



PLTW Algebra 1 Advantage

Algebra 1 Advantage | Course Outline

The PLTW Algebra 1 Advantage curriculum includes a variety of engaging real-world, relevant investigations, projects, and problems that help students build confidence in Algebra 1 knowledge and skills. To build higher engagement and deeper understanding of mathematical concepts, the PLTW Algebra 1 curriculum will highlight connections to:

- *Careers and a diverse pool of professionals who use algebra in their day-to-day work.*
- *Problems that directly or indirectly relate to algebra.*
- *Scenarios from students' daily lives that relate to algebra.*

Algebra 1 Advantage (A1A) is designed to be a supplemental curriculum to accompany a core Algebra 1 course. It includes student content along with a comprehensive teacher guide that includes all the elements needed for teachers to incorporate into their lesson plans. A1A can be implemented into Algebra classrooms as a supplement from 8th grade and up.

A1A is designed to be strongly aligned with the Common Core Math State Standards. Students practice and apply knowledge and skills that go beyond the standards, including transportable skills needed for their success in school and beyond. The course engages students in critical and creative thinking, collaboration and communication, reflections and discussions about math and its real-world application, and building confidence and resilience in problem solving.

PLTW's Algebra 1 Advantage curriculum includes Projects, Problems and shorter Investigations, all designed to guide students through a multi-step learning process. Projects and Problems follow a four-step approach (Explore, Connect, Attempt, and Reflect), while Investigations use a condensed three-step format (Explore, Connect, and Reflect). In the Explore step, students engage in an exploration such as a simulation, a game, or an interactive graph and are asked to make observations. It sometimes also includes a career connection that ties directly to the topic. In the Connect step, students begin to make the connections from the exploration to the math. This step is well scaffolded and guides students through the math standards covered in the project or problem. In the Attempt section, students are given the opportunity to apply the skills and solve problems independently. Finally, in the Reflect step, students engage in conclusion questions, reflections, or discussions to conclude the experience. Projects are more scaffolded; the Connect step includes answers so students can check their work. Problems are less guided, and all answer keys are reserved for the Teacher Guide.

The following is a list of the lessons of study in the course.

Lesson 1	Numbers and Equations	(290 minutes)
Lesson 2	Linear Relationships	(340 minutes)
Lesson 3	Relations and Functions	(295 minutes)
Lesson 4	Linear Functions	(470 minutes)
Lesson 5	Systems of Linear Equations	(335 minutes)
Lesson 6	Graphing Quadratic Functions	(295 minutes)
Lesson 7	Solving Quadratic Functions	(290 minutes)
Lesson 8	Exponential Functions & Data Analysis	(315 minutes)

**Lesson 1: Numbers and Equations (290 minutes)**

Lesson 1 has a theme of animal rescue and care. The lesson introduces students to standards related to quantities, units, simple equations, and using equalities and inequalities to solve problems.

Investigation 1.1	Cats	(20 minutes)
Investigation 1.2	Clock Towers	(20 minutes)
Investigation 1.3	Carbon Capture	(25 minutes)
Project 1.1	Meerkats	(90 minutes)
Project 1.2	Auks	(45 minutes)
Problem 1.1	Snakes in a Lake	(45 minutes)
Problem 1.2	Volunteering	(45 minutes)

Lesson 2: Linear Relationships (340 minutes)

Lesson 2 transitions students to a theme of budgeting and planning. The lesson covers standards related to linear relationships in one variable, solving equations and inequalities in one variable, interpreting expressions, and identifying viable and non-viable solutions.

Investigation 2.1	Formula One	(25 minutes)
Project 2.1	Saving Up	(45 minutes)
Project 2.2	Shopping	(45 minutes)
Project 2.3	Reasonable Requests	(45 minutes)
Problem 2.1	End-of-Year Party	(90 minutes)
Problem 2.2	Planning a Trip	(90 minutes)

Lesson 3: Relations and Functions (295 minutes)

Lesson 3 relates to food and culinary arts. The lesson covers standards related to relations and functions, explicit expressions and functions, and recursive processes.

Investigation 3.1	Plant Growth	(25 minutes)
Project 3.1	Vending Machine	(45 minutes)
Project 3.2	Baking a Cake	(45 minutes)
Problem 3.1	Restaurant Kitchen	(90 minutes)
Problem 3.2	Harvest Time	(90 minutes)

**Lesson 4: Linear Functions (470 minutes)**

Lesson 4 is all about communicating with NASA's mission control, tree growth, game development, and physical training. The lesson covers standards related to graphing linear functions, writing linear functions, and working with absolute value and piecewise functions.

Investigation 4.1	Seasons	(20 minutes)
Project 4.1	Mission Control	(135 minutes)
Project 4.2	Scattered Saplings	(90 minutes)
Problem 4.1	Path Predictor	(90 minutes)
Problem 4.2	Be the Coach	(135 minutes)

Lesson 5: Systems of Linear Equations (335 minutes)

Lesson 5 covers standards related to solving systems of equations graphically and algebraically, as well as graphing systems of linear inequalities. Topics range from saving animals, to budgeting for prom night, to 100-meter sprints, to art and color mixing.

Investigation 5.1	Transportation	(25 minutes)
Project 5.1	Auks and Ducks	(65 minutes)
Project 5.2	Prom Night	(65 minutes)
Problem 5.1	Going for Gold	(90 minutes)
Problem 5.2	Artist's Math	(90 minutes)

Lesson 6: Graphing Quadratic Functions (295 minutes)

Lesson 6 relates to graphing a quadratic function in standard form, intercept form, and vertex form, identifying key features of a quadratic function graph, transforming a quadratic function, and developing a quadratic equation from a graph.

Investigation 6.1	Encryption	(25 minutes)
Project 6.1	Projectile Motion	(60 minutes)
Project 6.2	Water Fountain Design	(45 minutes)
Problem 6.1	Bridge Design	(75 minutes)
Problem 6.2	Roller Coaster Design	(90 minutes)

**Lesson 7: Solving Quadratic Functions (290 minutes)**

Lesson 7 covers standards related to identifying x-intercepts and the vertex of a quadratic function, solving quadratic functions by completing the square, factoring, and using the quadratic formula.

Investigation 7.1	Solving With Algebra Tiles	(20 minutes)
Project 7.1	Capturing a Dive	(45 minutes)
Project 7.2	Drone Reforesting	(75 minutes)
Problem 7.1	Stop the Car	(65 minutes)
Problem 7.2	Maximizing Profit	(85 minutes)

Lesson 8: Exponential Functions and Data Analysis (315 minutes)

Lesson 8 is all about creating and graphing exponential functions, identifying key features of an exponential function, exponential growth versus decay, and transformations of exponential functions. It also includes concepts like data analysis, finding trends, and correlation.

Investigation 8.1	Growing Volunteers	(25 minutes)
Investigation 8.2	Patterns	(20 minutes)
Project 8.1	Social Media	(45 minutes)
Project 8.2	Student Involvement	(45 minutes)
Project 8.3	Population	(60 minutes)
Problem 8.1	Growing Interest	(60 minutes)
Problem 8.2	Computer Viruses	(60 minutes)