



Trigonometry Brain Summary

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This is a list of all the thoughts located in the Trigonometry Brain. Each thought is followed by a statement indicating the content associated by that thought. Thoughts followed by (jump) are jump thoughts, which are located on the left hand side of the central thought in the Brain matrix. Jump thoughts often take the user to entirely different sections of the Brain or provide reference information about the central thought.

Fundamentals of Trigonometry (jump) – The basics needed in order to be properly prepared for Trigonometry

Trigonometry (jump) – Return to the entry thought of the Trigonometry Brain

Algebra – A list of concepts covered in the Algebra Brain necessary for understanding trigonometry

Cartesian Plane – A brief review of the Cartesian Plane, including the Distance and Midpoint Formulas

Functions – A brief review of the idea of mapping from one set of items to another

Graphs of Functions – How to visually represent a function

Horizontal and Vertical Shifts – Moving a function around in the Cartesian Plane

Real Numbers – Introduction to different number sets used throughout Trigonometry

Absolute Value – Introduction to the absolute value operator and what it really means

Ordering Real Numbers – How real numbers relate to each other with respect to the origin

Analytic Geometry – Studying an equation from its graph and studying a graph from its equation

Conic Sections – Classification of conic sections by the discriminant of a quadratic function

Polar Equations of Conics (jump) – Describing a conic section in polar coordinates

Circles – Definition of a circle and its related equation

Ellipses – Definition of ellipse and its related equation

Hyperbolas – Definition of hyperbola and its related equation

Parabolas – Definition of a parabola and its related equation

Translation of Conics – Moving the graph of a conic section around in the plane

Circle Translation – How to move a circle around in the plane

Ellipse Translation – How to move an ellipse around in the plane

Hyperbola Translation – How to move a hyperbola around in the plane

Parabola Translation – How to move a parabola around in the plane

Lines – Introduction to the concept of a line and its slope

Plane Curves and Parametric Equations – Using a third variable to describe the motion of an object through *time*

Polar Coordinates – Introduction to an alternate method of expressing functions in terms of radii and angles

Graphing Polar Equations – Demonstration on how to graph an equation in polar coordinates

Polar Equations of Conics – Describing a conic section in polar coordinates

Conic Sections (jump) – Classification of conic sections by the discriminant of a quadratic function

Rotation of Axes – Transforming a quadratic equation by rotating the coordinate axes to eliminate the xy -term

Analytic Trigonometry – Second-degree polynomial functions

Inverse Trig Functions – Definition of the inverse of a trigonometric function along with its graph

Composition of Trig Functions – Composing one trigonometric function with another

Multiple-Angle Formulas – How to evaluate trigonometric functions of $n\theta$

Power-Reducing Formulas – Transforming trigonometric functions raised to a power greater than 1 into first power expressions

Half-Angle Formulas – Evaluating trigonometric functions of $\theta/2$

Sum and Difference Formulas – Evaluating trigonometric functions of $\theta \pm \varphi$

Product-to-Sum / Sum-to-Product Formulas – Transforming a sum of the trig functions of two different angles into a product and vice versa

Trigonometric Equations – Solving equations involving trigonometric functions using primarily algebraic techniques

Trigonometric Identities – Demonstration of how to relate trigonometric functions to each other

Six Basic Trig Functions (jump) – Definition of the sine, cosine, tangent, cotangent, secant, and cosecant functions

Verifying Trig Identities – Examples of how to determine if a trigonometric identity is true or not

Applications of Trigonometry – The many uses of trigonometry, such as the laws of sine and cosine

Law of Cosines – Solving an oblique triangle given three sides (SSS) or two sides and their included angle (SAS)

Heron's Area Formula – Using the law of cosines to find the area of an oblique triangle

Law of Sines – Solving an oblique triangle given two angles and any side (AAS or ASA) or two sides and an angle opposite one of the sides (SSA)

Area of Oblique Triangle – Using the law of sines to find the area of an oblique triangles

Law of Tangents – An obscure law derived from the law of sines and some trigonometric identities

Vectors – A number that has both a *magnitude* and a *direction*

Component Form – One of the several ways in which we represent vectors, handy for many applications

Vector Operations – Scalar multiplication and vector addition

Cross Product – A special form of vector multiplication that yields a third vector perpendicular to the first two

Direction Angles – The angle in which the vector \mathbf{u} points relative to the positive x -axis

Dot Product – A special form of vector multiplication that yields a directionless real number as a result

Angle Between Two Vectors – Given two vectors, find the angle between them

Finding Vector Components – Projecting a vector onto a set of coordinate axes to find the component of that vector

Work – A primary application of projecting vectors to find the amount of work done on an object based on the forces acting on that object

Unit Vectors – A handy form of notation that indicates the components of a vector relative to a set of coordinate axes

Complex Numbers – Numbers that contain both a real part and an imaginary part

Complex Plane (jump) – Using a set of coordinate axes to represent a complex number

Trigonometric Form – Writing a complex number in terms of the trigonometric functions

DeMoivre's Theorem – Raising a complex number in trig form to a power greater than 1

Multiplication and Division – Multiplying and dividing complex numbers in trigonometric form

Roots of Complex Numbers – A formula to find the n th roots of a complex number

Exponential and Logarithmic Functions – Basic concepts of functions based on the number e

Exponential Functions – Basic definition of the exponential function

Properties of Exponents (jump) – The various rules governing the behavior of exponents

Exponential and Logarithmic Equations – How to use logarithms to solve mathematical equations

Logarithmic/Exponential Models – Applications of logarithmic/exponential functions

Exponential Growth and Decay – Very common application of logs

Gaussian – Model which produces the bell-shaped curve used in statistical analysis

Logarithmic – Used in a wide variety of applications including earthquakes, sound, and time of death

Logistics Growth – Model used to accurately represent population growth in an environment

Logarithmic Functions – The inverse of an exponential function

Properties of Logarithms (jump) – Various rules governing behavior of logarithmic functions

Exponential / Logarithmic Equations – How to use logarithms to solve mathematical equations

Logarithmic/Exponential Models – Applications of logarithmic/exponential functions

Exponential Growth and Decay – Very common application of logs

Gaussian – Model which produces the bell-shaped curve used in statistical analysis

Logarithmic – Used in a wide variety of applications including earthquakes, sound, and time of death

Logistics Growth – Model used to accurately represent population growth in an environment

Natural Base e – Definition of logarithm of base e

Trigonometric Functions – The fundamental basis of trigonometry

Angles – Definition of an angle in terms of radians and degrees, and conversion from one to the other

Reference Angles – The acute angle formed by the terminal side of an angle and the nearest x -axis

Six Basic Trig Functions – Definition of the sine, cosine, tangent, cotangent, secant, and cosecant functions

Trigonometric Identities (jump) – Demonstration of how to relate trigonometric functions to each other

Unit Circle (jump) – A useful device for evaluating trigonometric functions of certain angles

Applications – Several applications of the six basic trigonometric functions

Bearings – A means of finding one's way in the world

Harmonic Motion – Anything that vibrates or oscillates falls into this category

Right Triangle Trigonometry – Finding the missing components of a right triangle given at least two other components

Graphs of Trig Functions – The visual representations of the six basic trigonometric functions

Cotangent Curves – Graphing the cotangent function

Amplitude and Period (jump) – The "height" and "frequency" of a given trigonometric curve

Phase Shift (jump) – Moving a trigonometric function from its standard position along the x -axis

Damped Trigonometric Graphs – Introducing additional terms in a trigonometric equation affects the curve

Reciprocal Curves – Graphs of the secant and cosecant functions

Sine and Cosine Curves – Graphs of the sine and cosine functions

Amplitude and Period – The "height" and "frequency" of a given trigonometric curve

Cotangent Curves (jump) – Graphing the cotangent function

Tangent Curves (jump) – Graphing the tangent function

Phase Shift – Moving a trigonometric function from its standard position along the x -axis

Cotangent Curves (jump) – Graphing the cotangent function

Tangent Curves (jump) – Graphing the tangent function

Tangent Curves – Graphing the tangent function

Amplitude and Period (jump) – The "height" and "frequency" of a given trigonometric curve

Phase Shift (jump) – Moving a trigonometric function from its standard position along the x -axis