Understanding Personal Finance and Compound Interest

Solutions manual and marking guidance (for learners checking their work, and for instructors).

O1: Explain income, expenses and a simple budget.

Q01 [Foundational · short answer] What is take-home pay?

Answer: Income actually received after tax and other deductions.

1. Budgets should be based on take-home pay.

Q02 [Foundational · classification] Classify as need or want: rent, streaming subscription, electricity, restaurant meal.

Answer: Needs: rent, electricity. Wants: streaming subscription, restaurant meal.

1. Needs are essential to live and work.

Q03 [Core · numerical] Apply 50/30/20 to $4,200 take-home pay.

Answer: $2,100 / $1,260 / $840

1. 0.5, 0.3 and 0.2 x 4,200.

Q04 [Core · true/false] True or false: the 50/30/20 rule must be followed exactly by everyone.

Answer: False

1. It is a starting guideline; local costs vary.

Q05 [Applied · application] Sam's take-home pay is $2,000; needs cost $1,300. Using 50/30/20 as a guide, how much is left for wants and saving, and what would you suggest?

Answer: $700 left; needs take 65%, so reduce wants (e.g. to $400) to keep saving about $300 (15%).

1. Adapt the guideline: protect saving where possible.

Q06 [Applied · explanation] Why does an emergency fund help prevent debt?

Answer: Unexpected costs can be paid from savings instead of borrowing at interest.

1. It breaks the link between surprises and expensive debt.

O2: Understand saving, debt and interest.

Q07 [Foundational · short answer] What is interest, from a borrower's point of view?

Answer: The price paid for using borrowed money.

1. Savers earn it; borrowers pay it.

Q08 [Foundational · multiple choice] What does APR stand for? (a) annual percentage rate (b) average payment ratio (c) annual payment return (d) account profit rate

Answer: (a)

1. Rates are usually quoted per year.

Q09 [Core · numerical] A loan of $1,500 has simple interest of 8% a year. How much interest is due after one year?

Answer: $120

1. 1,500 x 0.08 = 120.

Q10 [Core · true/false] True or false: all debt is harmful.

Answer: False

1. Planned, affordable borrowing (e.g. for education) can be reasonable; expensive unplanned debt is the danger.

Q11 [Applied · explanation] Why can an unpaid credit card balance grow faster than the headline rate suggests?

Answer: Interest is compounded (often monthly), so interest is charged on previous interest.

1. $2,000 at 20% APR monthly: $438.78 in a year, not $400.

Q12 [Advanced · evaluation] An advert promises '30% guaranteed returns, no risk'. What should you think and do?

Answer: Be very suspicious: high returns usually involve high risk; check official regulator warnings and seek independent advice.

1. Offers that sound too good to be true often are scams.

O3: Calculate simple and compound interest, step by step.

Q13 [Foundational · numerical] Simple interest: $1,000 at 5% for 3 years. Final balance?

Answer: $1,150.00

1. Interest 1,000 x 0.05 x 3 = 150.

Q14 [Foundational · numerical] Compound interest: $1,000 at 5% yearly for 2 years. Final balance?

Answer: $1,102.50

1. 1,000 x 1.05 = 1,050; 1,050 x 1.05 = 1,102.50.

Q15 [Core · numerical] $500 at 4% compounded yearly for 5 years. Final balance to the nearest cent?

Answer: $608.33

1. 500 x 1.04^5.

Q16 [Core · numerical] Use the Rule of 72 to estimate how long money takes to double at 8% a year.

Answer: About 9 years

1. 72 / 8 = 9. (Exact: 1.08^9 = 2.00).

Q17 [Applied · numerical] $3,000 at 6% for 10 years: calculate the difference between compound (yearly) and simple interest.

Answer: $572.54

1. Compound: 3,000 x 1.06^10 = 5,372.54; simple: 3,000 x (1 + 0.6) = 4,800.00.

Q18 [Applied · numerical] $1,000 at 12% a year, compounded monthly, for 1 year. Final balance?

Answer: $1,126.83

1. 1,000 x (1 + 0.01)^12.

Q19 [Advanced · numerical] How many whole years does $1,000 need at 5% yearly compounding to exceed $2,000? Check the Rule of 72.

Answer: 15 years

1. 1.05^14 = 1.980 (not yet), 1.05^15 = 2.079. Rule of 72: 14.4 years, a good estimate.

O4: Explain why time matters so much in long-term planning.

Q20 [Foundational · true/false] True or false: with compound interest, the amount added each year grows over time.

Answer: True

1. Each year's interest is calculated on a larger balance.

Q21 [Core · numerical] Using the lesson's figures, how much more did Amina pay in than Ben, and how much more did she end with?

Answer: $12,000 more paid in; about $65,233 more at 65.

1. Amina: 40 x 1,200 = 48,000 paid, about 144,960 at the end; Ben: 36,000 paid, about 79,727.

Q22 [Core · short answer] Why is the third decade of compound growth larger than the first?

Answer: Interest is calculated on a much larger balance by then.

1. $1,000 at 5%: +628.89 in years 1-10, +1,668.64 in years 21-30.

Q23 [Applied · explanation] Explain how inflation affects long-term saving.

Answer: Rising prices reduce what money can buy, so the real growth is roughly the interest rate minus inflation.

1. 5% return with 3% inflation is about 2% real growth.

Q24 [Applied · application] A 20-year-old can save $50 a month now, or $100 a month from age 30. Without exact calculation, which is likely to give more by 60 at the same rate, and why?

Answer: Often the earlier, smaller saving can match or beat the later, larger one because it compounds for 10 extra years; the exact answer depends on the rate.

1. Time multiplies every deposit.

Q25 [Advanced · numerical] At 5% (end-of-year deposits), what does saving $1,200 a year for 20 years grow to?

Answer: $39,679.14

1. Future value = 1,200 x ((1.05^20 - 1) / 0.05).

Marking scheme: Assignment 1: build a one-month budget (individual)

- Complete and realistic figures: 4 marks
- Needs/wants classification correct: 3 marks

- Justified comparison with the guideline: 3 marks
- Emergency fund plan: 2 marks
- Reflection and adjustments: 3 marks (total 15)

Marking scheme: Assignment 2: the cost of waiting (spreadsheet)

- Correct formulas (checks: 40 years at 5% = $144,959.73; 30 years = $79,726.62): 6 marks
- Totals correct: 3 marks
- 3% comparison correct: 3 marks
- Clear conclusion: 3 marks (total 15)