1: Double Your Money

OBJECTIVE:

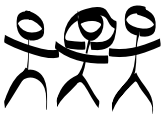
Students will estimate and calculate the sum of very large numbers.
Students will understand the concept of exponential growth.

MATERIALS:

- *The King's Chessboard*[1], by David Birch (optional)
- Large calendar (optional)
- "A Million or Double?" work page (page 4)
- "Double Your Money" work page (page 5)
- Calculators (optional)
- Pencil and paper

PREPARATIONS:

- Make copies of the "A Million or Double?" work page (page 4) and the "Double Your Money" work page (page 5).
- Gather calculators, one per student or partner group (optional).
- Read over *The King's Chessboard* (optional).

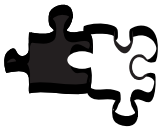


GROUPING:

- Whole group/individual or partners

CLASS TIME:

- 1 class period



CONNECTIONS:

- Math
- Language Arts

TERMS and CONCEPTS:

- One million
- Estimation
- Exponential growth

Understanding Very Large Numbers

STEPS:

1. Begin a discussion about one million by asking students questions, such as "How much is one million?" "Do you consider one million a large number?" "Can you think of a number larger than one million?"

2. Hand out the "Million or Double?" work page (page 4). Make sure students understand the alternative offer (Option 1: one million dollars. Option 2: a cent on the first day, two on the second, with the amount doubling and accumulating each day for one month.)

3. When all students have finished the work page, reconvene and record each student's decision on chart paper. If a copy of *The King's Chessboard* is available, begin reading the book. You may wish to stop part way through and ask if anyone would like to change their answer. If a copy of the book is not available, begin demonstrating the concept on a calendar or on a grid drawn on the board. Enter a "1" on the first day, a "2" on the second, "4" on the third, and continue doubling the number on each consecutive day for one week. Total the results.

4. Once students understand the concept, tell students that they will be working on problem solving to determine how much money a person who selected "Option 2" would have at the end of three weeks. Hand out the "Double Your Money" work page (page 5) and go over the instructions. Invite students to begin working. When all have finished the work page, discuss the results.

5. Discuss the concept of doubling and exponential growth. Engage students in a discussion about how the amount of money became enormous so fast, and why, assessing the level of understanding from student responses.

ENRICHMENT/EXTENSIONS:

Calculate how much money you would have if you exchanged cents for quarters for an entire month.

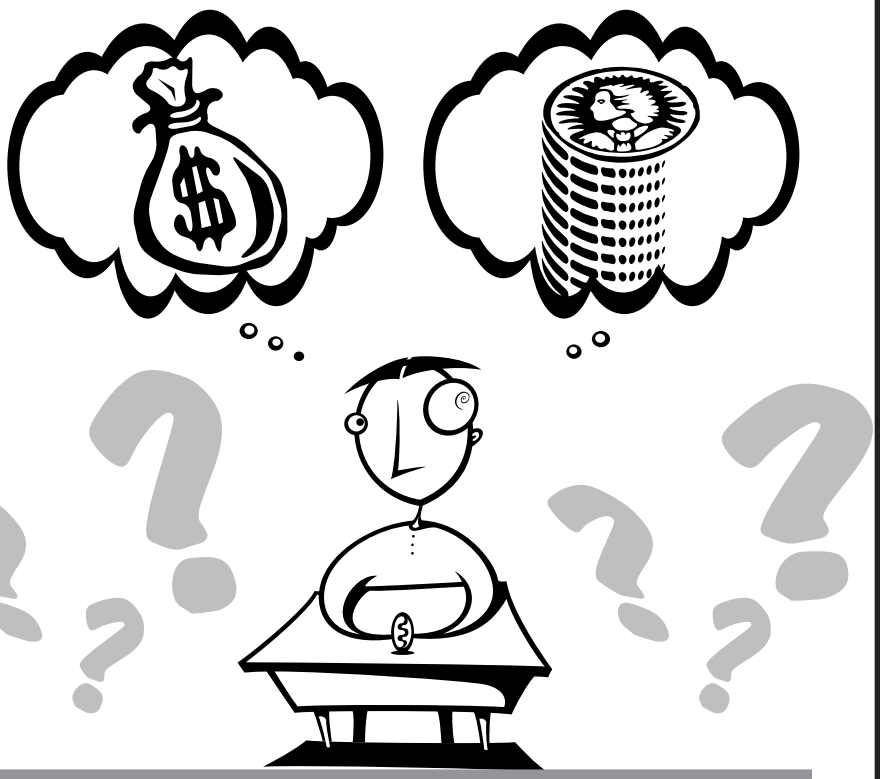
1.) Birch, David. *The King's Chessboard.* New York: Penguin Group, 1988.

Name _____ Date _____

A Million or Double?

DIRECTIONS:
Decide which of the following you would rather be given. Explain your answer.

Part 1—What would you choose?



❒ **Option 1:**
One Million Dollars.

❒ **Option 2:**
For the duration of a month, one cent on the first day, 2¢ on the second day, and 4¢ on the third day, with the number of cents doubling on each new day.

Part 2—Which option did you pick and why?

_____

_____

_____

_____

Name _____ Date _____

Double Your Money

DIRECTIONS: Calculate how many cents you would have if the number of cents doubled on each new day for 3 weeks. Show your work on scratch paper and graph your results.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21