Math 9 Lesson 8: Financial Literacy

- Simple budgets and transactions
- Banking, simple interest, savings, planned purchases
- Creating a budget/plan to host a First Peoples event

Core Concepts

1. You borrow $1000 for 3 years at 10% interest.
   a. Use the simple interest formula $I = P \times r \times t$ to roughly estimate how much you owe in 3 years.
   $I = 1000 \times 0.10 \times 3 = \$300$
   $\$1000 + \$300 = \$1300$

   b. Now recalculate the new interest at the end of each year. How much do you need to pay at the end of 3 years?
   Year 1: $1000 \times 1.10 = \$1100$
   Year 2: $1100 \times 1.10 = \$1210$
   Year 3: $1210 \times 1.10 = \$1331$

2. WealthSimple offers up to 3.25% cash back on your savings. If you have $20,000 in this bank, how much do you earn on interest each month?
   $20,000 \times 0.0325 = \$650$ (annually)
   $650 \div 12 = \$54.17$

3. Determine where you want to live as a young adult. Research project: Estimate the cost of living as a young adult if:
   a. You live on your own in a single bedroom apartment or a basement suite. Estimate the monthly cost for:
      i. Rent
      $1500

      ii. Utilities
      $100

      iii. Entertainment / Internet / TV
      $100

      iv. Phone
      $50

      v. Transportation
      $500 (not having a car would save a lot of money)

      vi. Food
      $1000

      vii. Clothes
      $100

      viii. Insurance
      $200

$3450 / month

b. How much would you earn in a month after taxes if you work a full-time job at $17.40 per hour?
Net income approximately $2,155

c. How much would you be able to save each month
   i. Living by yourself?
   Nothing

   ii. Splitting rent with a roommate?
   $3450 - 750 = \$2700$
   Nothing (you'll have to cut some corners or work overtime)

d. As a general guideline, up to what percent of your income should be spent on housing (rent, utilities, etc.)?
As a general guideline, financial experts often recommend that no more than 30% of your gross (before-tax) income should be spent on housing costs. This rule, known as the "30% rule" or sometimes "housing expense ratio," includes:
   i. Rent or mortgage payments
   ii. Property taxes for homeowners
   iii. Homeowner's or renter's insurance
   iv. Utilities in some calculations, although some guidelines exclude utilities from this percentage

Note: People in the Lower Mainland often spend more than 50% of their income on housing because the cost of housing is so high.

4. Suppose you are responsible for organizing a First Nations awards banquet for 300 guests. Research the cost of renting a banquet hall in your area and estimate the cost per guest.
Approximately $20,000 ($67 per person) but the price ranges vastly depending on the quality of the venue and food.

5. Where can you find more affordable housing?
You can move further away from the lower mainland.
   a. Prince George
   b. Kamloops
   c. Nanimo
   d. Kelowna
   e. Vernon
   f. Penticton
   g. Fort St. John
   h. Cranbrook
   i. Courtenay
   j. Cambell River
   k. Hope
   l. Quesnel
   m. Smithers
   n. Port Alberti
   o. Dawson Creek

Best Choice for a Young Family:

Kelowna stands out due to its blend of amenities, educational institutions, climate, and ongoing economic development, despite the cost of housing. However, if affordability is the primary concern, Smithers or Nanaimo offer excellent quality of life at potentially lower costs.
Median price of detached home in Kelowna, BC 984K (vs. Surrey 1,590K)
Median price of townhome in Kelowna: 770K
Median price of 1 bedroom rental: $2000 / mo

Here are some cheaper communities within Surrey:

a. Bridgeview
b. Whalley
c. Newton
d. Guildford
e. Fleetwood

Also consider renting a basement suite or paying to rent a single room.

6. Suppose you work 8 hours a day and 5 days a week and make $31 per hour. If there are 4 weeks in a month, how much housing can you "afford" each month? Assume you can spend 30% of your gross pay on housing.
   You gross $4960. $4960 \times 0.30 = \$1488$

7. When paying off your mortgage, is it better to pay $1000 to the bank 12 times a year, or pay $12,000 at the end of each year?
   Pay as often as possible (ex. every pay cheque)

8. You manage to invest $400,000 by the time you retire. If your investments make 10% annual interest, how much do you earn in interest each year?
   $40K

9. If you manage to save $1 million by the time you retire. Why it is overly optimistic to be able to spend $100,000 each year indefinitely?
   Sequence of returns risk

10. You become an oncologist and make a $400,000 annual salary. If you are taxed at a rate of 40%, estimate your daily budget.
    $400,000 \times 0.60 = 240,000$ gross.
    $240,000 \div 365 = \$657.53$ per day

11. You negotiate with your bank to waive your $30 per month banking fees because of your high account balance. How much do you save in monthly fees over the course of a decade?
    $30 \times 12 \times 10 = \$3600$

12. Why should paying off debts be a priority over borrowing more money to invest more?
    Decrease risk & peace-of-mind. You can take more risks once you are debt-free.

13. Under what circumstances is it ok to pay for rent instead of buying a home?
    What are some pros and cons of doing this?
    You may get ahead financially if your investments grow
    There is always some risk

14. Suppose the cost of your new iPhone is $2000. You have a coupon for 20% off. What is the cost of the iPhone now?
$2000 \times .80 = \$1600$

15. You pay off half your mortgage on a $1,000,000 home and own a car worth $30,000. But you owe $20,000 on your credit line. What is your net worth?
$500,000 + 30,000 - 20,000 = 510,000$

16. Restaurant
    a. Your family restaurant bill comes out to be $100. Taxes is 12%.
    You decide to tip 15%. How much do you end up paying in total
    if tip is calculated after taxes?
    $100 \times 1.12 = \$112$ (subtotal is calculated first)
    $112 \times 1.15 = \$128.80$

    b. You bring a dozen of your friends to a restaurant. The bill ends up being $300. Taxes and 18% gratuity are included in the bill. How much extra should you tip?
    $0

17. Planning a "best buy": At the supermarket milk is sold:
    Deal A: 4L of milk for $4.99
    Deal B: 1L for $1.25
    Deal C: 250 mL for 20 cents

    a. Calculate the unit cost of milk for each of these deals.
    Deal A:
    4000 mL = 499 cents
    1 mL = 0.12475 cents

    Deal B: 1000 mL = 125 cents
    1 mL = 0.125 cents

    Deal C: 250 mL = 20 cents
    1 mL = 0.08 cents

    Deal C is the cheapest, then Deal A, then Deal B

    b. Which is the best deal?
    Deal C

    c. Describe how price matching can save you money.
    If you find a competitor offering the same product at the same price, the store may have a price matching policy

18. What is the best deal?
    Deal A: Pay $500 for a phone and pay $20 per month for 24 months
    Deal B: Pay $0 but pay $40 per month for 24 months
    Deal C: Pay $1000 for the phone with no monthly payments
    Deal A cost: $500 + 20 \times 24 = \$980$

Deal B cost: $0 + 40 \times 24 = \$960$
Deal C cost: $\$1000$
Deal B is the best deal

19. What is the growth shape of unpaid debt over time?
    Exponential growth

20. What is the growth shape of money invested over time?
    Exponential growth

21. Suppose you have $50,000 in student loans. The annual interest rate is 10%.
    a. How much does your debt grow by in 1 year?
       $50,000 \times 1.10 = 55,000$

    b. If you pay this "debt growth" amount each year, how many years will it take to pay off your $50,000 student loan?
       Debt growth is $5000 per year
       Infinite time

22. What are two keys to building financial wealth?
    Make more money
    Spend less / invest more

23. Enrichment: If you invest one Starbucks drinks a day (each drink $7) how much does your investment grow to be in 50 years (10% interest rate) according to the "get smarter about money compound interest calculator"?
    About 3.7 million

24. Being desperate for cash you borrow $1000 from a Payday Loan company. Each year they charge 500% annual interest. How much does your debt grow to be in 3 years?
    Year 1: $1000 \times 5 = \$5000$
    Year 2: $5000 \times 5 = \$25,000$
    Year 3: $25,000 \times 5 = \$125,000$

25. You owe $5000 on your credit card. The interest rate is 29.99%.
    a. How much do you owe at the end of year 1?
       $5000 \times 1.2999 = \$6499.50$

    b. How much do you owe at the end of year 2?
       $6499.590 \times 1.2999 \approx \$8448.70$

    c. Use the simple interest formula $I = P \times r \times t$ to calculate how much you owe after 10 years without paying off the $5000 initial balance.
       $I = 5000 \times 0.2999 \times 10 \approx \$14995$

    d. Enrichment: In reality, how much will you owe after 10 years?
       Hint: $A = P\left(1 + \frac{i}{n}\right)^{nt}$ $n = 365$ (interest is compounded daily)
       $A = 5000\left(1 + \frac{0.2999}{365}\right)^{365(10)} \approx \$100,203.84$
       (which is much larger than the inaccurate simple interest calculation)

26. Despite the "free" perks of using credit cards, how can some financial experts justify "cutting up" the credit cards?
    You may spend more money if its too convenient to pay (vs. paying by cash)

27. Warren Buffet, a famous billionaire investor, believes that most people should invest in low MER index funds. What percentage of professional investors can "beat" the market?
    About 94% of professionals fail to beat the index over a 20 year period

28. Suppose you have $100,000 in investments. Your investments grow at a rate of 8% but your bank charges you a Management Expense Ratio (MER) fee of 2.5%.
    a. How much do you make this year on interest?
       $100,000 \times 0.055 = \$5,500$

    b. Enrichment: Over 30 years how much of a difference does this MER fee make (annual interest rate of 8%)? Use the "Get Smarter About Money" calculator.
       Over 30 years at 8%: $100,000 → $1.1 million
       Over 30 years at 5.5%: $100,000 → $519 K
       The bank takes about half your life savings!

29. Challenge: Which of the following is the best investment?
    A. 4.25% high interest cash account

    B. S&P 500
       Typically 10.5%

    C. Nasdaq 100 Index
       Typically 12.8%

    D. Crypto (ex. Bitcoin, MSTR, or HODL)
       Very high return but with high volatility. Some consider this to be a speculative stock.

    E. Picking individual stocks that did well last year (ex. MAG7 stocks)
       MAG7 may outperform Nasdaq but we are not picking concentrated stocks.

    F. MAGS or MAGX (leveraged) ETF
       MAGS charges a small fee. MAGX may outperform, but volatility decay may result in losses!

    G. TQQQ (triple leveraged) ETF
       TQQQ may outperform QQQ in a given year, but when there is a 33.3% drop in QQQ, TQQQ would be completely wiped out. Around the Year 2000 (during this dot com recession, TQQQ lost 99.99% of its value.

30. On Day 1 you have 1 cent. On Day 2 your money doubles to 2 cents. On day 3 your money doubles again to be 4 cents. Would you rather accept the amount of money you receive on day 30 or receive $5 million dollars?
    There's a quote often attributed to Albert Einstein that states, "Compound interest is the eighth wonder of the world. He who understands it, earns it; he who doesn't, pays it." However, there's no definitive proof that Einstein actually said or wrote these exact words.

    The power of exponential growth is incredible:
    On day 1: 1 cent
    On Day 2: 2 cents
    On Day 3: 4 cents
    On Day 24: $83,886.08
    On Day 30: $5,368,709 (over 5 million)

🎉Congratulations on Completing BC Grade 9 Math! 🎉