FEPPP
Financial Education
Public-Private Partnership
Setting the Washington Agenda for Financial Education

This task was developed by secondary mathematics and CTE teachers across Washington State from urban and rural areas. These teachers have incorporated financial literacy in their classroom and have received training on the Common Core State Standards and the Jump$tart Financial Literacy standards. The task was validated by content experts in the Common Core State Standards in mathematics. The purpose of this task is to demonstrate how financial literacy standards can be incorporated within mathematics classrooms that are implementing the Common Core State Standards.

TASK: Interest Comparison

TARGET COMMON CORE STATE STANDARD(S) IN MATHEMATICS:
F-LE.A: Construct and compare linear, quadratic and exponential models and solve problems
F-LE.A.1: Distinguish between situations that can be modeled with linear functions and with exponential functions.
F-LE.A.1b: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another
F-LE.A.1c: Recognize situations in which one quantity grows or decays by a constant percent rate per unit interval relative to another.
F-LE.B: Interpret expressions for functions in terms of the situation they model
F-LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context.
TARGET STANDARDS FOR MATHEMATICAL PRACTICES:
MP 1: Making sense of problems and preserve in solving them.
MP 2: Reason abstractly and quantitatively
MP 3: Construct viable arguments and critique the reasoning of others
MP 4: Model with mathematics
MP 5: Using appropriate tools strategically
MP 6: Attend to precision
MP 7: Look for and make use of structure
TARGET FINANCIAL LITERACY STANDARDS:
Financial Responsibility and Decision Making: **1: Take responsibility for personal financial decisions,** **2: Find and evaluate financial information from a variety of sources** **4: Make financial decisions by systematically considering alternatives and consequences** **5: Develop communication strategies for discussing financial issues.**
Saving and Investing: 3: Evaluate investment alternatives
RECOMMENDED COURSE(S):
Algebra 1, Personal Finance, Economics
ADDITIONAL INSTRUCTIONS:
Find a couple of good websites that have an online interest calculator for the students to use in this task. Understand the impact of time on compound interest.

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About the Common Core State Standards in Mathematics

The Common Core State Standards (CCSS) is a state developed set of standards that represent a coherent progression of learning expectations in English language arts and mathematics. These standards are designed to establish a set of shared goals and expectations for what students should understand and be able to do in grades K–12 in order to be prepared for success in college and the workplace. Forty-six states have now adopted these shared standards. The CCSS for mathematics highlight three major shifts around Focus, Coherence and Rigor. For more information:
http://www.k12.wa.us/CoreStandards/Mathematics/default.aspx

About the Jump$tart Financial Literacy Standards

The National Standards in K–12 Personal Finance Education, created and maintained by the Jump$tart Coalition® for Personal Financial Literacy, delineate the personal finance knowledge and skills that K–12 students should possess. The Jump$tart Coalition intends the National Standards in K–12 Personal Finance Education to serve as a model. As such, the National Standards represent the framework of an ideal personal finance curriculum, portions of which might not be appropriate for individual instructors and students. The Coalition leaves it up to various stakeholders to decide how to address the topics in the National Standards. http://jumpstart.org/national-standards.html

Key Terms

Compound interest
Compound annually
Compound monthly
IRA (Individual Retirement Account)

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The Task

Your grandparents gave you a generous graduation gift of $5000 with the stipulation that you invest the money for at least 10 years. You consider two options.

A. You can put your money into a savings account at City Bank which earns a compound interest rate of 3% per year, compounded monthly, meaning that each month the balance increases by one twelfth of 3% of the previous month's balance. You can also withdraw part or all of your money at the end of the 10 years.

B. The second option is to invest your money in an IRA (individual retirement account) where you cannot withdraw your money for 25 years; however, you will earn an average yearly rate of 7.3% (compounded annually).

Using an online interest calculator, answer the following questions by completing the table:

1. What would be the balance in your City Bank saving account at the end of 10 years?
2. What would be the balance in your IRA account at the end of 10 years?
3. What would be the balance in your City Bank savings account if you did not withdraw any money for 25 years?
4. What would be the balance in your IRA after 25 years?

	Total Balance 10 years	**Total Interest 10 years**	**Total Balance 25 years**	**Total Interest 25 years**
City Bank				
IRA				

5. For each account, how much interest did you obtain after 10 years and 25 years?
6. There is a significantly greater amount of interest in the IRA account than the City Bank savings account after 25 years. What mathematical growth pattern or structure does this represent?
7. Why does this growth pattern or structure create a significant difference in the balance of the two accounts?
8. Represent this mathematical structure by writing an equation to represent the total balance in the savings account for the City Bank and the total balance in the IRA account.
9. Using your equations, calculate your total savings for City Bank and the IRA account for both 10 and 25 years.
10. Which investment option would you choose and why? Be prepared to justify your answer, using data from the table and your understanding of the mathematics.

Possible Solutions

	Total Balance 10 years	Total Interest 10 years	Total Balance 25 years	Total Interest 25 years
City Bank	$6747	$1747	$10,575	$5575
IRA	$10,115	$5115	$29,105	$24,105

6. A key component of the lesson is for students to understand that compounding interest represents exponential growth.

7. This question is designed to have students talk about why exponential growth grows so quickly, to compare the two interest rates, and to understand the longer you invest, the greater growth you will see in your savings account—they should use data from the table to help explain the large difference in interest earned, to notice the power of exponential growth when investing and the significance of investing for a longer time to maximize their savings potential.

8. Compounding Monthly (City Bank) $P = C(1 + r/n)^{nt}$

   Compounding Yearly (IRA) $P = C(1 + r)^{t}$

9. $P = 5000(1 + .03/12)^{120}$ $P = 5000(1 + .03/12)^{300}$

   $P = 5000(1 + .073)^{10}$ $P = 5000(1 + .073)^{25}$

10. This question gives students an opportunity to engage in MP 3 as they discuss their mathematical thinking about the mathematics and insights on how exponential growth has an impact on investment. There is no correct answer—students should justify their choice using data from the table, knowledge of the mathematics and reasoning that supports their choice to take the money from their savings after 10 years or leave the money in for 25 years with the IRA account.

Possible Extensions

Students can continue to investigate by increasing or decreasing the interest rates or by increasing the time they invest their money (30 years, 40 years, etc.).

Students can explore how long it would take for their IRA account to reach $50,000.

Students can explore the impact of making a monthly deposit into their savings account or IRA account and how that will impact their total savings over time.