THE BARATELLI INSTITUTE · **MENTORING AT SCALE**

Money *Smarts.*

Exponents, compounding, and the most important chart you'll ever read.

Aligns to: exponents and exponential relationships (Grade 8 expressions & equations / functions); compound interest, the Rule of 72, and inflation (personal finance).

Grade 8 · Ages 13–14

1. Powers of Growth
2. The Compound Interest Formula
3. The Rule of 72
4. Simple vs. Compound
5. The Cost of Waiting
6. Inflation: the Other Direction
7. Read the Growth Chart
8. Saving Every Month

Project — Your Money in 40 Years

A free classroom tool · baratelliinstitute.com

How to use this packet

These turn exponents into real money: the compound-interest formula, the Rule of 72, the cost of waiting, and inflation. A growth chart and a contributions table make the curve concrete.

1. Powers of Growth	Evaluating $(1+r)^n$.
2. The Compound Interest Formula	$A = P(1+r)^n$.
3. The Rule of 72	Doubling time shortcut.
4. Simple vs. Compound	Comparing the two.
5. The Cost of Waiting	Starting early vs. late.
6. Inflation	Prices rising over time.
7. Read the Growth Chart	Interpreting a graph.
8. Saving Every Month	Contributions vs. growth.

The project. In the project, students choose a starting amount and rate, build a doubling table, and see — in their own numbers — why starting early beats starting big. It pulls the skills together into one real-world task — assign it as a capstone, group work, or homework. **Print in black-and-white, single-sided.** Most worksheets take 15–20 minutes; the answer key with concept notes and differentiation tips is at the back.

LEARN IT FIRST

The ideas behind this packet

Meet two cousins who each got the same $1,000 — and ended up worlds apart. Read the story once, then the worksheets will make sense — the answers will be things you were *taught*, not things you had to guess.

Two cousins, one $1,000

Start with what you already know: when you save or invest money, it earns a **return** — a percent of your money paid back each year (the **rate**). The new idea is what happens when that return is left alone to grow.

On their eighth birthday, cousins Leo and Mia each receive $1,000. Leo hides his in a drawer. Mia invests hers at an 8% rate. **Compounding** means Mia earns returns on her past returns, so each year builds on a bigger base: **$A = P(1 + r)^n$** turns $1,000 into about $2,159 in ten years and $4,661 in twenty. The **Rule of 72** (72 ÷ 8 = 9) says her money doubles about every nine years. That beats **simple interest**, which would add the same amount each year. Leo's cash never grows — worse, **inflation** of about 3% a year quietly shrinks what it buys, so his $1,000 feels more like $740 a decade later. The difference wasn't luck or income. It was **time** plus compounding.

KEY TERMS IN THIS STORY

Return / rate — the percent your money earns each year

Compounding — earning returns on your past returns

$A = P(1 + r)^n$ — multiply by (1 + rate) once for each year

Rule of 72 — 72 ÷ rate ≈ the years to double

Simple vs. compound — same amount each year vs. growth on a bigger base

Inflation — prices rising ~3%/yr, so cash buys less over time

LESSON

How money grows

When you save or invest, your money earns a return — a percent paid back each year. Watch what happens when it's left to grow.

Growth factor

Money that grows by a percent each year multiplies by (1 + rate). **Example:** 8% → ×1.08 each year; $1.08^2 = 1.1664$.

The compound formula

$A = P(1 + r)^n$ — multiply your start by (1 + rate) once for each year. **Example:** $1,000 at 6% for 2 years = $1{,}000 \times 1.06^2$ = **$1,123.60**.

The Rule of 72

72 ÷ the rate ≈ the years for money to double. **Example:** at 8%, money doubles in about **9 years**.

Now practice → the Powers of Growth, Compound Interest Formula, and Rule of 72 worksheets.

Name: ____________ Date: ____________

1. Powers of Growth

Money that grows by a percent each year multiplies by (1 + rate). Evaluate each power.

a) $1.05^2 =$ ______

b) $1.10^3 =$ ______

c) $1.08^2 =$ ______

Name: ____________________ Date: ____________

2. The Compound Interest Formula

Compounding means you earn returns on your past returns. Use the formula below (round to the cent).

COMPOUND GROWTH

$A = P \times (1 + r)^n$ (P = start, r = yearly rate, n = years)

a) $1,000 at 6% for 2 years. A = [ ]

b) $5,000 at 7% for 3 years. A = [ ]

Name: ____________ Date: ____________

3. The Rule of 72

A shortcut: 72 ÷ interest rate ≈ the years it takes money to double.

RULE OF 72

Years to double ≈ 72 ÷ rate

a) At 8%, money doubles in about ☐ years.

b) At 6%, about ☐ years.

c) At 4%, about ☐ years.

LESSON

Why compounding wins

Compounding beats simple growth, and it quietly beats inflation too.

Simple vs. compound

Simple interest adds the same amount each year; compound grows because each year builds on a bigger base. **Example:** $1,000 at 10% for 3 yr: simple = $1,300, compound = **$1,331**.

The cost of waiting

Starting earlier means more doublings, so a small head start becomes a huge gap. Waiting 10 years can roughly halve your final amount.

Inflation

Prices rise about 3% a year, so cash slowly buys less. **Example:** a $20 item costs about $26.88 in ten years. Invested money can outrun inflation; cash can’t.

Now practice → the Simple vs. Compound, Cost of Waiting, and Inflation worksheets.

Name: ____________ Date: ____________

4. Simple vs. Compound

Same money, same rate — but compounding pulls ahead. Compare on $1,000 at 10% for 3 years.

a) Simple interest ($I = Prt$), then balance = ☐

b) Compound, $A = 1{,}000 \times 1.10^3$ = ☐

c) How much more does compounding give? ☐

Name: ______________________ Date: ______________

5. The Cost of Waiting

Two people each invest $2,000 at 8%. One starts at 18, the other waits 10 years.

a) Starts at 18, grows 40 years: $A = 2{,}000 \times 1.08^{40} \approx$ ______

b) Starts at 28, grows 30 years: $A = 2{,}000 \times 1.08^{30} \approx$ ______

c) How much did waiting 10 years cost? ≈ ______

Name: ____________________ Date: ______________

6. Inflation: the Other Direction

Prices tend to rise about 3% a year. The same dollar buys a little less each year.

a) A $20 item, prices +3%, costs [ ] next year.

b) In 10 years: $\$20 \times 1.03^{10} \approx$ [ ]

c) Why is keeping all your money as cash a quiet way to lose value?

____

LESSON

Seeing growth in action

Charts and tables make the curve real.

Reading a growth chart

A growth chart curves upward — the biggest dollar jumps come in the later years, because compounding builds on the largest base.

Saving every month

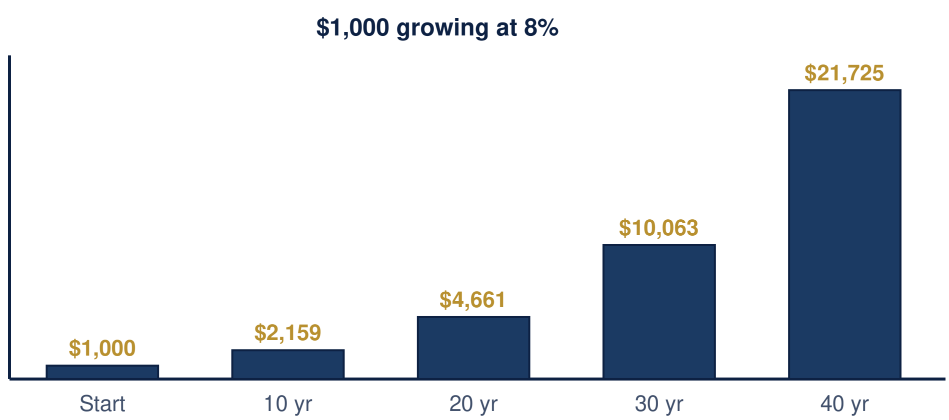
Adding a fixed amount monthly builds a big total, and growth multiplies it. **Example:** $100/month for 40 years is $48,000 of deposits — but about **$349,000** with 8% growth.

Now practice → the Read the Growth Chart and Saving Every Month worksheets.

Name: ____________________ Date: ____________

7. Read the Growth Chart

This shows $1,000 invested at 8%. Use it to answer the questions.



a) About how much after 20 years? [ ]

b) Roughly every how many years does it double? [ ]

c) Which 10-year stretch adds the most dollars — and why?

____

Name: ____________________ Date: ______________

8. Saving Every Month

You add $100 every month. First see the contributions alone, then the power of growth.

Years	1	5	10	40
You put in	$1,200			

At 40 years you contributed [ ]. With 8% growth, it becomes about **$349,000** *(assuming an 8% annual return, compounded monthly)*. What does that gap tell you?

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Your Money in 40 Years

Pick a starting amount and an interest rate, then watch compounding do the work. You'll build a doubling table, sketch the curve, and see what waiting costs.

Step 1 — Your numbers

Starting amount P = [   ] Rate r = ________ % Rule of 72: doubles every ________ years.

Step 2 — The doubling table

Fill in the value at each doubling, starting from your amount.

Doublings	0	1	2	3	4
Value					

Step 3 — Now vs. later

If you started 10 years later, you'd lose about one doubling. Roughly how much smaller would your final amount be? [   ]

Step 4 — The takeaway

In two or three sentences, explain to a younger student why starting early matters more than the exact amount.

Teacher's Answer Key & Concept Notes

1. Powers of Growth — a) 1.1025 b) 1.331 c) 1.1664.

Differentiate: Support: write it as repeated multiplication. Challenge: estimate 1.08^3 before computing.

2. The Compound Interest Formula — a) $1,123.60 b) $6,125.22.

Differentiate: Support: compute $(1+r)^n$ first, then × P. Challenge: solve for the years to reach $1,500.

3. The Rule of 72 — a) 9 years b) 12 years c) 18 years.

Differentiate: Support: just divide 72 by the rate. Challenge: what rate doubles money in 6 years?

4. Simple vs. Compound — a) simple = $1,300 b) compound = $1,331 c) $31 more.

Differentiate: Support: do simple first as a baseline. Challenge: widen the gap — try 20 years.

5. The Cost of Waiting — a) ≈ $43,449 b) ≈ $20,125 c) ≈ $23,300.

Differentiate: Support: note 40 yr ≈ 4.4 doublings. Challenge: what if both add $2,000 every year?

6. Inflation: the Other Direction — a) $20.60 b) ≈ $26.88 c) cash loses buying power to inflation while invested money can outpace it.

Differentiate: Support: ×1.03 once, then for 10 years. Challenge: what raise keeps pace with 3% inflation?

7. Read the Growth Chart — a) ≈ $4,661 b) about every 9 years c) the last stretch (30→40 yr) adds the most — compounding builds on the biggest base.

Differentiate: Support: read bar labels. Challenge: estimate the 50-year bar.

8. Saving Every Month — $6,000; $12,000; $48,000. The gap (≈$301,000) is growth, not your deposits — that's compounding.

Differentiate: Support: ×$1,200/yr. Challenge: how much of the $349k is growth vs. contributions?

P. Project — Your Money in 40 Years — Open — doubling table correct for the chosen P; reasoning about early start.

Differentiate: Support: provide P=$1,000, r=8%. Challenge: add a yearly contribution to the model.

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