Mathematics Calculator Guidance

Grade 8

TN Standard	Calculator Tested Subpart	Non-Calculator Tested Subpart	Lesson(s) i-Ready Math	Notes
Link to Calculator Step Guide				
8.NS.A.1 Know that real numbers that are not rational are called irrational (e.g., π, √2, etc.). Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually or terminates, and convert a decimal expansion which repeats eventually or terminates into a rational number.	✓	✓	Unit 6, Lessons 24 and 25	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to convert ratios to decimals. Historically, this standard has appeared on **both** the **calculator and non-calculator** subparts of the TCAP assessment.
8.NS.A.2 Use rational approximations of irrational numbers to compare the size of irrational numbers by locating them approximately on a number line diagram. Estimate the value of irrational	✓	✓	Unit 6, Lesson 25	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator.

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expressions (such as π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.				The calculators can be used to approximate the value of irrational numbers. Historically, this standard has appeared on **both** the **calculator and non-calculator** subparts of the TCAP assessment. Instruction should prepare students to demonstrate mastery with and without the aid of the calculator.
8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 x 3-5 = 3-3 = 1/33 = 1/27.	✓	✓	Unit 5, Lessons 19 and 20	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to apply mathematical operations to exponents when simplifying or expanding linear expressions. Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment.
8.EE.A.2 Use square root and cube root symbols to represent		✓	Unit 6, Lessons 23 and 25	Instruction should prepare students to demonstrate

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solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes.				mastery with and without the aid of the calculator. The calculators can be used to check values of exponents and radicals. Historically, this standard has appeared on **both** the **calculator and non-calculator** subparts of the TCAP assessment.
8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 x 108 and the population of the world as 7 x 109, and determine that the world population is more than 20 times larger.			Unit 5, Lesson 21	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to check values or estimations of exponents and scientific notation. Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment.

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8.EE.A.4 Use technology, solve real-world problems with numbers expressed in decimal and scientific notation. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading).	✓		Unit 5, Lesson 22	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to find solutions when applying mathematical operations to expressions involving scientific notation. The calculators can also be used to calculate unit conversions. Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment.
8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.	✓		Unit 3, Lesson 8 Unit 4, Lesson 17	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to calculate and check proportional relationships (unit rate) between values.
8.EE.B.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-	✓		Unit 3, Lessons 8 and 9	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator.

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vertical line in the coordinate plane; know and apply the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.				The calculators can be used to calculate the proportional relationship between points or a set of points when given a graph. (Slope formula) The calculators can be used to convert or calculate scale factor to identify the unit rate.
8.EE.C.7 Solve linear equations in one variable. **a.** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). **b.** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combing like terms.	✓		Unit 3, Lessons 10 and 11	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on **both** the **calculator and non-calculator** subparts of the TCAP assessment. If calculators are permitted, they can be used to find solutions to linear equations using the appropriate mathematical operations.

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8.EE.C.8 Analyze and solve systems of two linear equations. **a.** Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. **b.** Estimate solutions by graphing a system of two linear equations in two variables. Identify solutions by inspecting graphs.	✓	✓	Unit 3, Lessons 12 and 14	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. If calculators are permitted, they can be used to find solutions to system of equations using the appropriate mathematical operations.
8.EE.C.9 By graphing on the coordinate plane or by analyzing a given graph, determine the solution set of a linear inequality in one or two variables.			One-Day Activity: Determine the Solution of Linear Inequalities	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. If calculators are permitted, they can be used to find solutions to system of equations using the appropriate mathematical operations.

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8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in 8th grade.)	✓	✓	Unit 4, Lesson 15	Historically, this standard has appeared on **both** the **calculator and non-calculator** subparts of the TCAP assessment. Instruction should prepare students to demonstrate mastery with and without the aid of the calculator.
8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and another linear function represented by an algebraic expression, determine which function has the greater rate of change.*	✓	✓	Unit 4, Lesson 17	Historically, this standard has not appeared on the TCAP practice assessment. Instruction should prepare students to demonstrate mastery with and without the aid of the calculator.
8.F.A.3 Know and interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s^2 giving the area of a square as a function of its side length is not linear because its graph	✓	✓	Unit 4, Lesson 15	Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. Instruction should prepare students to demonstrate

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contains the points (1,1), (2,4) and (3,9), which are not on a straight line.				mastery with and without the aid of the calculator.
8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.	✓	✓	Unit 4, Lesson 16	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. If the calculators are permitted, they can be used to find the rate of change (slope) when given a graph, table, or set of coordinates.
8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	✓		Unit 4, Lesson 18	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. If the calculators are permitted, they can be used to find the approximate rate(s) of change when given a graph.

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8.G.A.1 Describe the effect of translations, rotations, reflections, and dilations on two-dimensional figures using coordinates. a. Verify informally that lines are taken to lines, and determine when line segments are taken to line segments of the same length. b. Verify informally that angles are taken to angles of the same measure. c. Verify informally that parallel lines are taken to parallel lines. d. Make connections between dilations and scale factors.	✓	✓	Unit 1, Lessons 1, 2and 3 Unit 2, Lessons 4 and 5	Instruction should prepare students to demonstrate mastery **with and without** the aid of the calculator. Historically, this standard has appeared on the **non-calculator** subpart of the TCAP assessment.
8.G.A.2 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	✓	✓	Unit 2, Lessons 6 and 7	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to apply transformation rules to coordinates to verify their effects on two-dimensional figures and solve equations.

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8.G.B.3 Explain a model of the Pythagorean Theorem and its converse.	✓		Unit 6, Lesson 26	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to find solutions applying triangle angle sum and exterior angle theorems to solve for missing angles. The calculators can be used to solve for missing angles by applying the appropriate angle relationship theorems.
8.G.B.4 Know and apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	✓	✓	Unit 6, Lesson 27	Historically, this standard has appeared on **both** the **calculator and non-calculator** subparts of the TCAP assessment Instruction should prepare students to demonstrate mastery with and without the aid of the calculator.

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				The calculators can be used to apply and verify the Pythagorean Theorem. The calculators can be used to find common factors to simplify radicals.
8.G.B.5 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	✓	✓	Unit 6, Lesson 27	Historically, this standard has appeared on **both** the **calculator and non-calculator** subparts of the TCAP assessment Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to apply and verify the Pythagorean Theorem. The calculators can be used to find common factors to simplify radicals.
8.G.C.6 Apply the formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems.	✓		Unit 6, Lesson 28	Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. Instruction should prepare students to demonstrate

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				mastery with and without the aid of the calculator. The calculators can be used to apply and verify the Pythagorean Theorem. The calculators can be used to find common factors to simplify radicals.
8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	✓	✓	Unit 7, Lesson29	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on the **non-calculator** subpart of the TCAP assessment. If the calculator is permitted, they can be used to find the approximate rate of change of any set of points to make inferences about scatter plots.
8.SP.A.2 Know that straight lines are widely used to model linear relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line and informally	✓	✓	Unit 7, Lesson29	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on **both** the

assess the model fit by judging the closeness of the data points to the line.				**<u>calculator and non-calculator</u>** subparts of the TCAP assessment. The calculators can be used to find the approximate rate of change of any set of points to make inferences and interpretations about scatter plots.
8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercepts. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.	✓		Unit 7, Lesson30	Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. Historically, this standard has appeared on the **<u>calculator</u>** subpart of the TCAP assessment. The calculators can be used to find the approximate rate of change of any set of points to make inferences and interpretations about scatter plots. The calculators can be used to compute input and output when solving or interpreting data in linear models.

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8.SP.B.4 Find probabilities of and represent sample spaces for compound events using organized lists, tables, tree diagrams, and simulation.	✓		• One-Day Activity: Investigate Compound Events • One-Day Activity: Find Probabilities of Compound Events with Two Events • One-Day Activity: Find Probabilities of Compound Events with More than Two Events • One-Day Activity: Use Simulations to Find Probabilities for Compound Events	Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to find solutions involving probability.
8.SP.B.4a Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.	✓		One-Day Activity: Investigate Compound Events	Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to find solutions involving probability.

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8.SP.B.4b Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event**.**			• One-Day Activity: Find Probabilities of Compound Events with Two Events • One-Day Activity: Find Probabilities of Compound Events with More than Two Events • One-Day Activity: Use Simulations to Find Probabilities for Compound Events	Historically, this standard has appeared on the **calculator** subpart of the TCAP assessment. Instruction should prepare students to demonstrate mastery with and without the aid of the calculator. The calculators can be used to find solutions involving probability.

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