

Curriculum topics:

- Financial Literacy
- Compound Interest
- Savings Accounts
- Real Life Math
- Percentages

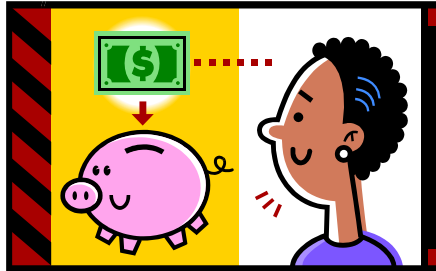
Subject:

Mathematics

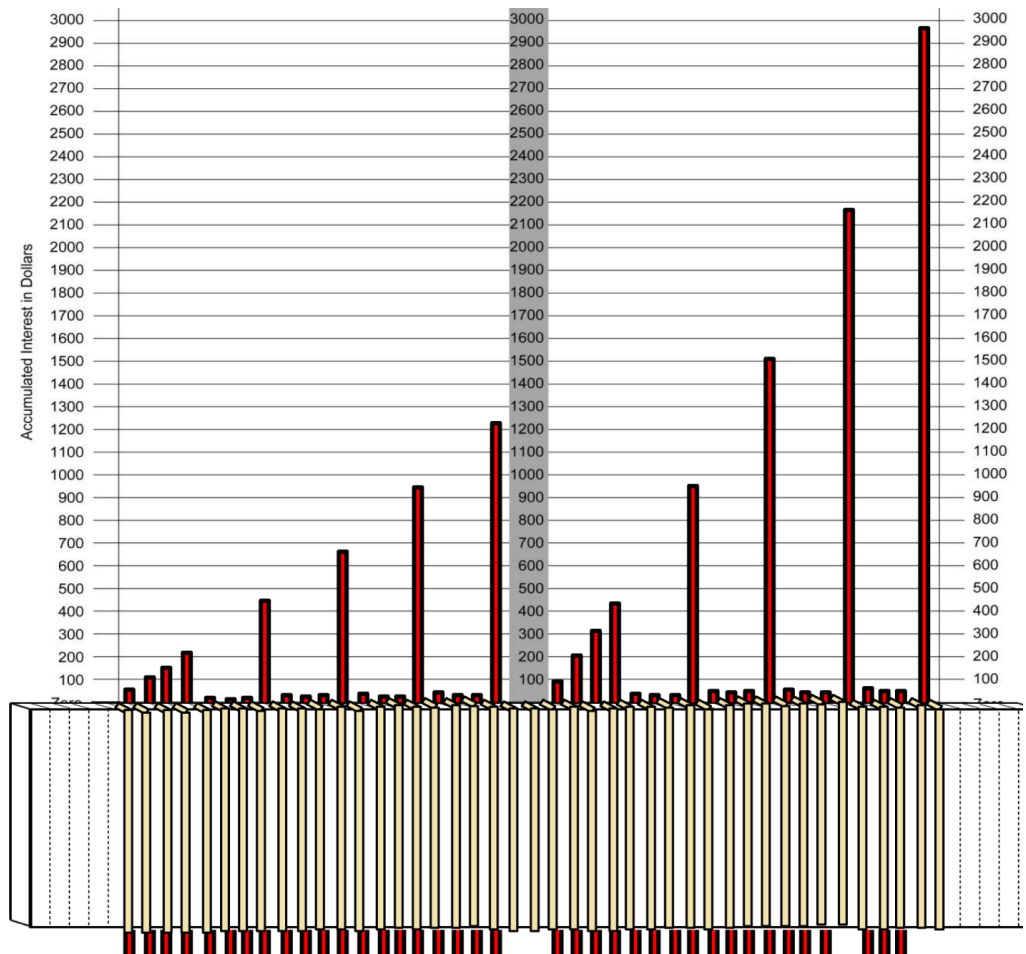
Grade range: 6 – 9

INTERESTING INTEREST

Watch savings grow with interest!



Money deposited in a savings account will earn interest and grow. Model the difference between two interest rates. Over time, does a small difference in interest rates really matter?



Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience through affordable “hands-on” activities that engage students and inspire the joy and discovery of learning.

For more ideas and to see RAFT Locations

www.raft.net/visit-raft-location

Materials required

For each group of 2 students:

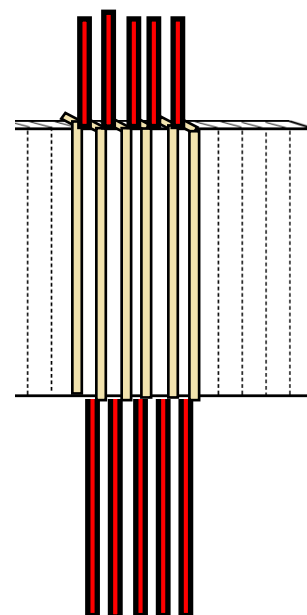
- Corrugated board, 1 strip ~5 cm (2") wide, with at least 50 corrugations
- Stir straws, that fit into the corrugations of the board above, 42
- Rubber bands, that fit over the narrow end of the strip of corrugated board, 45
- Binder cover or cardboard, at least 22 cm by 29 cm ~(8½" by 11")
- Binder clips, large, 2
- Compound Interest Comparison Sheet*
- Interesting Interest Chart – with scale*
- Optional: Calculator
- Optional: Interesting Interest Chart – no scale*

[*Templates can be downloaded at <http://www.raft.net/raft-idea?isid=738> for Compound Interest Comparison Sheet, Interesting Interest Chart – with scale, and Interesting Interest Chart – no scale.]

Preparation before the activity

Create the straw "graph"

- 1 Side a rubber band over a narrow end of the corrugated strip so that it lines up with a line of the corrugation ~2.5 cm (1") from the right end of the strip. Insert a straw into the hole to the left of the rubber band. Slide another rubber band over so that it touches the other side of the straw. Repeat so that they alternate - one rubber band, one straw, one rubber band, as shown. [Alternately, put all the rubber bands on the corrugated strip, and then insert the straws into the holes between the rubber bands.]
- 2 Place Interesting Interest Chart – with scale on top of the binder cover. Place straw graph on top so that the straws are between the edge scales and the top edge of the corrugated strip is on the "zero" line
- 3 Use a binder clip at each narrow end of the corrugated strip to hold the straw graph & scale in place on top of the binder cover.
- 4 Remove 2 center straws to uncover the center "gray" scale. Move the remaining straws so that their tops line up with the zero line.



Pre-activity discussion

- 5 Before the activity review the following with students:
 - Financial vocabulary
 - The concept of interest and how it is calculated
 - Compound interest

Find background resources at <http://www.raft.net/raft-idea?isid=738>

- 6 Review the compound interest formula:

Compound Interest Formula

$A = P (1 + r/n)^{nt}$ = accumulated money (principal + all interest)

P = original investment; r = annual interest rate; t = time in years

n = number of times the interest is compounded per year

For this activity the interest will be compounded one time a year – so equation is:

Compound Interest Formula (compounded annually n = 1)

$A = P (1 + r)^t$ = accumulated money (principal + all interest)

P = original investment; r = interest rate; t = time in years

To do and notice (2 students)

Scenario: Compare accumulated interest over time for \$2,500 deposited at a 2% interest rate and a 4% interest rate - compounded annually.

1

Calculate the interest earned in the first year for the account with the 2% interest rate.

Interest earned = (current principal) x (interest rate) = (\$2500) x (0.02) = \$50. Add that amount to the current principal to get the new total. Record amounts on the Compound Interest Comparison Sheet. The total for year 1 becomes the current principal for year 2. See right.

Interest rate = 2%
(compounded annually)

	Year 1	2
Current principal (equal to previous year's total)	\$2,500	\$2,550
Interest earned = (current principal) x (interest rate)	$(2,500 \times 0.02) = 50$	
Total (current principal + interest earned)	$2500 + 50 = 2550$	
Accumulated interest = total - original investment	50	

2

Enter the accumulated interest for year 1 in the appropriate box.

3

Repeat for years 2, 3, & 4 for the 2% interest rate.

Make sure all the straws in the straw graph are set at zero.

4

Each straw represents one year. Move the 1st straw on the left most side of the straw graph up so that the top aligns with the amount of accumulated interest for year 1. Repeat for years 2, 3, & 4. Optional: mark the paper above each straw as it is set. If a straw is not long enough, slit one straw an inch or two, and insert another straw into it in order to extend the length.

5

Repeat steps 1 through 4 for the 4% interest rate. Use the straws on the right of the gray column to represent the accumulated interest the 4% account.

6

Use the Compound Interest Formula (compounded annually) to calculate the account total and accumulated interest for year 4 of the 2% account. Verify that it matches the earlier calculation.

7

Use the formula for years 8, 12, 16, and 20.

8

Move the appropriate straws on the left side of the graph to show the accumulated interest calculated in step 7. Skip straws for the years not calculated.

9

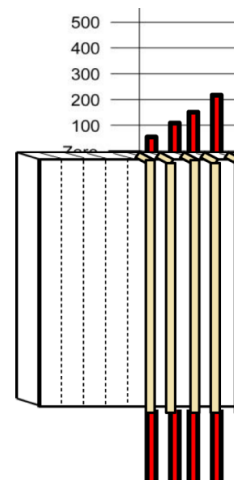
Repeat steps 6 to 8 for the 4% interest rate. Use the straws on the right-side graph for the 4% graph.

10

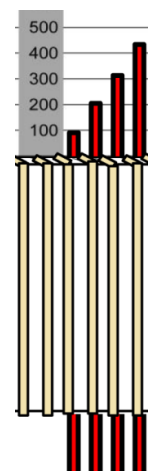
Compare the straw graphs for the 2% and 4% interest rates. Estimate the accumulated interest for the "uncalculated" years by looking at the calculated years and move the straws into place. Use the interest formula to spot-check the estimations. What do the graphs indicate about the accumulate interest over time? Over time, does a 2% difference in interest have much of an effect?

11

Compare the accumulated interest for another pair of interest rates using calculations and the straw graph. Customize the Interesting Interest Chart – no scale, if needed.



2% interest



4% interest

Curriculum Standards:

Percentage as a rate
(Common Core Math Standards: Grade 6, Ratios & Proportions, 3c)

Solve real –life problems using numbers and operations
(Common Core Math Standards: Grade 7, Number System, 3; Equations and Expressions, 3)

Exponents
(Common Core Math Standards: Grade 6, Expressions and Equations, 1)

Write, read, & evaluate expressions
(Common Core Math Standards: Grade 6, Expressions and Equations, 2)

Compare functions using graphs
(Common Core Math Standards: Grade 8, Functions, 2 & 5)

Graph equations in 2 or more variables
(Common Core Math Standards: High School, Algebra, Creating Equations, 2; Reasoning with Equations and Inequalities, 10)

Problem Solving and Reasoning
(Common Core Math Standards: Mathematical Practices Grades 6-9)

The math behind the activity

Interesting Interest gives students the opportunity to learn and practice several different elements of real life math:

- By hand-calculating compound interest (from year 1 to year 4) students develop an understanding of how compound interest works. Adding the interest earned in year one to the current principal for year one, then transferring this as the new current principal for year two, and so forth, a pattern emerges in how each year's current principal is derived.
- Using the Compound Interest Formula, and comparing the results to the hand- calculating results, give students a chance to evaluate a multivariable equation and understand how it works.
- By creating the straw graph, students visually and kinetically associate, compare, and make predictions for two different interest rates based on the trends for compound interest earned over time.
- This activity presents a real-life reason for understanding percentages and for the usefulness of formulas for calculating repeated (iterated) procedures over a long period.

Learn more

- Survey banks to determine interest rates paid on savings accounts.
- Discuss the difference between interest earned and interest paid.
- Use the straw graph to model the interest owned on a loan at two different rates (e.g. a \$1000 loan at 10% and 15%).
- Compare and contrast savings accounts at banks to money market funds from mutual fund companies.
- Explore and then report on other ways to use savings to earn money over time (e.g., investing in stocks).

Related activities: See RAFT Idea Sheets:

Brewing Coffee Mixtures -

[http://www.raft.net/ideas/Brewing Coffee Mixtures.pdf](http://www.raft.net/ideas/Brewing%20Coffee%20Mixtures.pdf)

Checkbook Window Shopping -

[http://www.raft.net/ideas/Checkbook Window Shopping.pdf](http://www.raft.net/ideas/Checkbook%20Window%20Shopping.pdf)

Happy Trails Mix -

[http://www.raft.net/ideas/Happy Trails Mix.pdf](http://www.raft.net/ideas/Happy%20Trails%20Mix.pdf)

Resources

Visit www.raft.net/raft-idea?isid=738 for “how-to” video demos & more ideas!

Grades K-12 Financial Literacy Resources -

<http://www.cde.ca.gov/eo/in/fl/finlitk12.asp>

Financial literacy curriculum from PwC - <http://www.pwc.com/us/en/about-us/corporate-responsibility/commitment-to-youth-education/financial-literacy-curriculum.jhtml>

National Financial Educators Council - Financial Literacy Lesson Plans

<http://www.financialeducatorsCouncil.org/financial-literacy-lesson-plans/>

Acknowledgements:

This idea sheet was developed with generous support from [PwC](http://www.pwc.com).