GLOSSARY

Absolute value. The absolute value of a quantity is positive, for examples: $|4| = 4$, $|-4| = 4$, but $-|4| = -4$.

Abstract thinking. Higher level thinking involving such things as symbolic representation of concepts (see concrete thinking and concrete operational).

Acceleration. Measures the change in velocity over time (see deceleration and speed).

Accuracy. How close a measurement is to the true value (see precision and significant figures).

Algorithm. A series of steps used to solve a specific type of problem.

Angle. Measures the space between two intersecting lines or segments of line.

Area. Measure of the space inside a two-dimensional figure.

Argument. This is a proof in mathematics.

Assessment. Evaluating knowledge and skills of students or instruction.

> ***Alternative assessment.*** Measures the performance and growth of individuals via process, problem solving, communication, and connection with other subjects. Uses open-ended questions, journals, projects, and portfolios.
>
> ***Authentic assessment.*** Based on what is taught and how it is taught.
>
> ***Criterion referenced assessment.*** Based on reaching a predetermined level of competency. All can attain the same grade.
>
> ***Formative assessment.*** Occurs during the learning period by questions, observation, etc.
>
> ***Norm-referenced assessment.*** Based on the normal or standard curve. A specific percentage of students will earn each grade level.
>
> ***Summative assessment.*** Occurs after the learning period by tests, etc.

Associative property or characteristic. Changing grouping in addition or multiplication.

Asymptotes. Lines to which a curve approaches put never touches.

Auditory. See aural.

Aural. Pertaining to hearing or listening.

Axiom. Something accepted as true without proof (see postulate, theorem, corollary).

Bias. When a measurement is distorted.

Biconditional. When two statements p and q are equivalent, and when p is true if and only if q is true.

Binomial. Two and only two results are possible.

Binomial expansion. Used in probability when two outcomes are possible.

Bisect. Dividing a geometric figure into two identical parts.

Bisector. The line used to bisect (see bisect).

Bivariate. Two variables.

Box-and-whisker plot. Distribution of data related to means. Shows extremes and data broken into four quartiles based on medians.

Capacity. The maximum amount possible.

Center and spread. Center is measured by mean or median and spread is the range.

Central tendency. Measured by mean, median, and mode.

Circle. The locus of points equally distant from a center.

Circle chart. See pie chart.

Circumference. The distance, C, around a circle (see perimeter).

Closure. An operation in a set of numbers will produce a number in the same set.

Clusters and gaps. Grouping of data with spaces between.

Combinations. Grouping items with no regard to their order (see permutations).

Common logarithm. When the base a is 10. Written as $\log_{10} x$ or $\log x$ (see logarithm).

Commutative property. Changing order in addition or multiplication.

Compass. A mechanical device having two arms. One arm has a point and the other holds a piece of lead. Used to draw arcs (see protractor).

Complementary angles. Two angles whose sum is 90° (see supplementary angles).

Complex conjugates. The $a + bi$ and $a - bi$ are complex conjugates.

Complex number. A number written as $a + bi$ where i is the square root of $^{-}1$ and bi is the imaginary number part.

Composite numbers. Numbers that have three or more whole number factors. Two of the factors are 1 and the number itself.

Compound event. More than one outcome occurs.

Compound statements. When two or more simple statements are joined.

Concrete operational stage. A cognitive developmental stage of psychologist Jean Piaget occurring in upper elementary grades where abstract thinking develops (see preoperational stage).

Concrete thinking. Simplistic and occurs before abstract thinking (see abstract thinking).

Conditional statement. This is the objective of a proof stating "if p then q."

Confidence level. A measure of confidence of a random sample.

Congruent. A special case of similar triangles when two geometric figures have the same shape and size (see similar). Represented by ≅.

Conjecture. Obtained by observing and gathering data, and may be false.

Conjunction. Both statements are true.

Conjunction commutativity. When reversing the order of two conjunctions is true.

Connections. Two successive steps in a proof have a connection.
Connecting math concepts with other math concepts, other content areas, or with real-life problems.

Connectives. Symbols or words that join two propositions.

Contraction. When a dilation decreases the size of a figure (see dilation).

Converse. Changing the conditional statement "if p then q" to "if q then p." A converse statement must be proved on its own merit (see inverse).

Cooperative learning. Group learning approach with a heterogeneous student mix, individual responsibility, and positive interdependence.

Corollary. Something proved as a result of another proof (see axiom, postulate, theorem.).

Correlation coefficient. Measures the correlation of two-variables by a coefficient ***r*** (see scatter plot and regression line).

Cosine. The trigonometric ratio of an angle's adjacent side over the hypotenuse of a right triangle.

Counter example. Example showing another statement is false.

Cross-section. A two-dimensional slice of a three-dimensional object (see net).

Data outliers. Extremes (for an example, see box-and-whisker plots).

Deceleration. Negative acceleration.

Deductive reasoning. From a known principal to a new principal.

Density. A ratio or fraction such as people to area, or the measure of mass for a certain unit of volume.

Density (rational numbers). There are an infinite amount of rational numbers between any two rational numbers.

Dependent event. The outcome of one event occurring does affect another event occurring.

Descriptive statistics. Organizing and summarizing statistical data (see statistics).

Differential calculus. Determines instantaneous rates of change, minimums and maximums (see integral calculus).

Dilation. Occurs by multiplying all coordinates of a figure by the same scale factor. The figure is enlarged if the scale is greater than 1 or less than −1. The figure is reduced if the scale is between 1 and −1 (see expansion, contraction, and transformation (geometric)).

Directrix. A fixed line that is outside a parabola.

Direct variation. The equation $y/x = k$, where k is a constant (see inverse variation).

Discriminant. Determines the type of roots of a quadratic equation. A part of the quadratic formula.

$$b^2 - 4ac$$

Disjunction. One or both statements are true.

Disjunction commutativity. When reversing order of two disjunctions is true.

Distribution chart. Plots frequency of occurrences versus measurements.

Distributive property. Combines addition and multiplication, e.g., $a(b + c) = ab + ac$.

Domain. The input to a relation or function (see range).

Ellipse. The locus of points whose distances from two other fixed points when summed together will equal a constant (see latus rectum).

Estimation. An approximation of a number (see rounding).

Equivalent or equivalency. Two terms or numbers of the same value.

Equivalent statements. Two statements with the same truth table.

Event. An occurrence used in probability studies and calculations (see simple, compound, dependent and independent events).

Expansion. When a dilation increases the size of a figure (see dilation).

Experiments. A taken of data in a study (see simulations).

Explicit. One quantity expressed directly in terms of another (see implicit).

Exponents and their functions, decay and growth. The power indicates the power a base number is to be raised to.

FOIL. An algorithm for multiplying two binomials.

Formal reasoning. Solving problems with a logical reasoning procedure (see informal reasoning).

Formula. Equations relating two are more variables.

Frequency distribution. A count of the occurrences of measurements.

Function. A relation where each input produces one unique output. See the following function related topics in this glossary: absolute value, degree, domain, exponential, linear, logarithmic, greatest integer, nonlinear, piecewise, quadratic, range, rational, relation, step, trigonometric, and vertical line test.

Geometric probability. A ratio based on geometric characteristics such as area.

Glide or Slide. Moving vertically, horizontally or at an angle (see transformation (geometric)).

Glide-reflection. Combination of a glide and a reflection (see transformation (geometric)).

Graph. A two or three-dimensional representation of a two or three variable relationship.

Greatest integer function. The function $f(x) = [x]$, where $[x]$ means the greatest integer no greater than x.

Histogram. A bar graph showing frequency for ranges of data.

Hypotenuse. The side opposite the right angle in a right triangle (see right triangle).

Identity properties. Adding a zero for addition. Multiplying by one for multiplication.

Imaginary number. A number like $14i$.

Implicit. Implied but not directly stated (see explicit).

Independent event. The outcome of one event occurring cannot affect another event occurring.

Inductive reasoning. Drawing a conclusion from occurrences of events (see deductive).

Inequalities. Relates to quantities that are not always equal or never equal ($\neq, \geq, >, <, \leq$).

Inferential statistics. Drawing conclusions from a statistical study (see statistics).

Informal reasoning. Deriving a relationship from models, experiments, conjectures, and arguments (see formal reasoning).

Integers. Whole numbers, their opposites and zero.

Integral calculus. Used to calculate length, area and volume under a curve (see differential calculus).

Interquartile range. The third quartile minus the first quartile in box plots.

Inverse. The inverse of a conditional statement "if p then q" is "if not p then not q" (see converse).

Inverse for addition. The adding of the opposite to produce zero.

Inverse for multiplication. Multiplying by the negative reciprocal to produce 1.

Inverse variation. The equation $yx = k$ or $y = k/x$, where k is a constant (see direct variation).

Irrational numbers. Numbers that cannot be written as a/b, with a and b being integers.

Journals. Written communication to self or teacher.

Kinesthetic. Pertaining to movement.

Latus rectum. A perpendicular line to the major axis and through the focus of an ellipse.

Learner-centered. When the teacher is a facilitator and students generate learning and/or knowledge.

Lemma. A theorem used to prove another theorem.

Linear function or equation. A function that plots as a straight line in two-dimension. The function $y = mx + b$.

Logarithmic function. If $x = a^y$, then $y = \log_a x$ (see common and natural logarithm).

Manipulatives. Physical objects used for instruction.

Mass. A measure of the amount of matter measured in kilograms.

Mean. The sum of a set of data divided by how many are in the set.

Median. The middle number of a set of data.

Midpoint. A point equally distant from two other points.

Mode. The number or numbers that occur the most in a set of data.

Monomial. A polynomial that has only one term.

Natural logarithm. When the base e is 2.718281 ... Written as $\log_e x$ (see logarithm).

Natural numbers. The numbers 1, 2, 3, 4, . . .

Negation. A statement is not true.

Net. The unfolding of a solid onto two-dimensions (see cross-section).

Normal curve or normal distribution. A bell-shaped curve that occurs with many natural populations. Characterized by specific percentages based on standard deviation.

Open-ended problems. When problems have many possible answers. Used to measure process, problem solving, and connections.

Order of operations. Most but not all calculators normally do these operations automatically. For Step 3, if multiplication is to the left of division, the multiplication is done before division; treat Step 4 likewise.

Step 1. Do all operations inside ( ), [ ], { }, and above and below a division bar ————.
Step 2. Do all exponent operations.

Step 3. Do all divisions and multiplications from left to right.
Step 4. Do all addition and subtraction from left to right

Parabola. A locus of all points that are equally distant form a fixed point (focus) and a line (directrix).

Parallel lines. Two lines that continuing indefinitely with the same distance between them.

Parallelism. Two lines are parallel when the have the same slope, m, and different y-intercepts.

Percent. How many per hundred with the % symbol.

Percentiles. Indicates the percentage who scored less.

Perimeter. The distance, or sum of the sides around a polygon.

Permutation. Grouping of items where order is counted. For the same group of items, there will be more permutations than combinations.

Perpendicular lines. Two lines that intersect at right angles.

Pie or circle chart. Shows percentage or parts of a whole.

Piecewise exponential function. An exponential function with asymptotes.

Piecewise step-function. A function with discontinuities that is commonly graphed with restrictions on discontinuities described by a dot • for includes and a circle ◦ for excludes.

Place value. The value of each position in a number system.

Plane. A two-dimensional flat surface that extends infinitely.

Point. Indicates a location and has no length, width, or height.

Polynomials. Contains a monomial of monomials (see monomial).

Population. A large and complete group to be studied statistically.

Portfolios. Long-term collection of high quality work. Shows growth and development.

Postulate or axiom. Assumed true and does not require proof (see axiom, theorem, corollary).

Precision. Being able to reproduce the same measurement (see accuracy and significant figures).

Premise. A proposition that supports or is a statement.

Preoperational stage. The cognitive developmental stage of psychologist Jean Piaget that precedes the concrete operational stage (see concrete operational stage).

Prime numbers. Natural numbers with the only two factors being 1 and the number itself.

Process or processing. Refers to the thinking process in problem solving.

Product rule. Counts possible groups of elements from different sets by multiplication.

Projects. Long-term assignments requiring originality and real-life problems.

Proof. Logically proving something true based on what is known.

Proportion. An equation of two equivalent ratios: $a/b = c/d$.

Proposition. A proposed statement that can be only true or only false.

Protractor. A semicircular plastic used to mark off degrees for hand geometry drawings (see compass).

Pythagorean theorem. Right triangle formula $a^2 + b^2 = c^2$, with sides of a, b, c.

Quadratic, equation, function or relation. Of the form $y = ax^2 + bx + c$.

Quadratic formula. Determines the roots of a quadratic equation (see discriminant).

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

Quartiles. Divides data into four equal amounts, dividing at 25%, 50% and 75%.

Radical. The radical symbol is $\sqrt{\ }$. An example of a radical is , and the 16 is the radicand.

Radicand. The quantity inside the radical symbol.

Random sample. A small, selected part of a population.

Range (data). The difference between largest and smallest in a range.

Range (functions). The output of a function or relation (see domain).

Rational function. A function with a variable term in the denominator of a fraction.

Rational numbers. Numbers that can be written as a/b, with a and b being integers and $b \neq 0$.

Real numbers. All rational and irrational numbers.

Reflection. Flipping a figure over a line or axis (see glide-reflection and transformation (geometric)).

Reflection device. Used to draw reflections, lines of symmetry, congruent figures, etc.

Regression line. A line of best fit drawn through a two-variable scatter plot (see scatter plot).

Relation. Every input can have one or more output (see function).

Reliability. Consistently getting the same results (see bias and validity).

Right triangle. A triangle with a 90° angle (see Pythagorean theorem and hypotenuse).

Roots. The solutions to a quadratic equation. Often called zeros (see square root).

Rotation. A spinning of a figure around a point (see transformation (geometric)).

Rotational symmetry. When rotating around a point causes coinciding of a figure (see translational symmetry).

Rounding. Rules used for estimating to a specific place value.

Rubric. A procedure or scoring guide.

Sample space. Selecting a part of a population for measurement and a statistical study (see population and random sample).

Scale. A ratio used to draw figures or objects (e.g., the scale of a map).

Scatter plot. Plot of a bivariate data set with points.

Scientific notation. Used to express small and large numbers compactly.

Secant line. A line that crosses a function at two or more places (see tangent line).

Segment. A segment has length and is a portion of a line, or a part of something.

Sequence. A list of quantities related by a rule that determines the next quantity.

Significant figures. Includes all measurements that are known accurately and one more digit that is estimated (see accuracy and precision).

Similar. Same shape but different or equal size for geometric figures (see congruent).

Simple event. One outcome occurs.

Simulations. Generally is software simulating an experiment (see experiment).

Sine. The trigonometric ratio of an angle's opposite side over the hypotenuse in a right triangle.

Skew. A shift of data two one side.

Slope. Determines the angle and direction of the line of a linear equation. It is m in the linear equation $y = m\,x + b$.

Speed. Measures motion as a rate of distance over time. Can be called velocity.

Square root. The factor of a number, that when multiplied by itself produces the original number. The square root of 4 is 2.

Standard deviation. This measures deviation from the mean and is the square root of the variance. A lower standard deviation means less variability.

Statistic. A statistical item or element such as the mean, etc.

Statistics. Assembling and studying data (see descriptive and inferential statistics).

Stem-and-leaf plot. Main features are order and frequency.

Straight edge. A ruler or other straight device for drawing lines.

Substitution. A method of solving systems of equations or inequalities.

Supplementary angles. Two angles whose sum is 180° (see complementary angles).

Symbolic. The use of letters or other symbols to represent a concept, formula, equation, etc.

Symmetry. Same shape and form on opposite sides of a line of symmetry or axis of symmetry.

Systems of equations. Two or more equations with like variables.

Systems of inequalities. Two or more inequalities with like variables.

Tactile. Pertaining to touch.

TAKS. The Texas Assessment of Knowledge and Skills test that in 2003 replaces the TAAS (the Texas Assessment of Academic Skills test).

Tangent. The trigonometric ratio of an angle's opposite side over the adjacent side in a right triangle.

Tangent line. A line that crosses a function at one point and measures the slope at that point (see secant line).

TEKS. Texas Essential Knowledge and Skills (state curriculum guide).

Theorem. A rule or law that has been proved true (see axiom, corollary, postulate).

Translation. When a figure glides or slides across a two-dimensional plane (see transformation (geometric)).

Transformation (algebraic). Transforming a function or relation by the same operation, of the same number, on all parts.

Transformation (geometric). Moving, resizing, or reorienting a geometric figure (see dilation, glide or slide, glide-reflection, rotation, reflection, and translation).

Translational symmetry. Occurs with tessellations when left or right transformations cause coinciding (see rotational symmetry).

Tree diagram. Visual to show factors with downward branches.

Trigonometric function. A function whose waveform repeats.

Truth table. A table showing all possible results of a compound statement.

Unit circle. A circle whose center is located at the center of coordinate plane, and the radius equals one.

Validity. The instrument used measures what is intended to be measured (see reliability and bias).

Variance. A measure of the variability with respect to the mean (see standard deviation).

Velocity. See speed.

Vertex. The maximum or minimum point of a parabola or an ellipse.

Volume. Measure of the space inside a three-dimensional object.

Weight. A measure of the force of gravity.

Whole numbers. The natural numbers and zero.

x-intercept. Where a linear equation crosses the x-axis.

y-intercept. Where a linear equation crosses the y-axis.