

GENERAL MATHEMATICS

Math in Business & Finance

Applying sequences, series, units, and surface area to real business decisions

Grade 11/12 • Business and Finance Applications



Lesson Focus

Business math helps owners plan, price, borrow, save, and measure accurately.

Today's lesson connects financial formulas with a realistic small-business project.

Learners will solve problems, explain results, and make practical decisions.

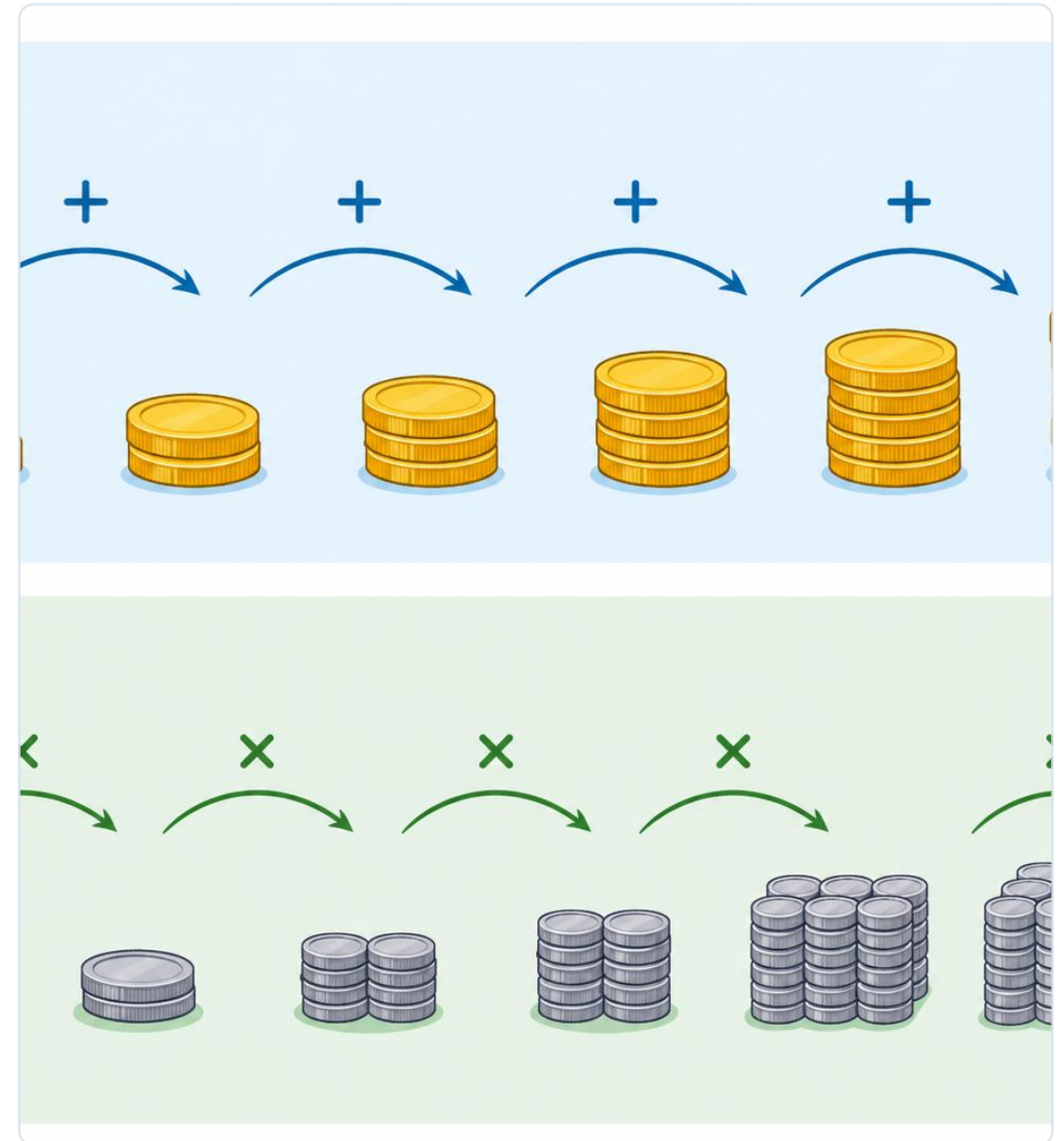


Quick Math Check

Arithmetic sequence: each term increases or decreases by the same amount.

Geometric sequence: each term is multiplied by the same ratio.

A sum is used when we add several terms or payments together.



Let's Think: Your Own Business

Imagine you will start a small business today.

What will you sell, and who will buy it?

Where will you get capital?

How will you measure materials and estimate costs?

Share one idea with a seatmate.



What We Will Learn Today

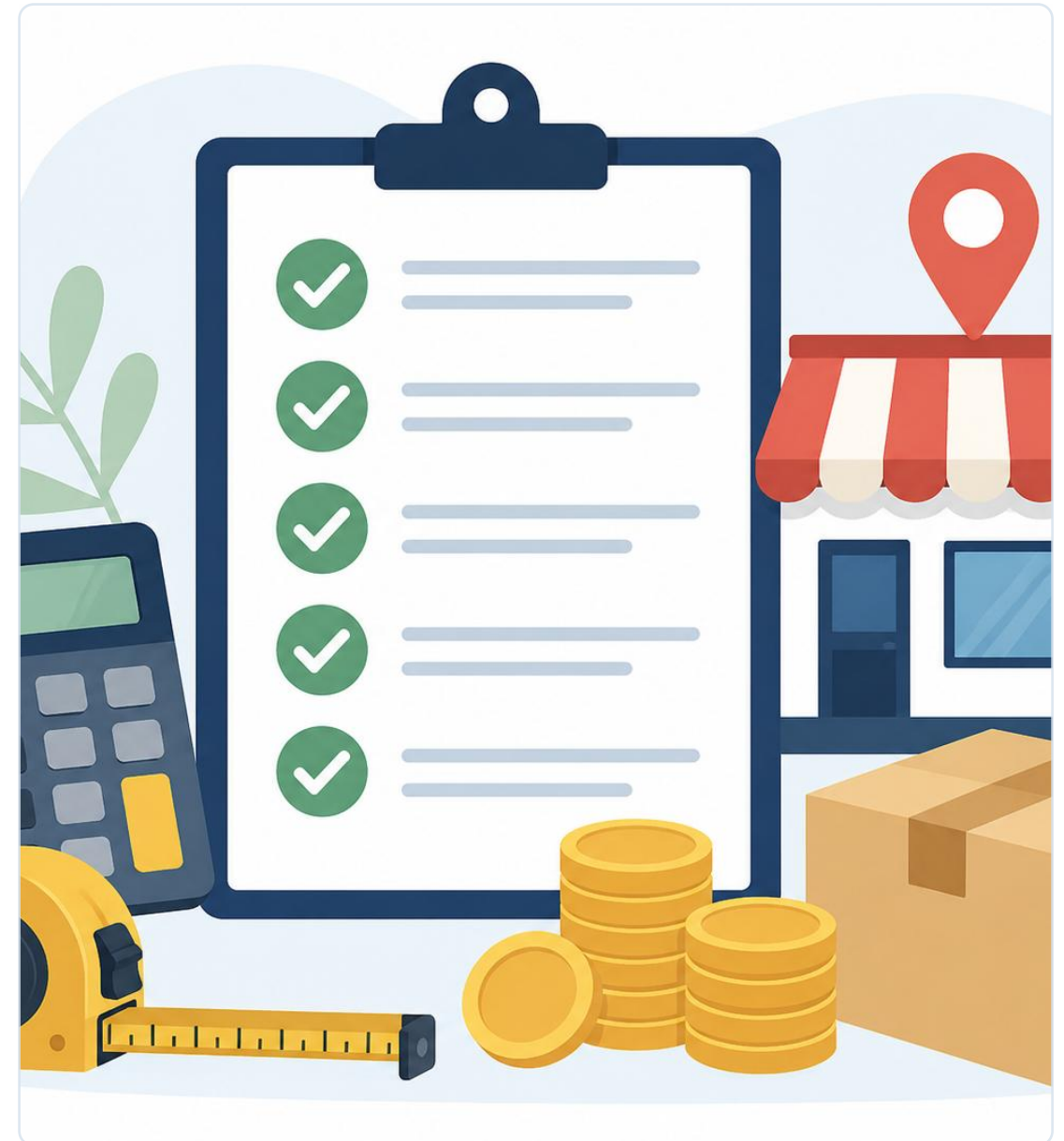
Compute loan payments using the present value of an annuity.

Compute investment growth using the future value of an annuity.

Choose appropriate metric units and convert measurements correctly.

Use surface area to estimate packaging and materials.

Apply the math in a small-business plan.



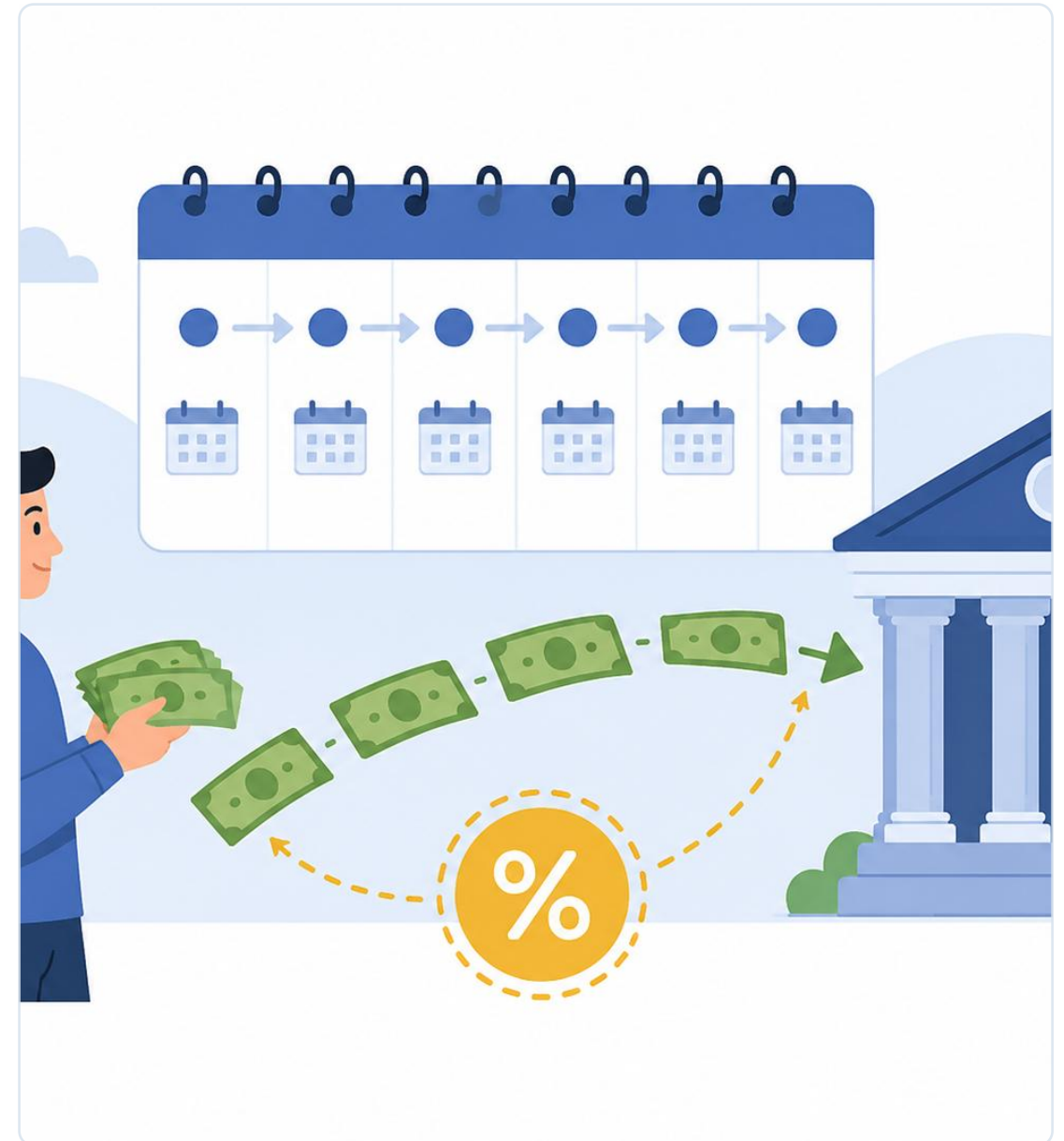
Key Words for Business Math

Loan: money borrowed and paid back with interest.

Investment: money placed in an account, project, or asset to grow.

Annuity: equal payments or deposits made at regular time intervals.

Surface area: the total outside area of a 3D object.



The Biz-Math Challenge

Work in groups to design a small business.

Plan products, materials, packaging, and store setup.

Solve one loan problem and one savings/investment problem.

Present your plan with clear mathematical evidence.



Step 1: Business Idea and Layout

Choose a business: food stall, mini-shop, printing service, crafts, or another realistic idea.

Sketch your kiosk, table, or store layout.

Design packaging for at least two products.

Label important dimensions on your sketch.



Step 2: Materials and Measurements

List all ingredients or materials needed for your business.

Use kilograms for bulk solids, grams for small quantities, liters or milliliters for liquids, and meters for length.

Convert units before computing cost or material use.

Accurate measurement prevents waste and wrong pricing.

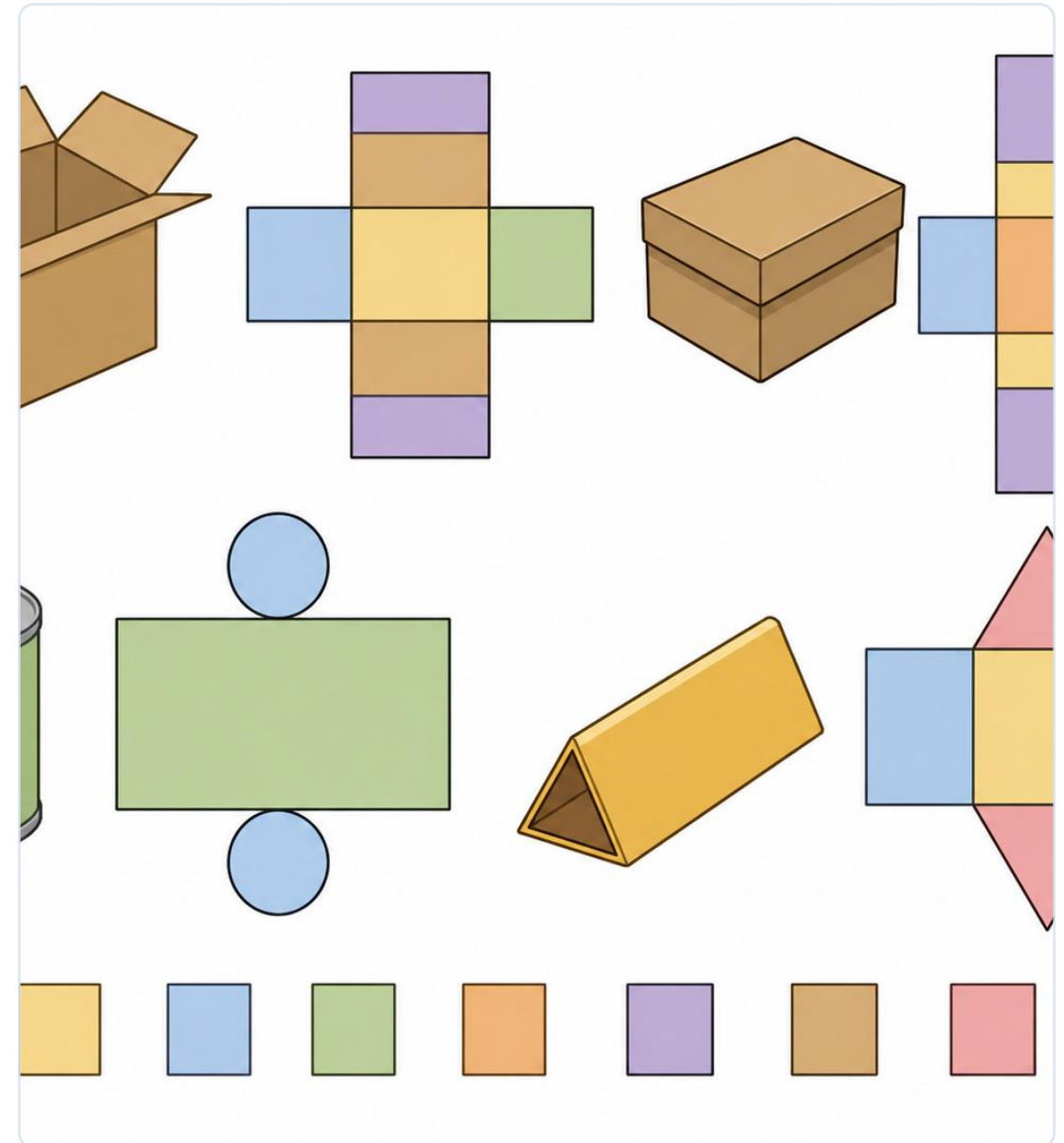


Surface Area Review

Rectangular prism: $SA = 2(lw + lh + wh)$

Cylinder: $SA = 2\pi r^2 + 2\pi rh = 2\pi r(r + h)$

Triangular prism: $SA = 2B + Ph$
where B = area of triangular base
and P = perimeter of the base
For composite objects, break the object into simple shapes first.



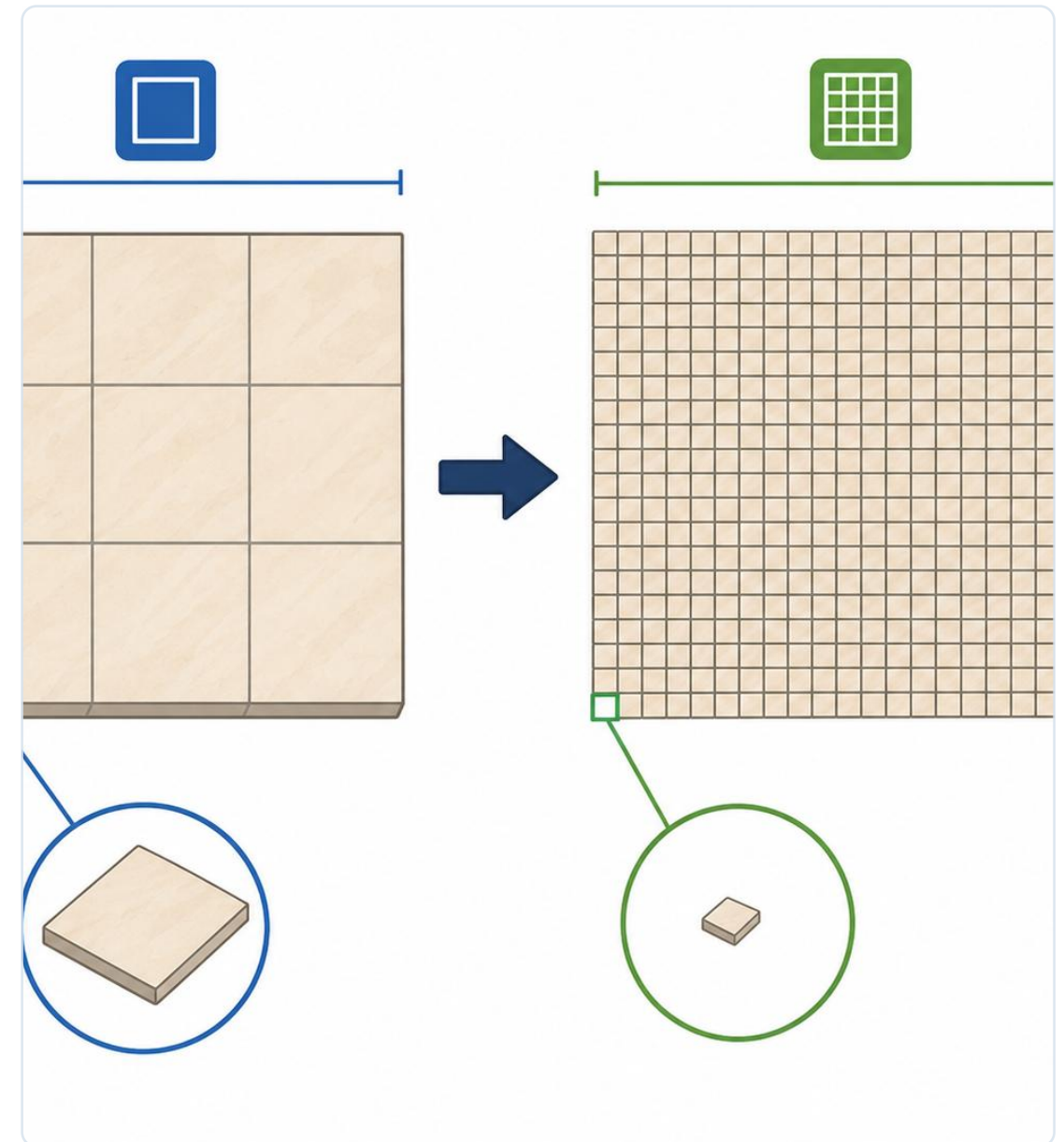
Why Surface Area Helps Business

Packaging uses material on the outside of an object.

More surface area usually means more cardboard, plastic, label paper, paint, or fabric.

Surface area estimates help owners control cost and reduce waste.

Always include units: cm^2 , m^2 , or other square units.



Activity: Material Estimator

Choose three objects from your business design.

Measure or assign realistic dimensions.

Calculate each object's surface area.

Decide how much material is needed and state the correct unit.



Math for Money Matters

Capital is the money needed to start or expand a business.

Loans can provide capital now, but payments include interest.

Savings and investments help money grow over time.

Financial math helps owners compare choices before spending.



Loans and Annuities

A loan is often repaid through equal monthly payments.

These equal payments form an annuity.

The payment depends on the amount borrowed, interest rate, and number of payments.

Present value of an ordinary annuity:

$$PV = R \cdot [1 - (1 + i)^{-n}] / i$$

where PV = amount borrowed, R = regular payment, i = periodic rate, and n = number of payments.



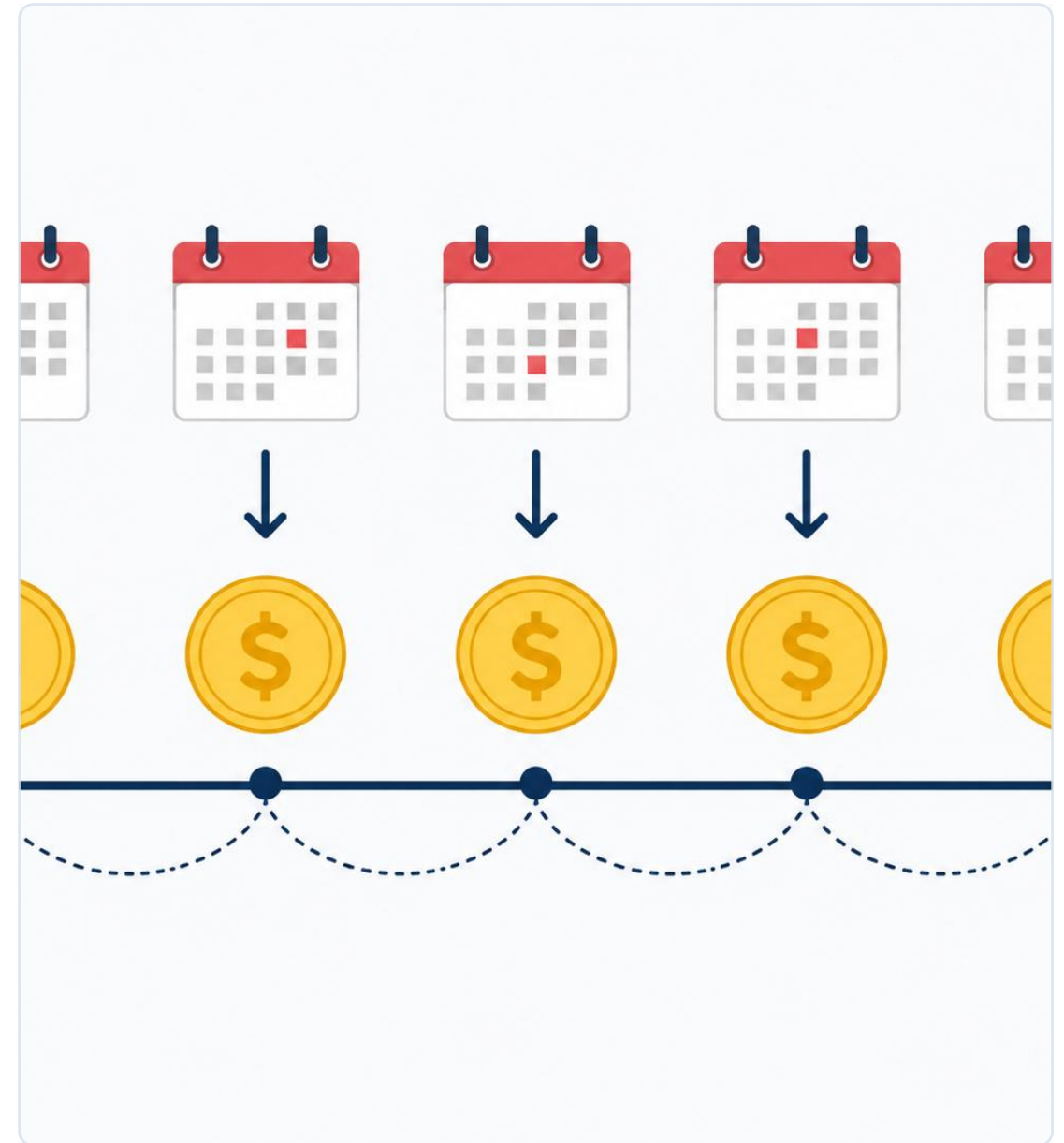
Example 1: Oven Loan

A bakery needs an oven worth ₱75,000.

The loan has 6% annual interest, compounded monthly.

The loan term is 3 years.

Question: How much is the monthly payment?



Complete Solution: Loan Payment

$$\text{Formula: } R = PV \cdot i / [1 - (1 + i)^{-n}]$$

$$\text{Given: } PV = \text{₱}75,000; i = 0.06/12 = 0.005; n = 12(3) = 36$$

$$R = 75,000(0.005) / [1 - (1.005)^{-36}]$$

$$R = 375 / 0.1643557$$

$$R = \text{₱}2,281.65 \text{ per month}$$

$$\text{Total paid} = \text{₱}2,281.65(36) = \text{₱}82,139.23$$

$$\text{Interest} = \text{₱}82,139.23 - \text{₱}75,000 = \text{₱}7,139.23$$



Growing Money Through Investments

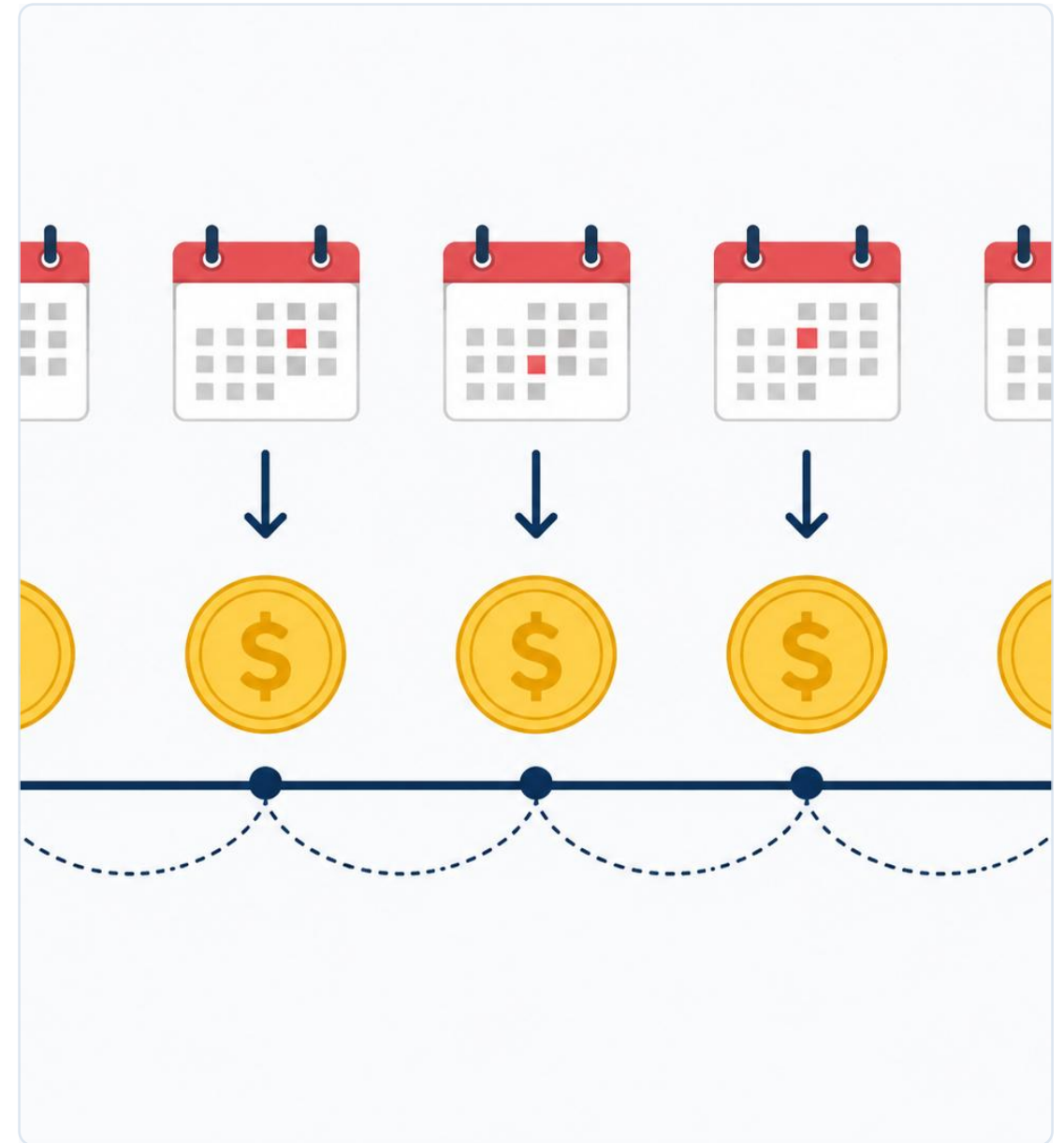
A business may deposit a fixed amount every month for future expansion.

Regular deposits also form an annuity. The future value formula tells how much the deposits will become.

Future value of an ordinary annuity:

$$FV = R \cdot [(1 + i)^n - 1] / i$$

where FV = future value, R = regular deposit, i = periodic rate, and n = number of deposits.



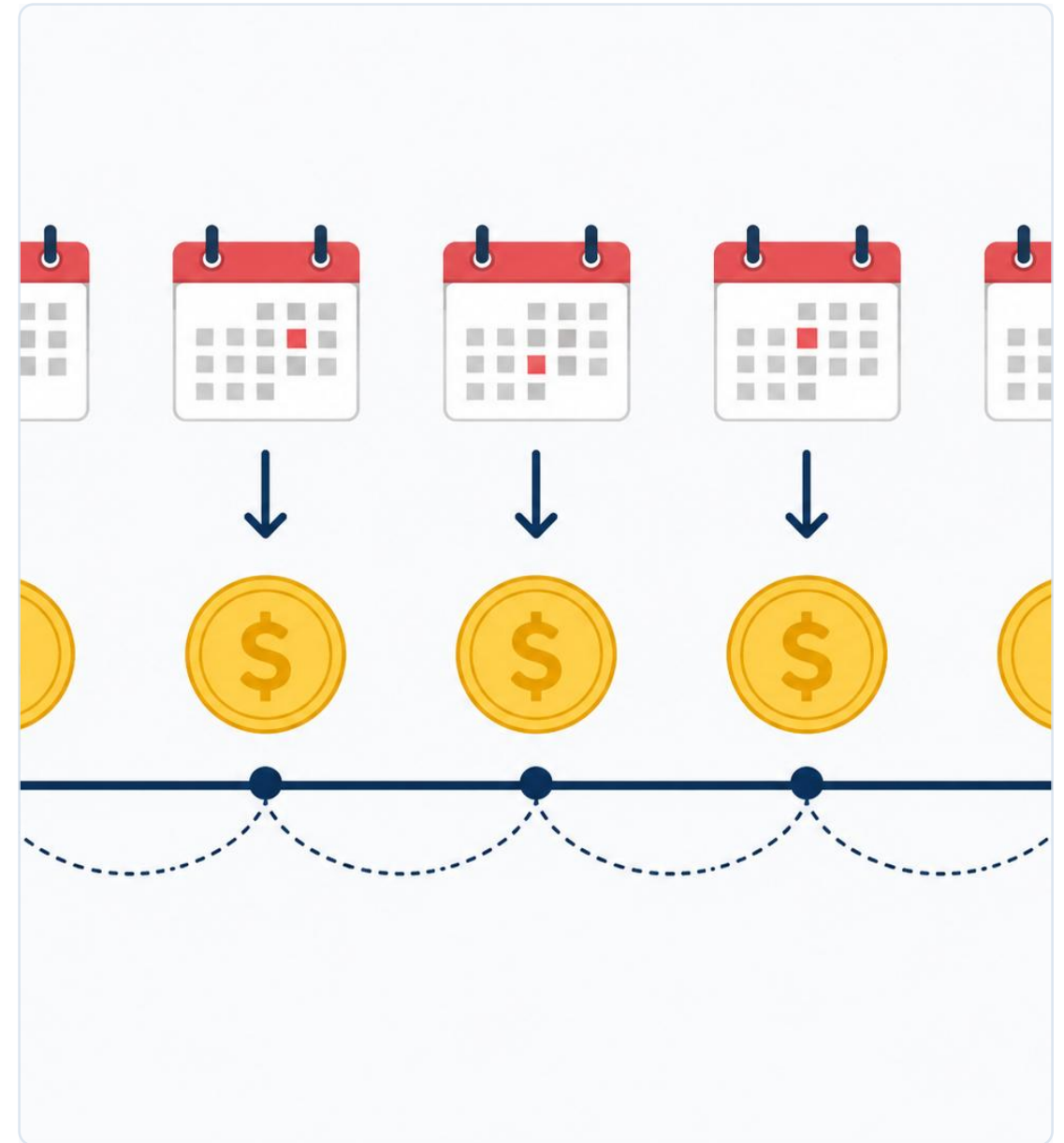
Example 2: Monthly Savings

A business saves ₱3,000 every month.

The account earns 4% annual interest, compounded monthly.

The saving period is 5 years.

Question: How much money will the business have after 5 years?



Complete Solution: Investment Value

Formula: $FV = R \cdot [(1 + i)^n - 1] / i$

Given: $R = ₱3,000$; $i = 0.04/12 = 0.003333...$; $n = 12(5) = 60$

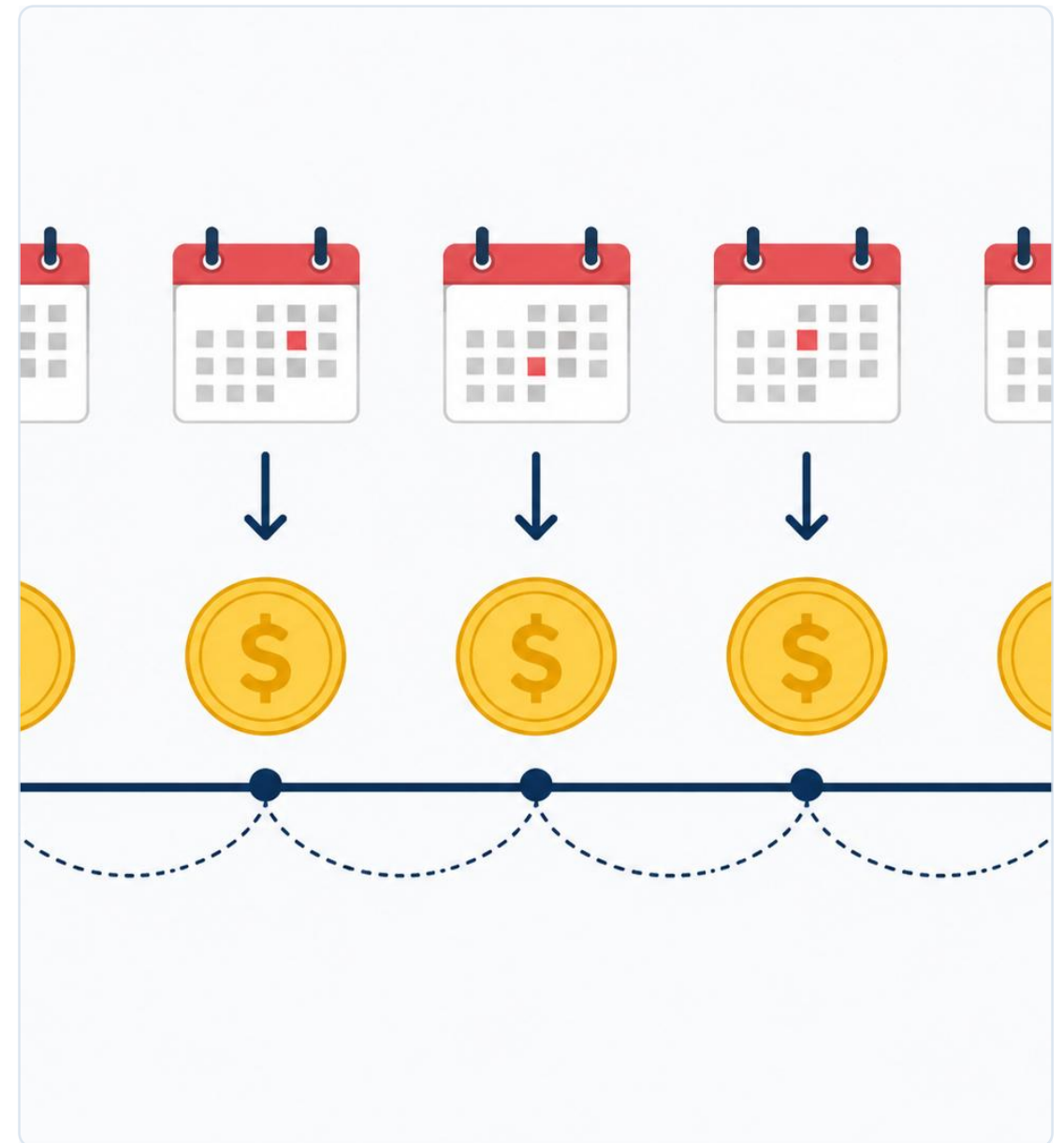
$FV = 3,000[(1.003333...)^{60} - 1] / 0.003333...$

$FV = 3,000(66.29898)$

$FV = ₱198,896.93$

Total deposits = $₱3,000(60) = ₱180,000$

Interest earned = $₱198,896.93 - ₱180,000 = ₱18,896.93$



Activity: Business Finances

Scenario A: Compute a monthly loan payment for equipment your business needs.

Scenario B: Compute the future value of monthly savings for expansion.

Show the formula, substitution, computation, final answer, and interpretation.

Prepare to explain whether your plan is financially realistic.



Quick Check

1. What metric unit is best for a sack of rice?
 2. Convert 2 square meters to square centimeters.
 3. What is an annuity used for in business finance?
- Answer individually first, then compare with a partner.



Quick Check Answers

1. Kilogram (kg), because rice is usually measured by mass in bulk.

2. $1\text{ m} = 100\text{ cm}$, so $1\text{ m}^2 = (100\text{ cm})^2 = 10,000\text{ cm}^2$.

Therefore, $2\text{ m}^2 = 2(10,000\text{ cm}^2) = 20,000\text{ cm}^2$.

3. An annuity represents equal payments or deposits made regularly, such as monthly loan payments or monthly savings.



What Did We Learn Today?

Mathematics supports better business planning and financial decisions.

Loan payments can be computed using present value of an annuity.

Savings growth can be computed using future value of an annuity.

Measurement, unit conversion, and surface area help estimate materials and costs.

Good math leads to clearer, smarter business plans.



Homework: Beyond the Classroom

Choose one task: research a loan, research an investment, interview a local business owner, or plan a simple DIY project.

Write the given values, formulas, and estimated costs or growth.

Submit a one-page output with computations and a short reflection.



Great Job, Everyone!

Keep exploring the power of mathematics in business and everyday life.

Remember: good decisions start with clear numbers.

