The invention of place value is one of humankind's greatest intellectual achievements. It is surprisingly nuanced, and it permeates the entire K-12 curriculum (and beyond!). So many state mathematics standards rely on a deep understanding of it.

Lessons 1 and 2 set the scene for developing a truly solid understanding of place value. We give the human story of mathematics: we discuss our quirky naming of numbers, for instance, why we focus on the number 10 in arithmetic, and why some cultures chose base 12, base 20, or base 60!

Lessons 3 and 4 probe all the standard school arithmetic algorithms we think we already know so well. These lessons provide an "intellectual jolt" and develop the meta-cognition and mindset for profound mathematical thinking for upper elementary, middle school, and high school students alike. High-school student in chat: THIS I understand!

Lessons 5 and 6 explore division, decimals, and the art of writing fractions as decimals. More, it subtly introduces the sophisticated ideas needed for the advanced the high-school curriculum in grade-appropriate ways.

Lessons 7 and 8 are aimed specifically at the high school audience. We present polynomial algebra within the story of place value and deep, student-owned insights follow. Students create infinite series and produce examples of numbers that they can personally prove to be irrational. All is connected and all is seen as natural and straightforward.

Bonus Lesson: We offer a bonus ninth lesson in which we show how the story of place-value connects with current research mathematics. We explore base one-and-a-half! (And can do more!)

"Exploding Dots has changed my mind, and thus my life! Thank you!"

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