

# **BLOSSOMS@Home for Students@Home VI**

## ***The Power of Exponentials, Big and Small***

[https://blossoms.mit.edu/videos/lessons/power\\_exponentials\\_big\\_and\\_small](https://blossoms.mit.edu/videos/lessons/power_exponentials_big_and_small)

**Key Words:** exponentials, exponential growth and decline, estimation, orders of magnitude  
**Grade levels:** 9 – 12.

### **Dear Student@Home!~**

Hi from MIT in Cambridge, Massachusetts, USA! If, starting today, you rounded up to the next dollar of every purchase you make and then deposited all those fractional dollars in a tax-free saving account yielding 5% annual compound interest, and you withdrew nothing from this account until you retire at age 65, about how much money do you think you'd have in that one account at retirement? That 5% annual interest grows exponentially over time. In this @Home BLOSSOMS lesson, we want you to begin to understand intuitively the power of exponentials. While doing this, you'll have some fun! An exponentially growing amount of fun!

OK, here is your voluntary assignment: Watch the assigned BLOSSOMS video (***The Power of Exponentials, Big and Small***), maybe twice! Try to work out your answers to the questions that end each segment (when you will need to pause the video). Take one or two of your favorite "solutions," and include them in your report to me. Include your logic, thought processes and estimates in your report.

In addition, your short report (300 words or less), should include your approaches to the two questions we ask below. We are less interested in numerical "answers" and more interested in your processes of approaching and attacking the problem. Explain clearly in words! Total estimated time to do all these things: Only 4 hours or less! Send me your report, and I promise to read it and send comments back to you! Maybe you'll get a Gold Star from us. You might want to share your report with your teacher, and your friends as well!

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### **For your report:**

**For the following two questions, we seek only approximate or "Ballpark" or "Order-of-Magnitude" answers. We want to see your logic that led you to those numbers. Have fun with these! 😊**

1. Estimation: Develop an approach to answering the first question above about saving fractional dollars in an interest-bearing savings account to age 65. State all of your assumptions, leading your approach to an estimated answer.
2. Estimation: Suppose your parents drive a car having a 15-gallon gas tank. They purchase the car in early January, with the tank full of gas. Each time the fuel gauge indicates that the tank is half empty, they refill the tank to the full 15 gallons. Estimate the amount of time that will elapse until the car's fuel tank contains only about a teaspoon of the original gasoline found in the tank at time of purchase. State all of your assumptions carefully. There is no right or wrong answer! It all depends only on carefully stated assumptions and then working them through to completion.