WAMC Lab Template

Math Concept(s):

- Financial Math Applied: This includes concepts such as basic arithmetic, percentages, algebra, functions, data analysis, and statistical measures, all applied within the context of financial scenarios and problem-solving.

Source / Text: Financial Math Escape Room Activity Materials

- Document: Updated_Financial_Math_Escape_Room_Materials_Complete.docx
- Next Steps After Solving Each Clue
- Document: Next_Steps_After_Solving_Each_Clue.docx
- Teacher Answer Sheet for Financial Math Escape Room
- Document: Teacher_Answer_Sheet_Financial_Math_Escape_Room.docx
- Instructions for Playing the Financial Math Escape Room Game
- Document: Financial_Math_Escape_Room_Game_Instructions.docx
- Alignment of Financial Math Escape Room Activity with High School Mathematics Standards
- Document: Financial_Math_Escape_Room_Standards_High_School.docx

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Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

The Financial Math Escape Room lab is an interactive activity designed to be done during a high school Financial Math class. This lab fits into the curriculum as a hands-on application of financial math concepts, including operations, percentages, algebra, and functions. It is ideally placed after students have received foundational instruction in these topics, allowing them to apply their knowledge in a practical, problem-solving context. Through the escape room challenge, students work collaboratively in teams to solve real-world financial problems, enhancing their understanding and retention of key concepts.

Lab Plan

Lab Title: Financial Math Escape Room

Prerequisite skills:

1. Basic arithmetic operations (addition, subtraction, multiplication, division)
2. Understanding of percentages
3. Basic algebra skills (solving equations and inequalities)
4. Familiarity with functions and their notation
5. Ability to interpret and analyze data from graphs and tables
6. Basic understanding of financial concepts such as interest rates, budgeting, and investments.

Lab objective:

To engage students in solving financial math problems through an interactive escape room challenge.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

Standards for Mathematical Practice:

- See Applicable Financial Math Standards for Escape Room Activity document.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
- ☐ Global Awareness
- ☐ Financial/Economic/Business/Entrepreneurial Literacy
- ☐ Civic Literacy
- ☐ Health/Safety Literacy
- ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation
- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Critical Thinking and Problem Solving
- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgments and Decisions
- ☐ Solve Problems

Communication and Collaboration
- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy
- ☐ Access and Evaluate Information
- ☐ Use and manage Information

Media Literacy
- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)
- ☐ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability
- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction
- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural
- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability
- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility
- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)
Materials
- Printed puzzle clues and worksheets, Envelopes, Paper, Pens, Paper clips, Rubber bands, Computers or tablets for online puzzles

Set-Up Required:
- Prepare the envelopes with printed puzzle clues and worksheets. Use paper clips and rubber bands to secure the clues if needed. Ensure computers or tablets are ready with online puzzles.

Lab Organization Strategies:
      Leadership (Connect to 21st Century Skills selected):
- This activity promotes financial literacy and encourages students to think creatively and reason effectively to solve problems.

Cooperative Learning:
- Learning: Students work in small groups to encourage collaboration and collective problem-solving.

Expectations:
- Students are expected to actively participate, collaborate with their group members, and apply financial math concepts to solve the puzzles.

Timeline:
- Introduction (5 minutes), Setup and Distribution of Materials (2 minutes), Escape Room Challenge (15 minutes), Reflection and Discussion (5 minutes)

Post Lab Follow-Up/Conclusions:
Discuss real world application of learning from lab.
- Discuss real world application of learning from lab: Students can discuss how the financial math skills learned can be applied to real-world scenarios such as budgeting, loan management, and investment planning.

Career Applications
- Financial Analyst, Budget Analyst, Accountant, Financial Planner

Optional or Extension Activities
- Students can create their own financial math problems and challenge their peers with a custom escape room.

Step-by-Step Instructions for setting up activity
Preparation Before Class
1. Print all necessary documents (puzzle clues, worksheets, or optional scenario cards).
2. Place each printed puzzle clue inside an envelope. Use paper clips and rubber bands to secure the clues if needed.
3. Ensure computers or tablets are set up with internet access.
4. Prepare any instruction sheets needed for using the online tools and provide the URLs to students during the activity.

Introduction (5 minutes)
1. Explain the concept of an escape room and the financial math focus of this activity.
2. Explain Scrum as a framework for managing projects, especially software development. It enables teams to work collaboratively in short cycles called Sprints, which include planning, execution, review, and retrospective phases. It is normally used for 1–4-week projects (name is taken from the sport of rugby).
3. Divide students into small groups (3-4 students per group).
4. Briefly explain the rules and objectives of the activity.

Distribute Initial Materials (2 minutes)
1. Give each group their initial envelope with Clue 1.
2. Ensure each group has pens and access to a computer or tablet with internet access.

Escape Room Challenge (10 minutes)
1. Groups solve the first puzzle to unlock the next clue.
2. Once they solve the first puzzle, they use the solution to open the next envelope.
3. Groups continue solving puzzles and drawing scenario cards as they progress.
4. Monitor the groups, providing hints if necessary to keep them on track.

Reflection and Discussion (3 minutes)
1. Once all groups have completed the challenge, gather for a debrief.
2. Discuss the financial math concepts covered and their real-world applications.
3. Highlight the importance of teamwork and problem-solving skills.

Post Lab Follow-Up/Conclusions:
Discuss real world application of learning from lab: Students can discuss how the financial math skills learned can be applied to real-world scenarios such as budgeting, loan management, and investment planning.
Career Applications: Financial Analyst, Budget Analyst, Accountant, Financial Planner
Extension Activities: Students can create their own financial math problems and challenge their peers with a custom escape room.

Financial Math Escape Room: Student Instructions

Objective:

Engage in an escape room activity to solve financial math problems.

Introduction to Scrum

Scrum is a framework for managing projects, especially software development. It enables teams to work collaboratively in short cycles called Sprints, which include planning, execution, review, and retrospective phases. It is normally used for 1–4-week projects (name is taken from the sport of rugby).

Scrum-Based Escape Room Lab Activity (15 Minutes):

Sprint Planning (2 minutes):

1. Form Teams: Get into groups of 3-4 students and select a team lead.
2. Receive Materials: Each team will receive an initial envelope containing Clue 1

Sprint Execution (10 minutes):

1. Solve Clues: Work together to solve the financial math problems in each clue.
2. Unlock Next Clue: Use the solution to open the next envelope and proceed to the next challenge.
3. Continue: Keep solving clues and unlocking the next ones until all puzzles are solved.
4. Use Resources: Utilize computers or tablets if needed for online financial calculators and tools.

Sprint Review & Retrospective (3 minutes):

- Reflect: Discuss what you learned about financial math concepts.
    - Reflect on the teamwork and problem-solving strategies used.

Materials Provided:

• Printed puzzle clues and worksheets
• Envelopes
• Access to online financial calculators (e.g. https://www.calculator.net/financial-calculator.html)

https://wa-appliedmath.org/

Clue 1
You need to calculate the monthly payment for a car loan of $15,000 at an annual interest rate of 5% for 5 years. Use the formula:
M = P [r(1+r)^n] / [(1+r)^n − 1]

$$M = P\left[\frac{r(1+r)^n}{(1+r)^n - 1}\right]$$

Where:
M = monthly payment
P = principal amount (loan amount)
r = monthly interest rate (annual rate / 12)
n = number of payments (loan term in years * 12)

okay to use Calculator.net or any financial calculator

Clue 2

Create a budget based on an income of $2,500, with fixed expenses of $1,500 and variable expenses of $500. Allocate the remaining amount to savings.

(May write by hand or use a spreadsheet)

Fixed

Category	Amount

Variable

Category	Amount

Total Monthly Savings =

Total Monthly Expenses =

Clue 3
Determine the total interest paid on a $10,000 loan at 4% annual interest over 3 years (simple interest). Use the formula:

Total Interest = P * r * t

Where:

P = principal amount

r = annual interest rate

t = time (in years)

Clue 4
Compare two investment options: one with a 5% annual return and another with a 7% annual return over 10 years. Use $5,000 for the investment amount.
Calculate the final amount for each investment using the compound interest formula:
A = P(1 + r/n)^(nt)
Where:
A = the future value of the investment/loan, including interest
P = the principal investment amount
r = the annual interest rate
n = the number of times that interest is compounded per year
t = the number of years the money is invested for

Option 1:
Annual Return: 5%
Investment Term: 10 years

Option 2:
Annual Return: 7%
Investment Term: 10 years

Compound Interest Formula:

$$A = P(1 + \tfrac{r}{n})^{nt}$$

Where:

A
A is the amount of money accumulated after
n
n years, including interest.
P
P is the principal amount ($5000)
r
r is the annual interest rate (expressed as a decimal)
n
n is the number of times that interest is compounded per year
t
t is the time the money is invested for in years

Final Amount Option 1:

Final Amount Option 2:

Scenario Cards

Unexpected Expense: Car repair costs $500

Bonus: Received a $200 bonus at work

Medical Expense: Doctor visit costs $150

Grocery Overrun: Spent $50 more on groceries than budgeted

Utility Bill: Utility bill is $30 less than expected

Financial Math Escape Room
Exit Ticket

Based on N.Q.A.1 Standard for Financial Math Escape Room activity. This standard aligns well with the escape room's focus on calculating loan payments, creating budgets, and interpreting financial data.

Name: _____

Date: _____

1. Calculate the monthly payment for a loan of $20,000 at an annual interest rate of 6% for 4 years. Show your work.

2. Create a budget based on an income of $3,000 with fixed expenses of $1,800 and variable expenses of $600. How much can you save each month?

3. Explain how the interest rate affects the total amount paid on a loan. Use an example to illustrate your point.

4. Describe a real-world scenario where you might need to use the skills learned in this escape room activity.

5. Reflect on the teamwork and problem-solving strategies your group used during the activity. What worked well, and what could be improved?

Clue 1: Loan Payment Calculation
Question: Calculate the monthly payment for a car loan of $15,000 at an annual interest rate of 5% for 5 years.
Answer: Use the formula:
M = P [r(1+r)^n] / [(1+r)^n – 1]
M = 15000 [(0.05/12)(1+(0.05/12))^(5*12)] / [(1+(0.05/12))^(5*12) – 1]
Monthly Payment **= $283.07**

Clue 2: Budget Worksheet
Question: Create a budget based on an income of $2,500, with fixed expenses of $1,500 and variable expenses of $500. Allocate the remaining amount to savings.
Answer:
Income: $2,500
Fixed Expenses: $1,500
Variable Expenses: $500
Total Expenses: $2,000
Savings: $500

Clue 3: Total Interest Calculation
Question: Determine the total interest paid on a $10,000 loan at 4% annual interest over 3 years (simple interest).
Answer: Use the formula:
Total Interest = P * r * t
Total Interest = 10000 * 0.04 * 3
Total Interest = $1,200

Clue 4: Investment Comparison
Question: Compare two investment options: one with a 5% annual return and another with a 7% annual return over 10 years. Calculate the final amount for each investment. Use $5,000 for the investment amount.
Answer: Use the compound interest formula:
A = P(1 + r/n)^(nt)
Option 1 (5%):
A = 5000(1 + 0.05/1)^(1*10)
Final Amount = $8,144.47
Option 2 (7%):
A = 5000(1 + 0.07/1)^(1*10)
Final Amount = $9,835.71

Financial Math Escape Room Activity Rubric

Rubric

Criteria	Advanced (4 points)	Proficient (3 points)	Developing (2 points)	Emerging (1 point)
Collaboration	Actively collaborates with team, consistently shares ideas, listens to others, and helps peers.	Collaborates with team, shares ideas, listens to others, but occasionally dominates.	Participates in team activities but rarely shares ideas or listens to others.	Minimal participation in team activities, does not listen to others or share ideas.
Critical Thinking and Problem Solving	Effectively uses critical thinking to solve all clues, demonstrates exceptional problem-solving strategies.	Uses critical thinking to solve most clues, demonstrates solid problem-solving strategies.	Solves some clues but struggles with others, demonstrates basic problem-solving strategies.	Struggles to solve clues, lacks effective problem-solving strategies.
Application of Financial Math Concepts	Accurately applies financial math concepts to all problems, demonstrates a deep understanding of financial principles.	Applies financial math concepts to most problems, demonstrates a good understanding of financial principles.	Applies financial math concepts to some problems, demonstrates a basic understanding of financial principles.	Fails to apply financial math concepts accurately, lacks understanding of financial principles.
Use of Resources	Utilizes all available resources efficiently, including financial calculators and online tools, to enhance	Utilizes most available resources effectively to aid problem-solving.	Utilizes some available resources but may not use them efficiently.	Fails to utilize available resources, relies solely on own calculations.

Financial Math Escape Room Activity Rubric

				problem-solving.
Engagement and Effort	Highly engaged throughout the activity, shows consistent effort and enthusiasm.	Mostly engaged, with minor distractions, shows good effort and enthusiasm.	Somewhat engaged, with several distractions, shows moderate effort.	Lacks engagement, frequently distracted, shows minimal effort.
Completion of Activity	Completes all clues and escapes within the allotted time, demonstrates exceptional time management skills.	Completes most clues, escapes with minor time extension, demonstrates good time management skills.	Completes some clues, needs significant time extension, demonstrates basic time management skills.	Fails to complete most clues and does not escape, lacks time management skills.
Reflection and Discussion	Actively participates in reflection and provides thoughtful insights, demonstrates a deep understanding of the learning experience.	Participates in reflection and provides some insights, demonstrates a good understanding of the learning experience.	Limited participation in reflection, provides minimal insights, demonstrates a basic understanding of the learning experience.	Does not participate in reflection or provide insights, lacks understanding of the learning experience.