BC Math 9 Financial Literacy 1 (solutions)
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1. Determine where you want to live as a young adult. Research project: Estimate the cost of living as a young adult if you live on your own in a single bedroom apartment or a basement suite. Estimate the monthly cost for:
    a. Rent
    At least $1500 per month

    b. Utilities
    $100 per month

    c. Internet / TV
    $100 per month

    d. Food
    $400 per month

    e. Clothes / entertainment
    $100 per month

    f. Insurance
    $200 per month

    Total monthly costs: $\$1500 + \$100 + \$100 + \$400 + \$100 + \$200 \approx \$2400$

2. How much would you earn in a month after taxes if you work a full-time job at $15 per hour?
Assume 8 hours a day: $8 \times \$15 = \$120$ per day. $\$120 \times 5 = \$600$ per week. Assume that you work 4 weeks in a month. $\$600 \times 4 = \$2400$ each month (gross pay). Using an online gross vs. net income calculator online we find that the average tax rate is about 15%. The net salary (after taxes) is approximately $2040.

3. Based on the net monthly income in the question above, how much would you be able to save each month
    a. Living by yourself?
    $\$2040 - \$2400 =$ negative $360 (budget not met)

    b. Splitting rent with a roommate?
    $\$2040 - (\$2400 - \$750) = \$390$ (budget met: excess of $390)

    c. As a rule of thumb, up to what percent of your income should be spent on housing (rent, utilities, etc.)? Up to 30% is considered to be affordable

4. Suppose you work 8 hours a day and 5 days a week and make $20 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.
$\$3200 \times .30 = \$960$ (it's difficult to pay for rent without a roommate in BC!)

5. 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?
$40,000

6. You leave $50,000 in an EQ Bank account and earn a guaranteed annual interest rate of 2%. If you spend $1000 each year from this account, what will be your balance five years from now?
   $50,000. Each year you earn $1000 in interest and then you spend that same amount so there is no change in your bank balance.

7. 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?
   The stock market does not always go up by 10% each year. There is a sequence of returns risk. If for example the stock market plunges by half, 10% of $500,000 will only produce $50,000 in that year.

8. You become an oncologist and make a $400,000 annual salary. If you are taxed at a rate of 40%, estimate your daily budget.
   $\$400\,000 \times 0.60 = \$240\,000$
   $\$24\,000 \div 365 \approx \$657.53$

9. 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?
   $3600 and much more if you invest this amount

10. Why should paying off debts be a priority over borrowing more money to invest more?
    Risk carries a true cost and you have peace of mind when you are debt free.

11. Suppose the regular price of a PlayStation 5 is $630. You have a coupon for 20% off. How much does the PS5 on sale cost now?
    $\$630 \times 0.80 = \$504$

12. 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?
    $\$500{,}000 + \$30{,}000 - \$20{,}000 = \$510{,}000$

13. 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?
       Either $128.80 or $127 depending on how the bill is calculated.

    b. You bring a dozen of your friends to a restaurant. The bill ends up being $600. Taxes and 18% gratuity are included in the bill. How much extra should you tip?
       $0. Your tip was already paid!

14. 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: 0.124 cents per mL
       Deal B: 0.125 cents per mL
       Deal C: 0.08 cents per mL

b. Which is the best deal?
Deal C

c. Describe how price matching can save you money.
Some stores (ex. Walmart) will take coupons and match prices from their competitor. For example, walk into Best Buy, then look up the same item on Amazon.ca and Walmart.ca.

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

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

17. 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?
    $5000

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

18. What are two keys to building financial wealth?
Make more money and spend less (i.e. invest more)

19. Enrichment: If you invest two Starbucks drinks a day (each drink $7) how much does your investment grow to be in 50 years (8% interest rate) according to the "get smarter about money compound interest calculator"?
$>$ $3 million!

20. 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.
    $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?
    $1331

21. 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?
    $6499.50

    b. How much do you owe at the end of year 2?
    $8442.85

    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.
    $I = \$5000 \times (0.2999) \times 10 \approx \$14995$
    Thus $\$14995 + \$5000 = \$19{,}995$ is owed according to the simple interest formula

d. Challenge: In reality, how much will you owe after 10 years?

$A = P\left(1 + \frac{i}{n}\right)^{nt}$ $n = 365$ (interest is compounded daily)

$A = \$5000\left(1 + \frac{0.2999}{365}\right)^{365(10)} \approx \$100{,}203.84$ which is much more!

22. Despite the "free" perks of using credit cards, how can some financial experts justify "cutting up" the credit cards?
Having a credit card increases the temptation to spend money.

23. 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?
The vast minority (about 9 out of 10 fund managers fail to beat the market)

24. Suppose you have $100,000 in investments. Your investments grow at a rate of 8% but you are charged a Management Expense Ratio (MER) fee of 2.5%.
    a. How much do you make this year on interest?
    $5500

    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.
    $574,836.19 (banks may be taking about half of all your money!)

25. Challenge: How many more years will it take for your money to double with MER fees set at 2.5% vs 1%?
Using the example from the question above we see that it takes about 3 years longer to double your wealth (14.2 vs 11.0 years).