Algebra I Summary

At this level it is expected that students will formalize and expand on Algebraic concepts established in previous coursework. Students will deepen and extend their understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend. Students will engage in methods for analyzing and using functions. Students will fluently move between multiple representations of functions including, but not limited to, linear, exponential, and quadratics.

Standards for Mathematical Practice

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

Functions and Coordinate Geometry

- Analyze a set of data for a pattern and represent the pattern algebraically or using graphing. For example, the *n*th term of the pattern 1, 5, 9, 13, . . . can be found using the expression $4n - 3$.
- Determine whether a relation is a function given a set of points or a graph. For example, the relation described by (3, 5), (4, 6), and (4, 9) is **not** a function because there are two different *y*-values for the *x*-value of 4.
- Identify the domain or range of a relation from a list of ordered pairs, a graph, or a table. For example, given the relation modeled by the table

x	1	2	3
y	5	5	8

  the domain is $x = \{1, 2, 3\}$, and the range is $y = \{5, 8\}$.
- Translate from one representation (table, equation, graph, or verbal description) to another representation. For example, the table

x	3	5	7
y	18	24	30

  can be represented by the equation $y = 3x + 9$.
- Solve problems involving a constant rate of change. For example, given the equation $y = 7x + 2$, determine that the *y*-value increases by 7 when the *x*-value increases by 1.
- Write a linear equation when given the graph of a line, two points on a line, or the slope and a point on a line. For example, a line with a slope of 6 that passes through the point (4, -2) can be modeled with the equation $y + 2 = 6(x - 4)$.
- Determine the slope or *y*-intercept represented by a linear equation or a graph. For example, given the equation $y = 2x + 3$, know that 2 is the slope and 3 is the *y*-intercept.
- Draw and find the equation for the line of best fit for a scatter plot.

Linear Equations and Inequalities

- Solve real-world and mathematical problems using linear equations. For example, know that a person who made $65 by earning $8 per hour for 4 hours plus tips (*t*) can be modeled by the equation $65 = 8(4) + t$.
- Justify the steps to solve a problem using algebraic properties. For example, know that $3x + 7 = 23$ can be simplified to $3x = 16$ because of the additive property of equality.
- Interpret solutions to problems modeled by linear equations in the context of the problem situation. For example, the equation $y = 50x + 200$ models the amount of money in a savings account that started with $200 and $50 is being added each week. The solution $y = 800$, $x = 12$ means that it will take 12 weeks before the savings account has $800.
- Write and solve a system of two linear equations using graphing, substitution or elimination. For example, given the equations $y = 5x + 7$ and $y = -3x - 1$, determine that (-1, 2) is the only point that lies on the lines for both equations.
- Interpret the solution of a system of linear equations in the context of a problem situation. For example, Jen bought 10 pieces of fruit. She paid a total of $0.40 for each apple and $0.30 for each banana and spent a total of $3.20. The situation is modeled by $x + y = 10$ and $0.4x + 0.3y = 3.2$. The solution $x = 2$ and $y = 8$ means that Jen bought 2 apples and 8 bananas.
- Solve problems and graph the solutions of linear inequalities in one variable. For example, simplify the inequality $1 < 3 - 2w < 7$ to $2 < w < 1$.
- Solve a system of two linear inequalities using graphing.

Diagnostic Category Skills List

Operations with Real Numbers and Expressions

- Compare and/or order real numbers. For example, $\pi < \sqrt{10} < 10/3$.
- Simplify square roots. For example, $\sqrt{24}$ is equivalent to $2\sqrt{6}$.
- Find the greatest common factor (GCF) and/or the least common multiple (LCM) for sets of monomials. For example, given $8x^2y^3$ and $6xy^4$, the GCF is $2xy^3$, and the LCM is $24x^2y^4$.
- Use properties of exponents, radicals, and absolute values to solve problems. For example, $(x^2\sqrt{x})^{-4}$ is equivalent to $1/(x^{10})$.
- Add, subtract, and multiply polynomial expressions. For example, $(x - 2)(x + 2) - (3x - 4)$ is equivalent to $x^2 - 3x$.
- Factor algebraic expressions. For example, $2x^2 + 14x - 36$ can be factored as $2(x + 9)(x - 2)$.
- Reduce a rational expression. For example, $(x^2 + 3x + 2)/(x^2 - x - 2)$ can be reduced to $(x + 2)/(x - 2)$; $x \neq -1$.

Data Analysis

- Calculate the range, quartiles, and interquartile range of a set of data. For example, for the data set 4, 4, 5, 5, 7, 8, 12, 13, the first quartile (Q1) is 4.5, the third quartile (Q3) is 10, and the interquartile range (IQR) is 5.5.
- Use data presented in a data display or by measure of center and variability to draw conclusions and make predictions. For example, after correcting 20 math tests, Ms. Gonzalez found the Q1 value for test scores was 72 and the Q3 value for test scores was 85. From these results, she predicted that 5 of the next 10 tests will have scores from 72 to 85.
- Make predictions using the equation or graph of a line of best fit in a scatter plot.
- Find the probability of a compound event. For example, a spinner is divided into three equal sections: one red, one blue, and one green. The spinner is spun twice. The probability of the spinner landing on red once and on blue once is 2/9.

Additional Materials and Resources can be found at:

http://www.pdesas.org/

or

https://pa.drcedirect.com/

July 2014

CLASSROOM DIAGNOSTIC TOOLS

Algebra I Summary, Standards for Mathematical Practice, and Diagnostic Category Skills List

The Algebra I Summary describes the expected performance that students in Algebra I are expected to demonstrate. The standards for mathematical practice describe practices that students should develop across grades in their study of mathematics. The Diagnostic Category Skills List provides descriptions of skills that students can be expected to demonstrate within each Diagnostic Category while taking the Classroom Diagnostic Tools for Algebra I. While this list does not include every possible skill that students may encounter within the CDT, it does provide a representative sample for each diagnostic category. Additionally, mathematics instruction should not address these as discrete skills but rather incorporate them with the standards for mathematical practice as a part of an integrated curriculum.

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