## Standards for Mathematical Practice

The eight standards for mathematical practice describe the "know-how" or habits of mind that we seek to develop in students. These practices define important methods and skills that students need to be mathematically proficient.

1. **Make sense of problems and persevere in solving them.**
   *Students seek the meaning of a problem and looks for efficient ways to represent and solve it. They may check their thinking by asking themselves, "What is the most efficient way to solve this?", "Does this make sense?", and "Can I solve the problem in a different way?".*

2. **Reason abstractly and quantitatively.**
   *Students represent a wide variety of real wold contexts through the use of real numbers and variables in mathematical expressions, equations, and inequalities.*

3. **Construct viable arguments and critique the reasoning of others.**
   *Students construct arguments using verbal or written explanations. They further refine their mathematical communication skills through mathematical discussions in which they critically evaluate their own thinking and the thinking of other students.*

4. **Model with mathematics.**
   *Students model problem situations symbolically, graphically, tabularly, and contextually. Students need many opportunities to connect and explain the connections between the different representations.*

5. **Use appropriate tools strategically.**
   *Students consider available tools (including estimation and technology) when solving a mathematical problem and decide when certain tools might be helpful.*

6. **Attend to precision.**
   *Students use clear and precise language in their mathematical discussions with others and in their own reasoning.*

7. **Look for and make use of structures.**
   *Students routinely seek patterns or structures to model and solve problems. For instance, students recognize patterns that exist in ratio tables recognizing both the additive and multiplicative properties.*

8. **Look for and express regularity in repeated reasoning.**
   *Students' use of repeated reasoning to understand algorithms and make generalizations about patterns.*

# Portland Public Schools

## Great Expectations:
## Standards and Practices for Algebra

### What are the Common Core State Standards?

For over a decade, research studies of mathematics education in high performing countries have concluded that mathematics instruction in the United States must become more focused and coherent in order to improve mathematics achievement. Historically, math standards have varied from state to state. In June of 2009, the development of the **Common Core State Standards** (CCSS) began**.** Oregon, along with over 45 other states, has adopted the CCSS and started assessing them in the 2014-15 school year.

The CCSS provide a clear and consistent understanding of what students are expected to learn in K-12 math. Common standards will help ensure that students are receiving a high quality education consistently, from school to school, and state to state. CCSS for mathematics includes two types of standards: one for ***mathematical practices*** (how students engage, apply, and extend their understandings of mathematical concepts) and one for ***mathematical content*** (what mathematical skills and procedures students are expected to know).

This guide outlines the mathematical content and practice standards that are taught in Algebra. The math content will focus on the following critical areas: manipulating two-variable equations; determining the equation of a line; modeling systems in multiple ways; solving systems using algebra; determining the line of best fit; representing one variable data on a scaled number line; rewriting, solving, graphing, and modeling quadratic expressions, equations, and functions; solving and graphing inequalities and represent them in multiple ways; modeling exponential functions in multiple ways; writing and evaluating sequences and series; and determining if a representation is a function and stating its domain and range. The eight mathematical practices define the ways that students engage with mathematics.

# Algebra Learning Targets

These learning targets encompass what a student should be proficient in by the end of Algebra. Mastery of this content will ensure student success at the next level.

## A1: Solving Linear Equations

(Example: Solve for $y$: $-8x + 2y = 2$)

- **A1a** - I can solve linear equations.
- **A1b** - I can manipulate two-variable equations.

## A2: Linear Functions

(Example: Given (-6,6) and slope of ½, find the equation of a line in $y = mx + b$ form.)

- **A2a** - I can model a linear function (in a table, graph, rule, & situation.
- **A2b** - I can determine the equation of a line.

## A3: Systems

(Example: Remi has $20 and is saving $6 per week, Odie has $150 and is spending $4 per week. When will they both have the same amount of money?)

- **A3a** - I can model systems in multiple ways.
- **A3b** - I can solve systems using algebra.

## A4: Statistics

(Example: Create a scatterplot and draw the line of best fit for a set of data. Write an equation for the line of best fit.)

- **A4a** - I can determine the line of best fit.
- **A4b** - I can represent one variable data on a scaled number line.

## A5: Quadratic Functions

(Example: Make a table and a graph of the parabola $y = -x^2 + 2x + 8$. Be sure to label all special points. Describe every connection you can between the rule, the table, and the graph. Be sure to consider symmetry, the vertex, intercepts, and the overall shape.)

- **A5a** - I can rewrite quadratic expressions.
- **A5b** - I can solve quadratic equations.
- **A5c** - I can graph quadratic functions.
- **A5d** - I can model quadratic functions.

## A6: Inequalities

(Example: To honor 50 years in business, All Strikes Bowling is having an anniversary special. Shoes rent for $1.25 and each game is $0.75. If Charlie has $20 and needs to rent shoes, how many games can he bowl?)

- **A6a** - I can solve and graph inequalities and respresent them in multiple ways.
- **A6b** - I can model inequalities and identify the solution region.

## A7: Exponents & Exponential Functions

(Example: Make a table of values and draw a graph of $y = 4(0.5)^x$.)

- **A7a** - I can apply the properties of exponents.
- **A7b** - I can model exponential functions in multiple ways.

## A8: Sequences & Series

(Example: During the last big rainstorm Darcy filled 12 buckets full to the rim. She plans to use one bucket of water each week. In the sun, each uncorvered bucket loses 0.35 gallons of its water volume each week. If each bucket starts with 15 gallons in it, how many gallons will be in each of the unused buckets after 2 weeks in the sun? After 7 weeks? At the end of the 12th week, how many total gallons of water will she have poured on her plants?)

- **A8a** - I can write sequences.
- **A8b** - I can evaluate series.

## A9: Functions

(Example: Evaluate $f(-5)$ for the function $f(x) = x^2 + 5x - 9$.)

- **A9a** - I can use function notation to evaluate and interpret functions.
- **A9b** - I can determine if a representation is a function and state its domain and range.