MATHEMATICS · GRADES 10-12

Loans and amortization

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how a loan gets paid off month by month, with each payment covering the interest first and shrinking what you still owe, like a mortgage or a car loan. Early on, most of your payment goes to interest and the balance barely moves, but as the balance shrinks, more of each payment goes to the loan itself. Knowing how this works helps you see why extra payments save so much interest, why a longer loan costs more in total, and what your mortgage or car loan will actually cost over its whole life.



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Rule

Each loan payment covers the interest on the balance first, and the rest reduces the balance.

Because the balance shrinks, the interest part of each payment shrinks too, so more of each later payment goes to the loan itself.

Worked examples

EXAMPLE 1

Q **A loan of 1000 dollars is repaid in 2 yearly payments at 10 percent interest. The payment is 576.19 dollars. How much interest is in the first payment?**

SOLUTION

Interest for year 1 = 10 percent of 1000 = 100 dollars.

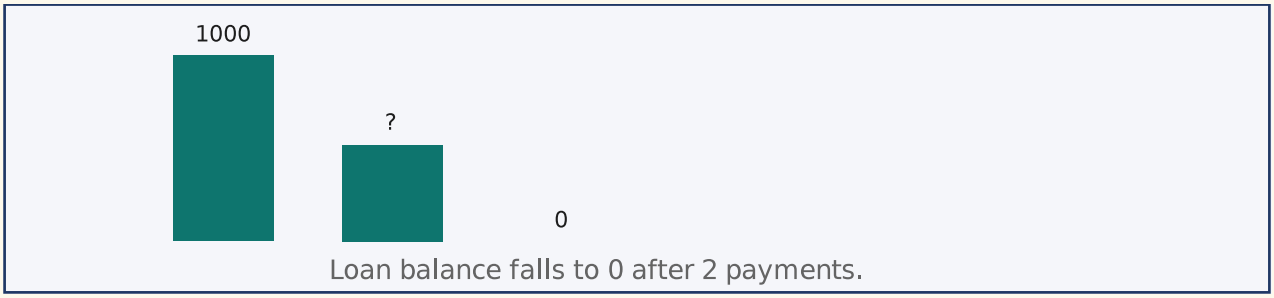
576.19 − 100 = 476.19
476.19 goes to the principal.

Interest in the first payment: 100 dollars; principal part: 476.19 dollars.

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EXAMPLE 2

Q After that first payment, what is the balance?



Loan balance falls to 0 after 2 payments.

SOLUTION

Balance = 1000 − 476.19

That is 523.81 dollars.

The next payment's interest is charged on 523.81 dollars.

Practice questions

1 A loan balance is 500 dollars at 10 percent per year. How much interest is charged in one year?

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A payment of 200 dollars includes 50 dollars interest. How much goes to principal?

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3

What is amortization?

A. Paying off a loan in regular instalments of interest plus principal

B. Paying only the interest each month

C. Borrowing more money each year

D. Saving money in a bank account

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4 **A balance of 1000 dollars at 5 percent per year. How much interest is charged in 6 months?**

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5 **As a loan is paid down, does the interest part rise or fall?**

A Rise

B Fall

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6 **A loan balance is 800 dollars at 10 percent per year. The yearly payment is 200 dollars. How much of the first payment goes to principal?**

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7

What happens to the balance after each payment?

A It rises by the interest

B It falls by the principal part of the payment

C It stays the same

D It falls to zero at once

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8

A loan of 2000 dollars, first payment 500 dollars, interest 100 dollars. New balance?

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9 Why does the interest part shrink over time?

- A Because the interest rate rises
- B Because the payments get smaller
- C Because interest is charged on a shrinking balance
- D Because the loan term gets longer

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10 What is the last payment of an amortized loan?

- A The largest payment of the loan
- B The payment that brings the balance to zero
- C The first payment
- D A payment of interest only

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ANSWER KEY

1. 50 dollars

2. 150 dollars

3. Paying off a loan in regular instalments of interest plus principal

4. 25 dollars

5. Fall

6. 120 dollars

7. It falls by the principal part of the payment

8. 1600 dollars

9. Because interest is charged on a shrinking balance

10. The payment that brings the balance to zero

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