Time Value of Money Challenge Scenarios

Chapter 5.2: Understanding the Power of Compound Interest and the Rule of 72

This worksheet presents several scenarios that illustrate the time value of money and opportunity cost concepts. For each scenario, you'll need to calculate the future value of money not spent today, evaluate the trade-offs, and make a decision based on both financial and personal considerations.

Remember: The goal of these scenarios is not just to identify the mathematically "correct" answer, but to thoughtfully evaluate trade-offs and recognize that financial decisions involve both objective calculations and subjective values.

Name: _____ Date: _____

How to Approach These Scenarios:

1. Calculate the future value of the money using compound interest
2. Determine what you would gain or lose financially with each choice
3. Consider non-financial factors that might influence your decision
4. Make a decision and explain your reasoning

Use this formula to calculate future value:

Future Value = Present Value × $(1 + r)^t$

Where r is the annual interest rate (as a decimal) and t is the time in years.

Scenario 1: Concert Tickets vs. Investment

You have $200 that you could use to buy tickets to see your favorite artist in concert next month. Alternatively, you could invest this money for 10 years at 7% annual compound interest.

Calculate the future value of $200 invested for 10 years at 7%:

Future Value = $200 × $(1 + 0.07)^{10}$

Future Value = $200 × _____ = $ _____

Option A: Buy Concert Tickets

Gain: Immediate experience and memories

Loss: Future value of the investment

Option B: Invest the Money

Gain: Future value after 10 years

Loss: Concert experience now

Your decision:

Explain your reasoning (consider both financial and non-financial factors):

What would make you change your decision? (e.g., different interest rate, time period, or concert price)

Scenario 2: Student Loan Repayment vs. Investment

You have $5,000 in extra money. You could use it to make an additional payment on your student loan, which has a 4.5% interest rate. Alternatively, you could invest it in a retirement account that historically returns 8% annually. Assume you have 20 years remaining on your student loan and won't need the retirement money for 30 years.

Calculate interest saved by paying off $5,000 of student loan over 20 years:

Interest saved = $5,000 × 4.5% × 20 years = $ _____

Calculate future value of $5,000 invested for 30 years at 8%:

Future Value = $5,000 × $(1 + 0.08)^{30}$

Future Value = $5,000 × _____ = $ _____

Option A: Pay Extra on Student Loan

Gain: Reduced debt, interest savings, earlier loan payoff

Loss: Future investment returns

Option B: Invest in Retirement

Gain: Potentially larger future value

Loss: Longer time with student loan, more total interest paid

Your decision:

Explain your reasoning (consider both financial and non-financial factors):

What would make you change your decision? (e.g., different interest rates, time period, or loan amount)

Scenario 3: Car Upgrade Now vs. Later

You currently have a functional but basic car. You could spend $7,000 now to upgrade to a better used car. Alternatively, you could keep your current car for 5 more years, invest the $7,000 at 6% compound interest, and then use that money (plus potentially more savings) for a bigger car upgrade later.

Calculate the future value of $7,000 invested for 5 years at 6%:

Future Value = $7,000 × $(1 + 0.06)^5$

Future Value = $7,000 × _____ = $ _____

Option A: Upgrade Car Now

Gain: Immediate car improvement, 5 years of driving a better car

Loss: Future value of the investment

Option B: Invest and Upgrade Later

Gain: Larger car budget in 5 years

Loss: Driving current car for 5 more years

Your decision:

Explain your reasoning (consider both financial and non-financial factors):

What other factors would you consider? (e.g., car maintenance costs, reliability, safety)

Scenario 4: New Phone vs. Investment

Your current phone works perfectly fine but is two years old. A new model has just been released for $1,000. You could buy the new phone now, or keep your current phone and invest the $1,000 at 5% annual compound interest for 2 years (when the next new model will likely be released).

Calculate the future value of $1,000 invested for 2 years at 5%:

Future Value = $1,000 × $(1 + 0.05)^2$

Future Value = $1,000 × _____ = $ _____

Option A: Buy New Phone Now

Gain: Latest features and technology for 2 years

Loss: Future value of the investment

Option B: Keep Current Phone and Invest

Gain: More money for future phone or other purposes

Loss: Using older technology for 2 more years

Your decision:

Explain your reasoning (consider both financial and non-financial factors):

How many phone cycles would you need to skip to make a significant difference in your finances?

Scenario 5: Daily Coffee vs. Long-term Investment

You currently spend $4 every day on a coffee from a café (approximately $120 per month). You're considering making coffee at home instead, which would cost about $20 per month for supplies. You could invest the $100 monthly difference at 7% annual compound interest.

Calculate the future value of $100 invested monthly for different time periods at 7%:

After 1 year: $ _____

After 5 years: $ _____

After 10 years: $ _____

After 20 years: $ _____

(You can use an online calculator for these calculations)

Option A: Continue Buying Coffee

Gain: Convenience, quality, social experience

Loss: Future value of the investment

Option B: Make Coffee at Home & Invest

Gain: Long-term wealth building

Loss: Daily convenience and experience

Your decision:

Explain your reasoning (consider both financial and non-financial factors):

What other small daily expenses might add up significantly over time?

Reflection on Time Value of Money Decisions:

After working through these scenarios, what have you learned about balancing present enjoyment with future financial security? Are there any recurring patterns in how you make these types of decisions?