

# Xbox Xponential

Lesson by Mathalicious;

Annotation by Student Achievement Partners

GRADE LEVEL High School

IN THE STANDARDS F-IF.C.8b, F-BF.A.1a, F-LE.A.2, F-LE.B.5, S-ID.B.6a

## WHAT WE LIKE ABOUT THIS LESSON




Mathematically:

- Requires students to interpret key features of an exponential function through a real-world model
- Connects an exponential function with its graph, table, and matching verbal description
- Includes several stages of the basic modeling cycle (computing, interpreting, and validating)

In the classroom:

- Captures student attention by using an engaging context
- Allows for student collaboration and discussion of mathematical concepts; includes guiding questions for teachers to use to facilitate discussion
- Uses technology to illustrate the mathematics of the lesson
- Provides ample time for students to engage deeply with the mathematics

## MAKING THE SHIFTS<sup>1</sup>

 Focus	Belongs to the Widely Applicable Prerequisites for College and Careers <sup>2</sup>
 Coherence	Builds on the idea that exponential functions have a structurally similar growth principle to linear functions
 Rigor <sup>3</sup>	Conceptual Understanding: secondary in this lesson Procedural Skill and Fluency: secondary in this lesson Application: primary in this lesson

<sup>1</sup>For more information read [Shifts for Mathematics](#).

<sup>2</sup>For more information, see [Widely Applicable Prerequisites for College and Careers](#).

<sup>3</sup>Lessons may target one or more aspect(s) of rigor.

## ADDITIONAL THOUGHTS

This [lesson](#) is a continuation of students' learning about exponential functions, and is not intended to be an introduction to exponential functions. The lesson assumes, and builds on, students' understanding of exponents, square roots, and percentages. This particular lesson, likely to take several days for students to complete, focuses on an exponential growth model based on [Moore's Law](#). It is not intended for students to meet the full expectations of the course-level standards through only this lesson.

This lesson begins with a focus on building a function (F-BF) to match a verbal description, followed by interpreting and comparing the function (F-IF) to real data. It concludes with building a new, improved function that more accurately models actual data. The premise of the lesson is entirely based on exponential models (F-LE). For more insight on the course-level concepts from the Functions conceptual category addressed in this lesson, read pages 7–17 of the progression document, [Grade 8, High School, Functions](#).

Within this lesson, students apply key understandings of functions and equations from previous grades or courses. The “Preview & Guiding Questions” section offers students the opportunity to use their knowledge of dependent and independent variables, their relationships, and how graphs represent those relationships as a way to quickly engage with the task. Throughout the lesson, there are examples of scaffolded discussion questions that may help students think about the structure of the exponential function they are examining. For example, questions like those below can help make the mathematics of the lesson more explicit for students.

- What operation did you keep doing over and over again?
- Once you know the number of doublings, how can you find the processor speed?
- Does your equation agree with the predicted speeds in your table?
- Is the annual growth rate greater than or less than 50%? How do you know?

Teachers and those who support teachers may find the [Instructional Practice Guide: Coaching](#) tool useful in implementing best practices in the classroom that allow all students to master the content of the lesson.