Integrated Mathematics I Performance Level Descriptors

Limited

A student performing at the **Limited Level** demonstrates a minimal command of Ohio's Learning Standards for Integrated Mathematics I. A student at this level has an emerging ability to demonstrate reasoning with numbers, quantities, expressions, and equations to solve problems, to write and analyze functions to model and solve problems, to use geometric transformations to prove congruence of triangles and theorems, and to summarize and interpret data on one or two variables.

A student whose performance lies within the **Limited Level** typically can:

- Carry out some routine procedures to solve straight forward one-step problems;
- Recognize solutions to some simple computation, straight forward problems;
- Compute accurately a few grade level numbers and operations;
- Recognize a few grade level mathematical concepts, terms and properties, and,
- Use previous grade level mathematical concepts, terms and properties.

A student at the **Limited Level** can:

- Identify units in familiar formulas involving whole numbers;
- Identify parts of simple linear expressions: terms, factors and coefficients;
- Solve simple linear equations with integer coefficients and inequalities with whole number coefficients in one variable situations, with integer constants and whole number solutions;
- Solve a few linear equations in two variables to describe a familiar situation using whole numbers supported by algebra manipulatives or diagrams**.**
- Given a straight forward linear relationship in context, sometimes write a function
- Given a graph of a simple function modeling a linear relationship between two quantities, determine where the function is increasing, decreasing, positive, or negative;
- Graph linear functions and show whole number intercepts;
- Match graphs of linear equations to tables of solutions;
- Recognize definitions of ray, angle, circle, perpendicular lines, parallel lines, and line segment;
- Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure;
- Use coordinates to compute perimeters of polygons with sides that are horizontal or vertical**.**
- Describe the comparison of center (median, mean) of two different data sets.

Integrated Mathematics I Performance Level Descriptors

Basic

A student performing at the **Basic Level** demonstrates partial command of Ohio's Learning Standards for Integrated Mathematics I. A student at this level has a general ability to demonstrate reasoning with numbers, quantities, expressions, and equations to solve problems, to write and analyze functions to model and solve problems, to use geometric transformations to prove congruence of triangles and theorems, and to summarize and interpret data on one or two variables.

A student whose performance falls within the **Basic Level** typically can**:**

- Carry out routine procedures;
- Solve simple problems using visual representations;
- Compute accurately some grade level numbers and operations;
- Recall and recognize some grade level mathematical concepts, terms and properties, and,
- Use more previous grade level mathematical concepts, terms and properties.

A student at the **Basic Level** can:

- Choose and interpret units in formulas;
- Given a situation, context, or problem, students will identify, and use appropriate quantities for representing the situation;
- Identify parts of simple linear expressions in terms of the context the quantity represents: terms, factors and coefficients**;**
- Create linear equations in two variables and inequalities in one variable and use them to solve simple routine problems**;**
- Evaluate given possible solutions as viable or non-viable options in a modeling context**;**
- Solve simple linear equations and inequalities with integer coefficients in one variable situations;
- Solve one-step linear equations with coefficients represented by letters, including formulas.
- Solve simple systems of two linear equations in two variables exactly algebraically;
- Understand that the graph of a function f is the graph of the equation $y = f(x)$;
- Given a graph of a function that models a linear relationship between two quantities, interpret key features: intercepts; intervals where the function is increasing, decreasing, positive, or negative;
- Know precise definitions of ray, angle, circle, perpendicular lines, parallel lines, and line segment;

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- Given two triangles, determine if the two triangles are congruent based upon sides and angles;
- Compare transformations that preserve distance and angle to those that do not;
- Use geometric descriptions of rigid motions to transform figures;
- Use the slope criteria for parallel or perpendicular lines to solve geometric problems;
- Use coordinates to compute areas of triangles and rectangles with horizontal and/or vertical sides.
- Recognize the difference between a linear and exponential situation represented by a graph or equation;
- Represent given data in a different statistical model;
- Interpret key features of a scatterplot (linear or nonlinear, correlation).

Integrated Mathematics I Performance Level Descriptors

Proficient

A student performing at the **Proficient Level** demonstrates an appropriate command of Ohio's Learning Standards for Integrated Mathematics I. A student at this level has a consistent ability to demonstrate reasoning with numbers, quantities, expressions, and equations to solve problems, to write and analyze functions to model and solve problems, to use geometric transformations to prove congruence of triangles and theorems, and to summarize and interpret data on one or two variables.

A student whose performance falls within the **Proficient Level** typically can:

- Solve most routine and straightforward problems accurately;
- Compute accurately with most grade level numbers and operations;
- Apply most grade level mathematical concepts, terms and properties, and,
- Use informal (visual representation and language) and some formal reasoning.

A student at the **Proficient Level** can:

- Choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays;
- Interpret parts of a simple exponential expression, such as terms, factors, coefficients, bases, and exponents in terms of its context;
- Create exponential equations in one or two variables and use them to solve routine problems;
- Graph equations on coordinate axes with appropriate labels and scales;
- Select a viable argument to justify a solution method for a simple linear equation;
- Solve multi-step linear equations and inequalities with integer coefficients in one variable situations;
- Solve multistep linear equations with coefficients represented by letters, including formulas.
- For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities; sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries;
- Relate the domain of a function to its graph;
- Solve a system of linear inequalities in two variables graphically;
- Recognize the difference between linear and exponential situations from real-world contexts or a variety of representations;

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- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- Recognize precise definitions of ray, angle, circle, perpendicular lines, parallel lines, and line segment based on the undefined notions of point, line, distance along a line and distance around a circular arc;
- Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent;
- Find the measures of inscribed angles and circumscribed angles given the measures of their intercepted arcs;
- Use the slope criteria for parallel and perpendicular lines to solve geometric problems algebraically;
- Use coordinates to compute perimeters of polygons and areas of triangles and rectangles (e.g. distance formula).
- Use statistics appropriate to the shape of the data distribution to compare center (median, mean) of two or more different data sets;
- Fit a linear function for a scatter plot that suggests a linear association;
- Compute (using technology) the correlation coefficient of a linear fit.

Integrated Mathematics I Performance Level Descriptors

Accelerated

A student performing at the **Accelerated Level** demonstrates a strong command of Ohio's Learning Standards for Integrated Mathematics I. A student at this level has a superior ability to demonstrate reasoning with numbers, quantities, expressions, and equations to solve problems, to write and analyze functions to model and solve problems, to use geometric transformations to prove congruence of triangles and theorems, and to summarize and interpret data on one or two variables.

Students whose performance falls within the **Accelerated Level** typically can:

- Accurately solve routine and straight forward problems;
- Solve a variety of routine and multi-step problems;
- Compute accurately and efficiently with familiar numbers,
- Recognize connections between mathematical concepts, terms and properties, and,
- Use informal and some formal reasoning with symbolic representation.

A student at the **Accelerated Level** can:

- Interpret linear expressions by viewing one or more of their parts as a single entity in respect to the context;
- Create exponential equations and inequalities in one or two variables and use them to solve problems;
- Represent constraints by systems of equations and/or inequalities;
- Construct a viable argument to justify a solution method for a system of linear equations;
- Solve multi-step linear equations and inequalities with rational coefficients in one variable situations;
- Solve multistep linear equations with coefficients represented by letters, including formulas, which could include factoring or distributive property.
- Find the approximate solutions of the equation $f(x) = g(x)$ by finding the x-coordinates where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect, including cases where $f(x)$ and/or $g(x)$ are linear or exponential;
- Create an explicit function to define an arithmetic sequence;
- For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: end behavior;
- Relate the domain of a function to the quantitative relationship it describes;
- Specify, using numeric values, a sequence of transformations that will carry a given figure onto another;
- Use statistics appropriate to the shape of the data distribution to compare spread (interquartile range, standard deviation) of two or more different data sets;
- Interpret conditional relative frequencies in the context of the data;
- Find and use linear models to solve problems in the context of the data;
- Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Integrated Mathematics I Performance Level Descriptors

Advanced

A student performing at the **Advanced Level** demonstrates a distinguished command of Ohio's Learning Standards for Integrated Mathematics I. A student at this level has a sophisticated ability to demonstrate reasoning with numbers, quantities, expressions, and equations to solve problems, to write and analyze functions to model and solve problems, to use geometric transformations to prove congruence of triangles and theorems, and to summarize and interpret data on one or two variables.

A student whose performance falls within the **Advanced Level** typically can:

- Solve routine and straightforward problems accurately and efficiently;
- Solve a variety of non-routine multi-step problems;
- Compute accurately and efficiently;
- Recognize, apply and justify mathematical concepts, terms and properties and their connections, and,
- Use more formal reasoning and symbolic representation (precise mathematical language).

A student at the **Advanced Level** can:

- Interpret exponential expressions by viewing one or more of their parts as a single entity in relationship to the context;
- Create quadratic and exponential equations and inequalities in one or two variables and use them to accurately solve routine and non-routine problems;
- Find and interpret solutions as viable or non-viable options in a modeling context;
- Construct a viable argument to justify a solution method for a quadratic equation.
- Interpret statements that use function notation in terms of a context;
- Recognize a recursive function that defines a sequence from a context;
- Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent;
- Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions;
- Use coordinates to accurately compute areas of triangles where sides are not horizontal or vertical; Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers);
- Use linear functions suggested by the data to solve problems in the context of the data.