \leftrightarrow \ln y = x$$

Log of a product

$$\log_a x \cdot y = \log_a x + \log_a y$$

$$\ln x \cdot y = \ln x + \ln y$$

Log of a quotient

$$\log_a \frac{x}{y} = \log_a x - \log_a y$$

$$\ln \frac{x}{y} = \ln x - \ln y$$

Log of a power

$$\log_a x^n = n \log_a x$$

$$\ln x^n = n \ln x$$

Log of a reciprocal

$$\log_a \frac{1}{x} = -\log_a x$$

$$\ln \frac{1}{x} = -\ln x$$

Log of the base

$$\log_a a = 1$$

$$\ln e = 1$$

Log of 1

$$\log_a 1 = 0$$

$$\ln 1 = 0$$

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BASIC CONIC EQUATIONS

Parabolas

$$y - k = a(x - h)^2$$

$$x - h = a(y - k)^2$$

Circle

$$(x - h)^2 + (y - k)^2 = r^2$$

Ellipse

$$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$$

Hyperbola

$$\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$$

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CONVERSION FACTORS

UNITS

12 inches = 1 foot
3 feet = 1 yard
5,280 feet = 1 mile
8 fl oz = 1 cup
2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
16 oz = 1 pound
2,000 pounds = 1 ton

UNITS OF TIME

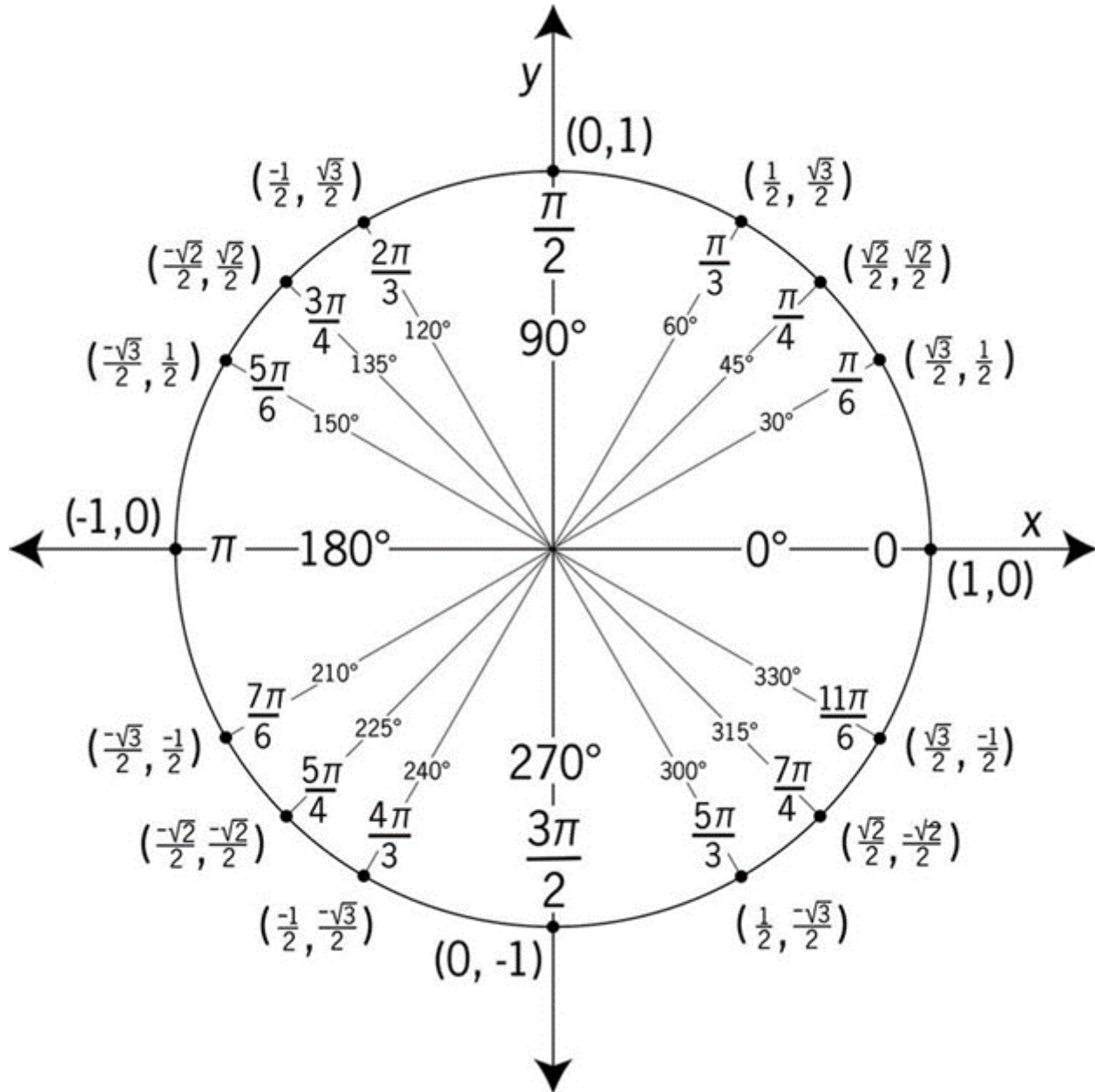
60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
52 weeks = 1 year = 365 days

METRIC CONVERSIONS

10 millimeters = 1 centimeter	10 milliliters = 1 centiliter	10 milligrams = 1 centigram
100 centimeters = 1 meter	100 centiliters = 1 liter	100 centigrams = 1 gram
1,000 meters = 1 kilometer	1,000 liters = 1 kiloliter	1,000 grams = 1 kilogram

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UNIT CIRCLE



Conversion Factor for Radians to Degrees

$$\pi = 180 \text{ degrees}$$

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TRIGONOMIC IDENTITIES

Reciprocal Identities

$$\mathbf{\tan x = \sin x / \cos x}$$

$$\mathbf{\csc x = 1 / \sin x}$$

$$\mathbf{\sec x = 1 / \cos x}$$

$$\mathbf{\cot x = 1 / \tan x = \cos x / \sin x}$$

Pythagorean Identities

$$\mathbf{\sin^2 x + \cos^2 x = 1}$$

$$\mathbf{1 + \tan^2 x = \sec^2 x}$$

$$\mathbf{1 + \cot^2 x = \csc^2 x}$$

Cofunction Identities

$$\mathbf{\sin (\pi/2 - x) = \cos x}$$

$$\mathbf{\cos (\pi/2 - x) = \sin x}$$

$$\mathbf{\tan (\pi/2 - x) = \cot x}$$

$$\mathbf{\cot (\pi/2 - x) = \tan x}$$

$$\mathbf{\sec (\pi/2 - x) = \csc x}$$

$$\mathbf{\csc (\pi/2 - x) = \sec x}$$

Even/Odd Identities

$$\mathbf{\sin (-x) = -\sin x}$$

$$\mathbf{\cos (-x) = \cos x}$$

$$\mathbf{\tan (-x) = -\tan x}$$

$$\mathbf{\csc (-x) = -\csc x}$$

$$\mathbf{\sec (-x) = \sec x}$$

$$\mathbf{\cot (-x) = -\cot x}$$

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TRIGONOMIC IDENTITIES

Sum and Difference Formulas

$$\sin (u + v) = \sin u \cos v + \cos u \sin v$$

$$\sin (u - v) = \sin u \cos v - \cos u \sin v$$

$$\cos (u + v) = \cos u \cos v - \sin u \sin v$$

$$\cos (u - v) = \cos u \cos v + \sin u \sin v$$

$$\tan (u + v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$

$$\tan (u - v) = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

Double Angle Formulas

$$\sin 2x = 2 \sin x \cos x$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

$$\cos 2x = \cos^2 x - \sin^2 x \text{ or } 2 \cos^2 x - 1 \text{ or } 1 - 2 \sin^2 x$$

Half Angle Formulas

$$\sin x/2 = \pm \sqrt{\frac{1 - \cos x}{2}}$$

$$\cos x/2 = \pm \sqrt{\frac{1 + \cos x}{2}}$$

$$\tan x/2 = \frac{1 - \cos x}{\sin x} \text{ or } \frac{\sin x}{1 + \cos x}$$