

Honors Algebra 1 - Expectations for Exit Exam

This Test-Out Exam is limited to 120 minutes. Students are allowed the use a scientific calculator for the exam, and it will be provided in the testing platform (students do not need to bring a calculator). The exam contains both multiple choice and constructed response items. Partial credit may be earned on some items. Any of the concepts listed below may be on the test. Students must score a 77% or above to pass the exam and be placed into Honors Geometry for the following school year.

Content Covered in the Course:

The Troy School District curriculum is based on the Michigan Mathematics Standards. The list below gives a brief description of the topics covered in Honors Algebra 1. The TSD Honors Algebra 1 content includes Math 8 power standards and standards for high school Algebra 1. For a detailed explanation of the content expectations, see the complete list of Michigan Mathematics Standards for Grade 8 and HS Algebra:

https://www.michigan.gov/-/media/Project/Websites/mde/Literacy/Content-Standards/Math_Standards.pdf?rev=1e793e2b1e314e4fa1abc754251b5dc9

The Exit Exam is a comprehensive assessment of the full Troy School District Curriculum and Michigan Mathematics Standards. Students should be prepared to demonstrate their proficiency on all content.

Rigid Transformations and Congruence

- Draw and label the image of figures that result from translations, rotations, and reflections on a square or isometric grid, and the coordinate plane and explain the sequence of transformations that takes one figure to its image.
- Compare and contrast side lengths, angle measures, and other features of shapes using rigid transformations to explain why a shape is or is not congruent to another.
- Justify that two polygons on a grid are congruent using the definition of congruence in terms of rigid transformations.
- Calculate angle measures using alternate interior angles of parallel lines cut by a transversal, vertical, and supplementary angles, and the triangle sum theorem to solve problems.

Dilations, Similarity, and Slope

- Identify the center, scale factor, and image of a dilation with a given scale factor on the coordinate plane.
- Calculate unknown side lengths in similar triangles using the ratios of side lengths within the triangles and the scale factor between similar triangles.
- Justify that two triangles are similar by finding a sequence of transformations that takes one triangle to the other or by checking that two pairs of corresponding angles are congruent
- Use slope triangles to create an equation of a line and use the equation to justify whether a point (x, y) is on the line.

Linear Relationships

- Create an equations, graphs and tables that represents linear relationships in context. Use appropriate scale and axes when graphing.
- Interpret the slope and y -intercept of the graph of a line in context.

Linear Equations and Linear Systems

- Write equivalent equations to solve linear equations in one variable.
- Describe features of linear equations that have one solution, no solution, or many solutions, including in context.
- Comprehend that solving a system of equations means finding values of the variables that make both equations true at the same time.
- Determine whether a system of equations will have 0, 1, or infinitely many solutions by analyzing their structure or by graphing.
- Create a system of equations that represents a situation and interpret the solution in context.
- Use elimination or substitution to create one or more equivalent systems to help solve the original system.

Linear Inequalities and Systems

- Write and solve inequalities in one variable to represent the constraints in situations and to solve problems.
- Write inequalities in two variables to represent the constraints in a situation, and use technology to graph the solution set to answer questions about the situation.
- Understand that the solution set of a system of inequalities in two variables is composed of any pair of values that make both inequalities true, and that it is represented graphically by the region where the graphs overlap.

Functions

- Understand that a relationship between two quantities is a function if there is only one possible output for each input.
- Sketch a graph and write an equation of a function given statements in function notation.
- Interpret key features of a graph—the intercepts, maximums, minimums, and intervals when the function is increasing or decreasing—in terms of a situation.
- Given a graph of a function, estimate or calculate the average rate of change over a specified interval.
- Define domain and range.
- Interpret the graph of piecewise function and an absolute value function in context.
- Find the inverse of a linear function.

Exponential Functions

- Use exponent rules to generate equivalent numerical expressions for powers of 10.
- Use exponent rules to generate equivalent numerical expressions for expressions with different bases and bases other than 10.
- Compare and contrast linear and exponential relationships in graphs and tables.

- Write and graph an equation that represents exponential growth or decay to solve problems, including in function notation.
- Write an equation of the form $y = a \cdot b^x$ to represent a quantity a that changes by a growth factor b .
- Describe the effect of changing a and b on a graph that represents $f(x) = a \cdot b^x$.
- Calculate the result of repeated percent increase for the same initial balance and interest rate, but compounded at different intervals.

Quadratic Functions

- Comprehend that a “quadratic relationship” can be expressed with a squared term and interpret quadratic functions that represent a physical phenomenon, given expressions and graphs.
- Determine and explain whether a visual pattern represents a linear, exponential, or quadratic relationship.
- Use the distributive property to write equivalent quadratic expressions from factored into standard form.
- Coordinate a quadratic expression given in factored form and the intercepts of its graph.

Pythagorean Theorem and Irrational Numbers

- Use the square root symbol to represent solutions to equations of the form $x^2 = n$ and represent the square root as a point on the number line.
- Comprehend the term “square root of n ” and the notation \sqrt{n} to mean the side length of a square whose area is n square units.
- Define irrational number.

Quadratic Equations

- Write quadratic equations, and reason about their solutions in context.
- Use factored form and the zero product property to solve quadratic equations.
- Given a quadratic expression of the form $ax^2 + bx + c$, create an equivalent expression in factored form.
- Solve quadratic equations of the form $x^2 + bx + c = 0$ by rearranging terms and completing the square.

One-Variable and Two-Variable Statistics

- Create and interpret data displays such as dot plots, histograms, and box plots.
- Describe the shape of a distribution, including a measure of center and a measure of variability.
- Describe the effect of outliers on a distribution of data.
- Recognize standard deviation as a measure of variability.
- Create relative frequency tables from information given in a two-way table or about a situation.
- Comprehend the connection between residuals, variability, and whether or not using a linear model is appropriate.
- Investigate the relationship between two variables to analyze whether or not the relationship is causal.

- Describe the strength and sign of the relationship between variables based on the correlation coefficient.

Students will also be expected to show proficiency in the Standards for Mathematical Practice (Common Core State Standards):

- Standard 1: Make sense of problems and persevere in solving them
- Standard 2: Reason abstractly and quantitatively
- Standard 3: Construct viable arguments and critique the reasoning of others
- Standard 4: Model with mathematics
- Standard 5: Use appropriate tools strategically
- Standard 6: Attend to precision
- Standard 7: Look for and make use of structure
- Standard 8: Look for and express regularity in repeated reasoning