

OHEOC Tutorials for Ohio are designed specifically for the Ohio Learning Standards to prepare students for the Ohio End Of Course assessments. EOC Categories are at the heart of OHEOC Tutorial structure – bringing category-based learning to the student experience, and category-based performance and progress tracking to the teacher experience.

Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

Test-Taking Strategies for EOC Tutorials allow students to practice and apply learning approaches that will hone their test-taking skills and focus them for success on the day of their EOC test.

1. REAL NUMBER SYSTEM

● MONITORING PRECISION AND ACCURACY

- **OH.Math.HSN.Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- **OH.Math.HSN.Q.2** Define appropriate quantities for the purpose of descriptive modeling.
- **OH.Math.HSN.Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

2. EQUATIONS AND INEQUALITIES

● ONE-STEP EQUATIONS AND INEQUALITIES

- **OH.Math.HSA.CED.1a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.1b** Focus on applying simple quadratic expressions.
- **OH.Math.HSA.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

● MULTI-STEP EQUATIONS AND INEQUALITIES

- **OH.Math.HSA.CED.1a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.1b** Focus on applying simple quadratic expressions.
- **OH.Math.HSA.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

● AXIOMS OF EQUALITY

- **OH.Math.HSA.REI.1** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

- **LITERAL EQUATIONS**

- **OH.Math.HSA.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **OH.Math.HSA.CED.4a** Focus on formulas in which the variable of interest is linear or square.

3. WRITING EXPRESSIONS AND EQUATIONS

- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**

- **OH.Math.HSA.SSE.1a** Interpret parts of an expression, such as terms, factors, and coefficients.
- **OH.Math.HSA.SSE.2** Use the structure of an expression to identify ways to rewrite it.

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**

- **OH.Math.HSA.CED.1a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.1b** Focus on applying simple quadratic expressions.

- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**

- **OH.Math.HSA.CED.1a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.1b** Focus on applying simple quadratic expressions.

4. FUNCTIONS

- **FUNCTIONS AND RELATIONS**

- **OH.Math.HSF.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- **OH.Math.HSF.IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.

- **DOMAIN AND RANGE**

- **OH.Math.HSF.IF.5b** Focus on linear, quadratic, and exponential functions.

- **EVALUATING FUNCTIONS**

- **OH.Math.HSF.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

5. GRAPHS OF LINEAR FUNCTIONS

- **SLOPE**

- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**

- **OH.Math.HSF.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.

6. LINEAR FUNCTIONS

- **GRAPHING AND MANIPULATING $Y = MX + B$**

- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.
- **OH.Math.HSF.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.
- **OH.Math.HSF.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a

graph, a description of a relationship, or two input-output pairs (include reading these from a table).

- **OH.Math.HSF.IF.7a** *Graph linear functions and indicate intercepts.*
- **OH.Math.HSA.CED.2a** *Focus on applying linear and simple exponential expressions.*
- **OH.Math.HSA.CED.2b** *Focus on applying simple quadratic expressions.*

7. LINEAR EQUATIONS

● SLOPE-INTERCEPT FORM OF A LINEAR EQUATION

- **OH.Math.HSA.REI.10** *Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).*
- **OH.Math.HSF.LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
- **OH.Math.HSF.IF.7a** *Graph linear functions and indicate intercepts.*

● POINT-SLOPE FORM OF A LINEAR EQUATION

- **OH.Math.HSA.REI.10** *Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).*
- **OH.Math.HSF.LE.2** *Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
- **OH.Math.HSF.IF.7a** *Graph linear functions and indicate intercepts.*

8. TWO-VARIABLE LINEAR SYSTEMS

● SOLVING SYSTEMS OF LINEAR EQUATIONS: GUESS AND CHECK

- **OH.Math.HSA.CED.3a** *While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations.*
- **OH.Math.HSA.REI.6a** *Limit to pairs of linear equations in two variables.*

● SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- **OH.Math.HSA.CED.2a** *Focus on applying linear and simple exponential expressions.*
- **OH.Math.HSA.CED.2b** *Focus on applying simple quadratic expressions.*
- **OH.Math.HSA.CED.3a** *While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations.*
- **OH.Math.HSA.REI.11** *Explain why the x -coordinates of the points where the graphs of the equation $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, making tables of values, or finding successive approximations.*
- **OH.Math.HSA.REI.6a** *Limit to pairs of linear equations in two variables.*

● SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION

- **OH.Math.HSA.CED.2a** *Focus on applying linear and simple exponential expressions.*
- **OH.Math.HSA.CED.2b** *Focus on applying simple quadratic expressions.*
- **OH.Math.HSA.CED.3a** *While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations.*
- **OH.Math.HSA.REI.6a** *Limit to pairs of linear equations in two variables.*

● SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION

- **OH.Math.HSA.CED.2a** *Focus on applying linear and simple exponential expressions.*
- **OH.Math.HSA.CED.2b** *Focus on applying simple quadratic expressions.*
- **OH.Math.HSA.CED.3a** *While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations.*
- **OH.Math.HSA.REI.5** *Verify that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.*
- **OH.Math.HSA.REI.6a** *Limit to pairs of linear equations in two variables.*

9. LINEAR INEQUALITIES

● GRAPHS OF LINEAR INEQUALITIES

- **OH.Math.HSA.CED.3a** While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations.
- **OH.Math.HSA.REI.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

● SOLVING SYSTEMS OF LINEAR INEQUALITIES

- **OH.Math.HSA.CED.2a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.2b** Focus on applying simple quadratic expressions.
- **OH.Math.HSA.CED.3a** While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations.
- **OH.Math.HSA.REI.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

10. EXPONENTIAL FUNCTIONS, EQUATIONS, AND INEQUALITIES

● EXPONENTIAL FUNCTIONS

- **OH.Math.HSA.SSE.1b** Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **OH.Math.HSA.SSE.3c** Use the properties of exponents to transform expressions for exponential functions.
- **OH.Math.HSF.IF.8b.i** Focus on exponential functions evaluated at integer inputs.
- **OH.Math.HSF.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.
- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.
- **OH.Math.HSF.IF.7e** Graph simple exponential functions, indicating intercepts and end behavior.
- **OH.Math.HSF.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

● EXPONENTIAL GROWTH AND DECAY

- **OH.Math.HSA.SSE.1b** Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **OH.Math.HSF.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.
- **OH.Math.HSF.IF.8b.i** Focus on exponential functions evaluated at integer inputs.
- **OH.Math.HSF.LE.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
- **OH.Math.HSF.LE.1a** Show that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.
- **OH.Math.HSF.LE.1b** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- **OH.Math.HSF.LE.1c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **OH.Math.HSA.CED.2a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.2b** Focus on applying simple quadratic expressions.
- **OH.Math.HSF.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

● SOLVING EXPONENTIAL INEQUALITIES

- **OH.Math.HSF.LE.1c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **OH.Math.HSA.CED.2a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.2b** Focus on applying simple quadratic expressions.

11. SEQUENCES

• SEQUENCES

- **OH.Math.HSF.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- **OH.Math.HSF.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
- **OH.Math.HSF.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- **OH.Math.HSF.BF.1a.i** Focus on linear and exponential functions.
- **OH.Math.HSF.BF.1a.ii** Focus on situations that exhibit quadratic or exponential relationships.

• ARITHMETIC AND GEOMETRIC SEQUENCES

- **OH.Math.HSF.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
- **OH.Math.HSF.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- **OH.Math.HSF.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- **OH.Math.HSF.BF.1a.i** Focus on linear and exponential functions.
- **OH.Math.HSF.BF.1a.ii** Focus on situations that exhibit quadratic or exponential relationships.

12. POLYNOMIALS

• POLYNOMIAL BASICS

- **OH.Math.HSA.SSE.1a** Interpret parts of an expression, such as terms, factors, and coefficients.

• ADDITION AND SUBTRACTION OF POLYNOMIALS

- **OH.Math.HSA.APR.1a** Focus on polynomial expressions that simplify to forms that are linear or quadratic.

• MULTIPLICATION OF POLYNOMIALS

- **OH.Math.HSA.APR.1a** Focus on polynomial expressions that simplify to forms that are linear or quadratic.

13. FACTORING

• FACTORING QUADRATIC TRINOMIALS

- **OH.Math.HSA.SSE.3a** Factor a quadratic expression to reveal the zeros of the function it defines.
- **OH.Math.HSA.REI.4b** Solve quadratic equations as appropriate to the initial form of the equation by inspection, e.g., for $x^2 = 49$; taking square roots; completing the square; applying the quadratic formula; or utilizing the Zero-Product Property after factoring.

• FACTORING SPECIAL CASES

- **OH.Math.HSA.SSE.2** Use the structure of an expression to identify ways to rewrite it.
- **OH.Math.HSA.SSE.1b** Interpret complicated expressions by viewing one or more of their parts as a single entity.

• FACTORING HIGHER-ORDER POLYNOMIALS

- **OH.Math.HSA.SSE.2** Use the structure of an expression to identify ways to rewrite it.

14. QUADRATIC FUNCTIONS

• QUADRATIC FUNCTIONS

- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.

15. GRAPHS OF QUADRATIC FUNCTIONS

● ANALYZING GRAPHS OF QUADRATIC FUNCTIONS

- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.
- **OH.Math.HSF.IF.5b** Focus on linear, quadratic, and exponential functions.
- **OH.Math.HSA.REI.4b** Solve quadratic equations as appropriate to the initial form of the equation by inspection, e.g., for $x^2 = 49$; taking square roots; completing the square; applying the quadratic formula; or utilizing the Zero-Product Property after factoring.
- **OH.Math.HSF.IF.7b** Graph quadratic functions and indicate intercepts, maxima, and minima.

● REPRESENTATIONS OF QUADRATIC FUNCTIONS

- **OH.Math.HSA.SSE.2** Use the structure of an expression to identify ways to rewrite it.
- **OH.Math.HSA.REI.4a** Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions.
- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.
- **OH.Math.HSF.IF.8a.i** Focus on completing the square to quadratic functions with the leading coefficient of 1.
- **OH.Math.HSA.CED.2a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.2b** Focus on applying simple quadratic expressions.
- **OH.Math.HSA.SSE.3a** Factor a quadratic expression to reveal the zeros of the function it defines.

16. SOLVING QUADRATIC EQUATIONS

● SOLVING QUADRATIC EQUATIONS BY FACTORING

- **OH.Math.HSA.SSE.3a** Factor a quadratic expression to reveal the zeros of the function it defines.
- **OH.Math.HSA.REI.4b** Solve quadratic equations as appropriate to the initial form of the equation by inspection, e.g., for $x^2 = 49$; taking square roots; completing the square; applying the quadratic formula; or utilizing the Zero-Product Property after factoring.
- **OH.Math.HSF.IF.8a.i** Focus on completing the square to quadratic functions with the leading coefficient of 1.

● COMPLETING THE SQUARE

- **OH.Math.HSA.REI.4b** Solve quadratic equations as appropriate to the initial form of the equation by inspection, e.g., for $x^2 = 49$; taking square roots; completing the square; applying the quadratic formula; or utilizing the Zero-Product Property after factoring.
- **OH.Math.HSA.SSE.3b** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- **OH.Math.HSF.IF.7b** Graph quadratic functions and indicate intercepts, maxima, and minima.
- **OH.Math.HSF.IF.8a.i** Focus on completing the square to quadratic functions with the leading coefficient of 1.
- **OH.Math.HSA.REI.4a** Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions.

● QUADRATIC FORMULA

- **OH.Math.HSA.REI.4a** Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions.
- **OH.Math.HSA.REI.4b** Solve quadratic equations as appropriate to the initial form of the equation by inspection, e.g., for $x^2 = 49$; taking square roots; completing the square; applying the quadratic formula; or utilizing the Zero-Product Property after factoring.
- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.

17. PARENT FUNCTIONS AND TRANSFORMATIONS

● LINEAR AND EXPONENTIAL PARENT FUNCTIONS

- **OH.Math.HSF.IF.5b** Focus on linear, quadratic, and exponential functions.
- **OH.Math.HSA.REI.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

- **QUADRATIC PARENT FUNCTION**

- **OH.Math.HSF.IF.5b** Focus on linear, quadratic, and exponential functions.

- **TRANSFORMATIONS OF THE QUADRATIC PARENT FUNCTION**

- **OH.Math.HSF.BF.3a** Focus on transformations of graphs of quadratic functions, except for $f(kx)$.

18. ADVANCED SYSTEMS OF EQUATIONS

- **SOLVING THREE-VARIABLE SYSTEMS OF LINEAR EQUATIONS**

- **OH.Math.HSA.CED.3a** While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations.
- **OH.Math.HSA.REI.5** Verify that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

- **SYSTEMS OF NONLINEAR EQUATIONS**

- **OH.Math.HSA.REI.7** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
- **OH.Math.HSA.REI.11** Explain why the x -coordinates of the points where the graphs of the equation $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, making tables of values, or finding successive approximations.

19. WORKING WITH FUNCTIONS

- **INVERSE FUNCTIONS**

- **OH.Math.HSF.BF.4a** Informally determine the input of a function when the output is known.

- **LINEAR VERSUS NONLINEAR FUNCTIONS**

- **OH.Math.HSF.LE.1a** Show that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.
- **OH.Math.HSF.LE.1b** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- **OH.Math.HSF.LE.1c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **OH.Math.HSF.IF.9b** Focus on linear, quadratic, and exponential functions.
- **OH.Math.HSF.IF.4b** Focus on linear, quadratic, and exponential functions.

20. REPRESENTATIONS OF FUNCTIONS

- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**

- **OH.Math.HSA.CED.2a** Focus on applying linear and simple exponential expressions.
- **OH.Math.HSA.CED.2b** Focus on applying simple quadratic expressions.
- **OH.Math.HSF.IF.9b** Focus on linear, quadratic, and exponential functions.

21. STATISTICS

- **DATA ANALYSIS**

- **OH.Math.HSS.ID.1** Represent data with plots on the real number line (dot plots, histograms, and box plots) in the context of real-world applications using the GAISE model.

- **OH.Math.HSS.ID.2** *In the context of real-world applications by using the GAISE model, use statistics appropriate to the shape of the data distribution to compare center (median and mean) and spread (mean absolute deviation, interquartile range, and standard deviation) of two or more different data sets.*
- **OH.Math.HSS.ID.3** *In the context of real-world applications by using the GAISE model, interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).*

- **FREQUENCY TABLES**

- **OH.Math.HSS.ID.5** *Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.*

22. SCATTERPLOTS

- **SCATTERPLOTS**

- **OH.Math.HSS.ID.7** *Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.*
- **OH.Math.HSS.ID.6c** *Fit a linear function for a scatterplot that suggests a linear association.*
- **OH.Math.HSS.ID.8** *Compute (using technology) and interpret the correlation coefficient of a linear fit.*

- **SCATTERPLOTS AND MODELING**

- **OH.Math.HSS.ID.6c** *Fit a linear function for a scatterplot that suggests a linear association.*
- **OH.Math.HSS.ID.8** *Compute (using technology) and interpret the correlation coefficient of a linear fit.*
- **OH.Math.HSS.ID.7** *Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.*

23. TEST-TAKING STRATEGIES

- **STUDY HABITS**
- **BEING PREPARED AND GETTING STARTED**
- **WORDING IN TEST QUESTIONS**
- **WORDING IN ANSWER CHOICES**
- **QUESTIONS WITH PASSAGES AND VISUAL DATA**
- **ESSAY AND SHORT ANSWER QUESTIONS**
- **WORD PROBLEMS**