Financial interest: simple and compound interest

Lesson plan and teacher's notes · Form 2 Mathematics · 1 period of 40 minutes

School	(write school name)	**Teacher**	(write name)
Date	(date)	**Class**	Form 2
Subject	Mathematics	**Enrolment**	Boys ___ Girls ___ Total ___
Time	40 minutes	**Topic**	Financial interest: simple and compound interest

Learners explain interest, principal and interest rate, calculate simple interest with the formula, build up compound interest year by year, and explain why compound interest is larger than simple interest over the same time. The lesson uses savings of K5,000 at 10% and a trader who borrows.

Specific outcomes

By the end of the lesson, learners should be able to:

1. Explain what interest, principal and interest rate mean
2. Calculate simple interest and the amount using $I = (P \times R \times T) / 100$
3. Build up compound interest year by year
4. Compare simple and compound interest over the same time and say why they differ

Prior knowledge

- Finding a percentage of an amount
- Adding and multiplying numbers with money
- Using a formula by substituting values

Teaching and learning materials

- chalk and board
- exercise books
- a calculator for checking, if available

References

Ministry of Education (CDC) Form 2 Mathematics syllabus and module; 25Schools learners' note: Financial interest: simple and compound interest.

Lesson development

Stage and time	Teacher activities	Learner activities
Introduction 5 min	Ask who has seen a bank or a savings group in the village and what happens to money kept there for a year. Write interest on the board.	Share what they know about saving and borrowing.
Development: simple interest 12 min	Define principal, interest, rate and amount. Teach I = (P × R × T) / 100 and work the Ruth example: K5,000 at 10% for 3 years.	Calculate the interest each year, the interest for 3 years and the amount.
Development: compound interest 12 min	Build compound interest year by year for K5,000 at 10%: K5,500, K6,050, K6,655. Stress that each year starts with the new balance. Do not use a formula at this stage.	Copy the table and repeat for K4,000 at 10% for 2 years.
Development: comparing 8 min	Compare K6,500 and K6,655. Ask why they match after one year and differ after three. Link to savers and borrowers.	Explain in one sentence why compound interest is larger.
Conclusion 3 min	Ask two learners to say the difference between simple and compound interest in their own words. Set the homework.	Answer and copy the homework.

Teacher's content notes

Read these before the lesson. They are what you need to know, not what to copy onto the board.

Interest, principal and rate

Interest is money earned on savings or charged on a loan. The principal is the original amount saved or borrowed, and the interest rate is the percentage paid each year. The amount is the principal plus the interest.

Simple interest

Under simple interest the bank always uses the original principal, so the interest is the same every year. I = (P × R × T) / 100, where P is the principal, R is the rate per year and T is the time in years.

Compound interest

Under compound interest each year's interest is worked out on the balance at the start of that year, so earlier interest also earns interest. Take 10% of the starting balance, add it, and use the new total as the next starting balance.

Comparing

For K5,000 at 10% for 3 years, simple interest gives K6,500 and compound interest gives K6,655. After one year both give K5,500 because both use the original principal.

Savers and borrowers

Compound interest helps a saver because earlier interest earns more interest. It hurts a borrower who makes no repayments, because interest is charged on earlier interest too.

Questions to ask during the lesson

Question	Expected answer
A learner saves K2,000 in a school savings club for 3 years at 5% simple interest per year. (a) Write the formula. (b) Find the interest. (c) Find the amount.	(a) I = (P × R × T) / 100. (b) (2,000 × 5 × 3) / 100 = K300. (c) 2,000 + 300 = K2,300.
A farmer saves K4,000 at 10% compound interest per year for 2 years. (a) Find the interest in year 1 and the balance. (b) Find the interest in year 2. (c) Find the amount after 2 years.	(a) 10% of 4,000 = K400, so K4,400. (b) 10% of 4,400 = K440. (c) K4,840.
A learner notices that K5,000 at 10% gives the same amount after one year under both simple and compound interest. (a) State the amount after one year. (b) Say why they match. (c) Say when they first differ.	(a) K5,500. (b) In year 1 both use the original principal as the starting balance. (c) In year 2.
A pupil says compound interest earns interest on interest, and a friend asks what that means. (a) Say what earns interest in year 2. (b) Say where the extra comes from. (c) Say what happens to the yearly interest.	(a) The principal plus the interest added in year 1. (b) Interest added earlier becomes part of the balance. (c) It grows each year.

Worked examples for the board

Example 1: simple interest

Ruth saves K5,000 for 3 years at 10% simple interest per year. Interest for one year = (5,000 × 10 × 1) / 100 = K500. Interest for 3 years = 3 × 500 = K1,500. Amount = 5,000 + 1,500 = K6,500.

Example 2: compound interest

K5,000 earns 10% compound interest per year. Year 1: 10% of 5,000 = 500, balance K5,500. Year 2: 10% of 5,500 = 550, balance K6,050. Year 3: 10% of 6,050 = 605, balance K6,655.

Example 3: comparing plans

Natasha saves K2,000 for 3 years at 10% simple interest: interest = (2,000 × 10 × 3) / 100 = K600, amount K2,600. Mulenga gets compound interest: K2,200, K2,420, K2,662. Mulenga earns K662 against K600 because each year's interest is worked out on a larger balance.

Board plan

Write the title and the formula I = (P × R × T) / 100. Left: simple interest worked for K5,000 at 10% for 3 years. Centre: the compound interest table year by year. Right: the comparison of K6,500 and K6,655 with the reason.

Year	Simple balance	Compound balance
1	K5,500	K5,500
2	K6,000	K6,050
3	K6,500	K6,655

K5,000 at 10% for 3 years

Mistakes to expect

Learners often think	Put it right
Compound interest uses a higher rate than simple interest.	The rate is the same. Only the amount used to work out interest changes, because compound interest uses the balance at the start of each year.
The interest is the same as the amount.	The amount is the principal plus the interest.
Simple and compound interest differ in the first year.	In year 1 both use the original principal as the starting balance, so they give the same amount.

Differentiation

Learners who struggle

Give learners a table with columns for starting balance, interest and new balance and fill in the first row. Use K1,000 and 10% for the first practice question.

Learners who finish early

Ask learners who finish early to continue the K5,000 compound table to year 4 and compare it with simple interest for 4 years.

Hearing or visual impairment

For learners with hearing impairment, write each year's balance on the board as you explain it. For learners with visual impairment, read the table row by row aloud and let them state the next balance orally before writing.

No projector, no printing

All working is done on the board and in exercise books. Learners use rounded money amounts and check by adding the interest to the balance each year.

If time is short

Teach simple interest with the formula and compound interest year by year for K5,000 at 10%. Leave the comparison and savers and borrowers for homework.

Evaluation

Question or task	A correct answer shows
Ruth saves K5,000 in a bank for 3 years at 10% simple interest per year. (a) Find the interest for one year. (b) Find the interest for 3 years. (c) Find the amount after 3 years.	(a) (5,000 × 10 × 1) / 100 = K500. (b) 3 × 500 = K1,500. (c) 5,000 + 1,500 = K6,500.
A market trader puts K5,000 in a savings account that pays 10% compound interest per year for 3 years. (a) Find the interest in year 1 and the balance. (b) Find the interest in year 2 and the balance. (c) Find the balance after year 3.	(a) K500, so K5,500. (b) 10% of 5,500 = K550, so K6,050. (c) 10% of 6,050 = K605, so K6,655.
A trader borrows K5,000 from a lender who charges 10% compound interest per year and makes no repayments for 3 years. (a) Say how much interest is charged in year 2. (b) Say how much the trader owes after 3 years. (c) Explain why the debt grows faster each year.	(a) 10% of K5,500 = K550. (b) K6,655. (c) Each year's interest is worked out on a larger balance that already includes earlier interest.

Homework

Mulenga puts K2,000 in a bank that pays 10% compound interest per year for 3 years, and his friend Natasha saves K2,000 for 3 years at 10% simple interest. (a) Find Natasha's amount after 3 years. (b) Find Mulenga's amount after 3 years. (c) Say who earns more and why.

Extra practice with answers

Question	Answer
1. A learner saves K3,000 in a bank that pays 8% simple interest per year for 2 years. (a) Find the interest for one year. (b) Find the interest for 2 years. (c) Find the amount.	(a) (3,000 × 8 × 1) / 100 = K240. (b) K480. (c) K3,480.
2. A woman saves K1,000 at 10% compound interest per year for 3 years. (a) Find the balance after year 1. (b) Find the balance after year 2. (c) Find the balance after year 3.	(a) K1,100. (b) 10% of 1,100 = 110, so K1,210. (c) 10% of 1,210 = 121, so K1,331.
3. A family saves K2,000 at 5% compound interest per year for 2 years. (a) Find the interest in year 1. (b) Find the interest in year 2. (c) Find the amount.	(a) K100. (b) 5% of 2,100 = K105. (c) K2,205.
4. A trader deposits K6,000 at 4% simple interest per year for 5 years. (a) Find the interest. (b) Find the amount. (c) Say whether the yearly interest changes.	(a) (6,000 × 4 × 5) / 100 = K1,200. (b) K7,200. (c) No, it is the same every year.
5. Two learners each have K3,000 for 2 years at 10%, one with simple interest and one with compound interest. (a) Find the simple interest amount. (b) Find the compound interest amount. (c) Find the difference.	(a) Interest K600, amount K3,600. (b) Year 1 K3,300, year 2 K3,630. (c) K30.

6. A learner says that a borrower who makes no repayments is better off with compound interest, and a friend disagrees. (a) Say who is right. (b) Give a reason. (c) Give the amount owed on K5,000 at 10% for 3 years.

(a) The friend. (b) Interest is charged on earlier interest, so the debt grows faster. (c) K6,655.

Answers to the learners' check-yourself questions

1. What is the principal?
   The original amount saved or borrowed.
2. Find the simple interest on K2,000 at 5% per year for 3 years.
   I = (2,000 × 5 × 3) / 100 = K300.
3. Why do simple and compound interest give the same amount after one year?
   In the first year both use the original principal as the starting balance.
4. Find the amount after 2 years when K4,000 earns 10% compound interest per year.
   Year 1: 10% of 4,000 = 400, balance K4,400. Year 2: 10% of 4,400 = 440, balance K4,840.
5. What does it mean to say compound interest earns interest on interest?
   Interest added in earlier years becomes part of the balance, so it is included when later interest is worked out.
6. Mulenga saves K2,000 at 10% interest per year for 3 years in a bank that pays compound interest. His friend Natasha saves K2,000 for 3 years at 10% simple interest. (a) Find Natasha's amount after 3 years. (b) Find Mulenga's amount after 3 years. (c) Who earns more and why?
   (a) Natasha: interest = (2,000 × 10 × 3) / 100 = K600, so the amount is K2,600. (b) Mulenga: Year 1 interest K200, balance K2,200; Year 2 interest K220, balance K2,420; Year 3 interest K242, balance K2,662. (c) Mulenga earns more, K662 against K600, because each year's interest is worked out on a la
7. A trader borrows K5,000 from a lender who charges 10% compound interest per year and makes no repayments for 3 years. (a) How much interest is charged in year 2? (b) How much does the trader owe after 3 years? (c) Explain why the debt grows faster each year.
   (a) Year 2 interest = 10% of K5,500 = K550. (b) After 3 years the trader owes K6,655. (c) Each year's interest is worked out on a larger balance that already includes earlier interest, so the yearly interest rises: K500, K550, K605.

Teacher's reflection

What went well:

What I will change next time:

Learners who need follow-up: