

# Financial Literacy Review

Try each problem first. You don't need to finish everything.

Core path ~55 min · Full sheet ~1 h 45 min

**Recommended:** K1-K5, then one A and one T problem

K = Knowledge & Understanding · A = Application · T = Thinking · Boss = Challenge



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## QUICK REFERENCE

**Budget:** start from **net income** (take-home pay), not gross pay. Savings is a planned line in the budget, not whatever is left over.

**Simple interest:**  $I = Prt$ , with  $t$  in years (18 months is  $t = 1.5$ ).

**Compound interest:**  $A = P(1 + r)^t$ , and the interest earned is  $A - P$ .

Percents over several years don't add: losing 15% a year for 2 years leaves  $0.85^2 = 72.25\%$  of the value, a 27.75% loss, **not** 30%.

Show your work on separate paper.

## Core Skills (K)

Budgets · Appreciation & Depreciation · Simple Interest · Compound Interest · Cost of Credit

### K1 Sam's Monthly Budget

Sam's gross pay is \$3150 a month. Deductions (income tax, CPP and EI) take \$640 a month. The table shows Sam's monthly expenses.

| Expense   | Rent | Car insurance | Phone plan | Groceries | Hydro |
|-----------|------|---------------|------------|-----------|-------|
| Cost (\$) | 1100 | 160           | 55         | 420       | 85    |

- State whether each expense is fixed or variable.
- Determine Sam's monthly net income and total monthly expenses.
- Determine Sam's monthly surplus or deficit, and the total for one year.

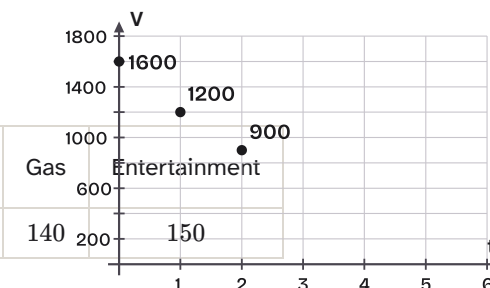
### K2 Value Over Time

- A painting worth \$1200 appreciates by 5% each year. Find its value after 3 years.
- A laptop bought for \$1400 depreciates by 30% each year. Find its value after 2 years.

**Percent change every period:** multiply by  $(1 + r)$  to appreciate and by  $(1 - r)$  to depreciate. After  $t$  periods,  $V = P(1 + r)^t$  or  $V = P(1 - r)^t$ .

**Cost of credit** = everything you pay (down payment included) – the price of the item.

- The graph shows the value  $V$ , in dollars, of an e-bike at the start and after 1 and 2 years. It loses the same percent of its value each year. Determine that percent, and the value after 5 years.



### K3 Simple Interest

Use  $I = Prt$ .

- Find the interest earned on \$2500 at 4% per year for 3 years.
- \$1800 is invested at 3.5% per year for 18 months. Find the total amount at the end.
- \$600 earns \$54 in simple interest over 3 years. Determine the annual interest rate.

### K4 Compound Interest

Use  $A = P(1 + r)^t$ . Interest is compounded annually.

- \$2000 is invested at 5% per year for 4 years. Find the amount at the end.
- Find the interest earned in (a).
- A GIC pays 3% per year. Determine how much must be invested today to have \$5000 in 6 years.

**K5 Cost of Credit**

A phone costs \$1200, taxes included. **Plan 1:** \$150 down, then \$49 a month for 24 months. **Plan 2:** \$0 down, then \$54 a month for 24 months.

- Find the total amount paid with Plan 1.
- Find the cost of credit for Plan 1.
- Find the total paid and the cost of credit for Plan 2. Which plan costs less overall?

**Real World (A)**

Saving Goals · Comparing Assets · Car Loans

**A1 Saving for a Laptop**

Aisha works part-time in Hamilton. Her net pay is \$1240 a month. Her monthly expenses are: phone \$50, transit pass \$128, family contribution \$300, food out \$260, clothing \$150 and entertainment \$180. She wants a laptop with a shelf price of \$1500 in 6 months.

- Find Aisha's monthly surplus. How much must she save each month to reach \$1500 in 6 months, and is her surplus enough?
- She cuts entertainment by \$60 and food out by \$40 and saves the whole new surplus. Find her new surplus and the number of whole months she needs to save \$1500.
- At the checkout, Ontario adds 13% HST to the shelf price. Can Aisha buy the laptop after 6 months? If not, how many months does she need?

**A2 Cards vs Snowmobile**

A family in Timmins buys a hockey card collection for \$2000 and a snowmobile for \$12,000 in the same year. The cards appreciate by 9% each year. The snowmobile depreciates by 20% each year.

- Write an equation for the value of each item after  $t$  years. Find each value after 5 years.
- Make a table of values for whole years. After how many years are the cards first worth more than the snowmobile?
- A dealer will always pay at least \$500 for the snowmobile as parts. After how many years does the model first give a value below \$500? What is the snowmobile worth from then on?

**A3 Car Loan Choice**

Ethan borrows \$15,000 for a used car. **Plan A:** \$463 a month for 36 months. **Plan B:** \$256 a month for 72 months. The car loses 18% of its value each year.

- Find the total amount repaid and the cost of credit for each plan.

- Ethan picks Plan B because the payment is lower. How much more does Plan B cost in total? Find the car's value when Plan B is paid off.
- After 2 years on Plan B, Ethan wants to sell the car. The lender says he still owes \$10,670. Find the car's value. Can selling it pay off the loan?

**Think It Through (T)**

Error Analysis · Build a Budget

**T1 Spot the Flaw**

A student finds the value of \$3000 invested at 6% per year, compounded annually, for 5 years:

*"6% of \$3000 is \$180. Five years of interest is  $5 \times 180 = 900$ , so the account holds \$3900."*

- What kind of interest did the student calculate? Find the correct value of the account.
- Find the interest earned during year 5 alone. Explain why it is more than \$180.
- After how many whole years is the compound account first more than \$500 ahead of the student's method?

**T2 Build a Budget**

Jordan's gross pay is \$3000 a month, and deductions take 20%. Jordan's budget must follow three rules: rent is at most 35% of net income; savings is at least 10% of net income and is listed as an expense; the budget is balanced.

- Find Jordan's net income, the largest rent allowed and the smallest savings allowed.
- Write one balanced monthly budget for Jordan that follows all three rules and has at least two fixed and two variable expenses. Many answers are possible.
- When the lease renews, rent rises by 5%. Is the rent rule still met? Can cutting other expenses fix this? Find the smallest net income for which the new rent follows the rule.

**Boss Level**

Optional challenge

**Up, Then Down**

A store raises the price of an item by a percent, then lowers the new price by the same percent.

- A jacket costs \$80. Its price is raised by 25%, then the new price is lowered by 25%. Find the final price.
- For another item, a rise of  $x\%$  followed by a fall of  $x\%$  leaves the price 9% below the original. Find  $x$ .
- Show that for every  $x$  with  $0 < x < 100$ , a rise of  $x\%$  followed by a fall of  $x\%$  ends below the original price.



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