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THT WORKSHEETS

Learn With the Solutions

Australian Curriculum

Year 11 General Mathematics

Financial Mathematics – Loans, Investments & Decision Making

These solutions are designed to explain not only the calculations, but also why each method is appropriate and how to interpret the result in its financial context.

1.

Understanding the Question

The account earns **simple interest**, which means the interest is calculated only on the original deposit each year.

We need to find:

a) the total interest earned over three years
b) the final balance after adding the interest to the original deposit

Principal = $7,500

Annual interest rate = 4.2%

Time = 3 years

Convert the percentage rate to a decimal:

4.2% = 0.042

Formula

Simple interest:

$I = P \times r \times t$

where:

P = principal
r = annual interest rate as a decimal
t = time in years

a) Interest earned

Substitute the values:

$I = 7{,}500 \times 0.042 \times 3$

First calculate one year of interest:

$7{,}500 \times 0.042 = 315$

Now calculate the interest for three years:

$315 \times 3 = 945$

The account earns $315 each year for three years.

Final Answer: $945 interest

b) Final balance

Final balance = Principal + Interest

$= 7{,}500 + 945$

$= 8{,}445$

Final Answer: $8,445

Common Mistake

Do not use 4.2 in the formula. A percentage must first be converted to a decimal:

$4.2\% = 0.042$

2.

Understanding the Question

The jacket receives two consecutive discounts.

The second discount is not calculated from the original price. It is calculated from the price remaining after the first discount.

Original price = $185

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First discount: 25%

Calculate 25% of $185:

$185 \times 0.25 = 46.25$

Price after the first discount:

$185 - 46.25 = 138.75$

The jacket now costs $138.75.

Second discount: 10%

Calculate 10% of the discounted price:

$138.75 \times 0.10 = 13.875$

Do not round this value yet.

Subtract the second discount:

$138.75 - 13.875 = 124.875$

Round the final amount to the nearest cent:

$\$124.875 \approx \$124.88$

Final Answer: $124.88

Faster Method

After a 25% discount, the customer pays 75% of the original price.

After a further 10% discount, the customer pays 90% of the reduced price.

Final price:

$185 \times 0.75 \times 0.90$

$= 124.875$

$= \$124.88$

Common Mistake

Do not add the discounts and calculate 35% off the original price. Consecutive discounts are applied one after the other to different amounts.

Also avoid rounding after the first intermediate calculation. Round money only at the end unless instructed otherwise.

3.

Understanding the Question

The price of $1,980 already includes 10% GST.

A GST-inclusive price represents:

100% original price + 10% GST = 110%

We need to separate the GST from the total.

a) GST component

For a price that already includes 10% GST, the GST component is one-eleventh of the total price.

GST component:

1,980 ÷ 11 = 180

Final Answer: $180 GST

Why divide by 11?

Suppose the original price is $100.

GST = $10

GST-inclusive price = $110

The GST amount, $10, is one-eleventh of $110.

Therefore:

GST = GST-inclusive price ÷ 11

b) Price before GST

Price before GST:

1,980 − 180 = 1,800

Final Answer: $1,800 before GST

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Check

10% of $1,800:

1,800 × 0.10 = 180

Add the GST:

1,800 + 180 = 1,980

The answer is consistent.

Common Mistake

Do not calculate 10% of $1,980. That would find 10% of the GST-inclusive amount, not the GST that was originally added to the pre-GST price.

4.

Understanding the Question

This account earns **compound interest**, meaning interest is added to the balance each year. The following year's interest is then calculated on the increased balance.

Principal = $12,000

Annual rate = 5.1%

Time = 4 years

Convert the rate:

5.1% = 0.051

Formula

Compound interest:

$A = P(1 + r)^n$

where:

A = final amount
P = principal
r = annual interest rate as a decimal
n = number of compounding periods

Substitute the values

$A = 12{,}000(1 + 0.051)^4$

$A = 12{,}000(1.051)^4$

Calculate:

$(1.051)^4 \approx 1.2201433692$

$A \approx 12{,}000 \times 1.2201433692$

$A \approx 14{,}641.7204$

Round to the nearest cent:

Final Answer: $14,641.72

Check Using Year-by-Year Growth

End of Year 1:

$12{,}000 \times 1.051 = 12{,}612.00$

End of Year 2:

$12{,}612 \times 1.051 = 13{,}255.21$

End of Year 3:

$13{,}255.21 \times 1.051 \approx 13{,}931.23$

End of Year 4:

$13{,}931.23 \times 1.051 \approx 14{,}641.72$

Common Mistake

Do not use the simple-interest formula. Compound interest changes each year because interest is earned on previous interest as well as on the original principal.

5.

Understanding the Question

We must compare two accounts over the same five-year period:

- Account A uses simple interest.

- Account B uses compound interest.

Although Account A has the higher advertised rate, Account B may still produce more because its interest compounds.

Principal = $20,000

Time = 5 years

Account A: 4.8% simple interest

Convert the rate:

4.8% = 0.048

Use:

$I = P \times r \times t$

$I = 20{,}000 \times 0.048 \times 5$

One year of interest:

$20{,}000 \times 0.048 = 960$

Five years of interest:

$960 \times 5 = 4{,}800$

Final amount:

$20{,}000 + 4{,}800 = 24{,}800$

Account A final amount: $24,800

Account B: 4.5% compound interest

Convert the rate:

4.5% = 0.045

Use:

$A = P(1 + r)^n$

$A = 20{,}000(1.045)^5$

$A \approx 20{,}000 \times 1.2461819377$

$A \approx 24{,}923.6388$

Round to the nearest cent:

Account B final amount: $24,923.64

Compare the returns

24,923.64 − 24,800.00 = 123.64

Account B produces $123.64 more.

Final Answer: Account B provides the better return by $123.64.

Key Idea

A higher interest rate does not automatically produce the better return. The way interest is calculated also matters.

6.

Understanding the Question

Option B requires:

1. a deposit;
2. borrowing the remaining balance;
3. paying simple interest on the borrowed amount.

Laptop price = $2,400

Deposit rate = 20%

Interest rate = 8%

Loan period = 12 months = 1 year

a) Deposit

Deposit:

2,400 × 0.20 = 480

Final Answer: $480 deposit

b) Amount borrowed

Amount borrowed:

2,400 − 480 = 1,920

Final Answer: $1,920 borrowed

c) Total amount repaid

The simple interest applies only to the borrowed amount.

Use:

$I = P \times r \times t$

$I = 1{,}920 \times 0.08 \times 1$

$I = 153.60$

Interest charged:

$153.60

Loan repayment:

$1{,}920 + 153.60 = 2{,}073.60$

This is the amount repaid after the deposit.

To find the total amount paid for the laptop, include the deposit:

$480 + 2{,}073.60 = 2{,}553.60$

Final Answer: $2,553.60 paid altogether

d) Extra cost compared with paying upfront

$2{,}553.60 - 2{,}400.00 = 153.60$

Final Answer: Option B costs $153.60 more than paying upfront.

Common Mistake

Do not calculate interest on the full $2,400. Interest applies only to the $1,920 balance after the deposit.

7.

Understanding the Question

The family's weekly income is divided between expenses and savings.

We need to:

a) add all expenses;
b) subtract expenses from income;
c) express the savings as a percentage of income.

Weekly income = $1,450

a) Total weekly expenses

Housing = $620
Groceries = $280
Transport = $170
Utilities = $140
Entertainment = $90

Add:

620 + 280 + 170 + 140 + 90

= 900 + 170 + 140 + 90

= 1,070 + 140 + 90

= 1,210 + 90

= 1,300

Final Answer: $1,300 in weekly expenses

b) Weekly savings

Savings = Income − Expenses

= 1,450 − 1,300

= 150

Final Answer: $150 saved each week

c) Percentage of income saved

Percentage saved:

Savings ÷ Income × 100

= 150 ÷ 1,450 × 100

≈ 0.103448 × 100

≈ 10.3448%

Rounded to one decimal place:

Final Answer: 10.3%

Check

10% of $1,450 is $145.

The family saves $150, so an answer slightly above 10% is reasonable.

8.

Understanding the Question

The discount is applied first. The booking fee is added afterwards.

Original price = $4,850

Discount = 15%

Booking fee = $85

Calculate the discount

4,850 × 0.15 = 727.50

Discount amount:

$727.50

Find the discounted price

4,850 − 727.50 = 4,122.50

Add the booking fee

4,122.50 + 85 = 4,207.50

Final Answer: $4,207.50

Faster Method

The customer pays 85% of the original price:

4,850 × 0.85 = 4,122.50

Then add the fee:

4,122.50 + 85 = 4,207.50

Common Mistake

Do not discount the booking fee unless the question specifically says that the fee is included in the discount.

9.

Understanding the Question

This question does not ask for a calculation. It asks whether the advertisements provide enough information for a fair comparison.

Bank 1 advertises:

5% interest

Bank 2 advertises:

4.8% interest compounded monthly

The first advertisement does not explain:

- whether the 5% is simple or compound;
- how often interest is calculated;
- how long the money must remain invested;
- whether account fees apply;
- whether the rate is temporary;
- whether minimum balances or withdrawal restrictions apply.

The second bank provides a compounding frequency, but other account conditions may still matter.

Sample Answer

The advertisements do not provide enough information because the first bank does not state whether its 5% rate is simple or compound or how often interest is calculated. The accounts may also have different fees, minimum balances, investment periods or withdrawal conditions. Therefore, the advertised rates alone are not enough to decide which investment is better.

Final Answer: More information is required before the two accounts can be compared fairly.

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Key Idea

Financial products should be compared using the final return and all relevant conditions, not only the headline interest rate.

10.

Understanding the Question

The student claims that two successive 20% discounts equal a single 40% discount.

The easiest way to test the claim is to use an original price of $100.

First discount

20% of $100:

$100 \times 0.20 = 20$

Price after the first discount:

$100 - 20 = 80$

Second discount

The second 20% discount applies to $80.

$80 \times 0.20 = 16$

Final price:

$80 - 16 = 64$

Overall discount

$100 - 64 = 36$

The total reduction is $36 from an original price of $100.

Therefore, the combined discount is 36%.

Final Answer: The statement is incorrect. Two consecutive 20% discounts produce an overall discount of 36%, not 40%.

Why It Is Not 40%

The second discount is calculated from the reduced price, not from the original price.

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Faster Method

Amount remaining:

100% × 80% × 80%

= 0.8 × 0.8

= 0.64

The customer pays 64%, so the discount is:

100% − 64% = 36%

11.

Understanding the Question

We need to calculate the total cost from each supplier after including both discounts and delivery fees.

Original price = $980

Supplier A

Discount = 10%

Delivery = Free

Discount amount:

980 × 0.10 = 98

Final cost:

980 − 98 = 882

Supplier A total: $882

Supplier B

Discount = 15%

Delivery fee = $65

Discount amount:

980 × 0.15 = 147

Price after discount:

980 − 147 = 833

Add delivery:

833 + 65 = 898

Supplier B total: $898

Compare

898 − 882 = 16

Supplier A costs $16 less.

Final Answer: Supplier A offers the lower overall cost by $16.

Common Mistake

Do not choose Supplier B simply because its discount percentage is larger. The delivery charge changes the final cost.

12.

Understanding the Question

A higher advertised interest rate may appear attractive, but the overall value of a savings account depends on more than the rate.

Possible reasons include:

- account-keeping fees;
- withdrawal fees;
- a high minimum balance;
- a temporary introductory rate;
- restrictions on accessing funds;
- penalties for withdrawals;
- different compounding frequencies;
- greater financial risk;
- requirements for regular deposits.

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Sample Answer

A higher-rate account may charge fees that reduce the interest earned. It may also require a high minimum balance or restrict withdrawals. Therefore, the account with the highest advertised rate may not produce the best overall financial result.

Final Answer: Any two valid, clearly explained financial considerations are acceptable.

Key Idea

Compare the net return after fees and conditions, not just the advertised rate.

13.

Understanding the Question

Taylor must compare:

- Investment A: 4.9% compound interest
- Investment B: 5.2% simple interest

Although Investment B has the higher rate, Investment A may grow more because interest compounds.

Initial investment = $15,000

Time = 6 years

Investment A: Compound interest

Rate:

4.9% = 0.049

Formula:

$A = P(1 + r)^n$

Substitute:

$A = 15{,}000(1.049)^6$

$A \approx 15{,}000 \times 1.3324561607$

$A \approx 19{,}986.8424$

Rounded:

Investment A final value: $19,986.84

Investment B: Simple interest

Rate:

5.2% = 0.052

Formula:

$I = P \times r \times t$

$I = 15{,}000 \times 0.052 \times 6$

Interest for one year:

$15{,}000 \times 0.052 = 780$

Interest for six years:

$780 \times 6 = 4{,}680$

Final value:

$15{,}000 + 4{,}680 = 19{,}680$

Investment B final value: $19,680

Compare the investments

$19{,}986.84 - 19{,}680.00 = 306.84$

Investment A produces $306.84 more.

Final Answer: Investment A is the better option by $306.84.

Key Idea

A lower compound rate can eventually outperform a higher simple rate because compound interest is earned on an increasing balance.

14.

Understanding the Question

The family must compare the immediate financial cost of paying cash with the total cost of financing.

Car price = $18,000

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Option A: Pay cash

The family pays the full price immediately.

Total cost: $18,000

Advantages:

- no interest;
- no loan repayments;
- no long-term debt;
- lowest total financial cost.

Disadvantages:

- reduces savings immediately;
- may leave less money available for emergencies.

Option B: Finance the car

Deposit = 15%

Interest = 7% simple interest

Time = 5 years

Step 1: Calculate the deposit

18,000 × 0.15 = 2,700

Deposit:

$2,700

Step 2: Calculate the financed balance

18,000 − 2,700 = 15,300

Amount financed:

$15,300

Step 3: Calculate simple interest

I = P × r × t

I = 15,300 × 0.07 × 5

Annual interest:

15,300 × 0.07 = 1,071

Interest over five years:

1,071 × 5 = 5,355

Interest charged:

$5,355

Step 4: Calculate loan repayments

15,300 + 5,355 = 20,655

Total repaid through the loan:

$20,655

Step 5: Include the deposit

20,655 + 2,700 = 23,355

Option B total cost: $23,355

Compare the options

23,355 − 18,000 = 5,355

Financing costs $5,355 more.

Sample Recommendation

From a purely financial perspective, Option A is the better choice because it avoids $5,355 in interest and has a total cost of only $18,000.

However, paying cash would immediately reduce the family's savings. Option B allows them to retain more money for emergencies, but it creates five years of debt and a substantially higher total cost.

Assuming the family can pay cash without exhausting its emergency savings, Option A is the stronger financial choice.

Final Answer: Option A is financially cheaper by $5,355.

Key Idea

A mathematical calculation identifies the cheaper option, but a responsible financial recommendation should also consider cash flow, savings and the ability to manage repayments.

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Quick Answer Check

1. a) $945 interest
   b) $8,445 final balance
2. $124.88
3. a) $180 GST
   b) $1,800 before GST
4. $14,641.72
5. Account A: $24,800
   Account B: $24,923.64
   Account B is better by $123.64.
6. a) $480 deposit
   b) $1,920 borrowed
   c) $2,553.60 paid altogether
   d) $153.60 extra
7. a) $1,300 expenses
   b) $150 savings
   c) 10.3%
8. $4,207.50
9. Insufficient information to compare the accounts fairly.
10. Incorrect; the combined discount is 36%.
11. Supplier A, cheaper by $16.
12. Any two valid considerations, such as fees, restrictions, minimum balances or temporary rates.
13. Investment A: $19,986.84
    Investment B: $19,680
    Investment A is better by $306.84.
14. Cash: $18,000
    Finance: $23,355
    Paying cash is cheaper by $5,355.

