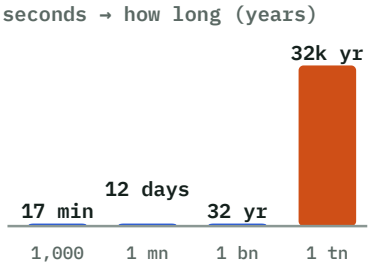
How much is a trillion?

A huge total means little alone: “billion” and “trillion” both sound like “a lot”, but each is **1,000 times** the one before. Divide by the **people**, divide by the **time**, compare with the **whole**. Question 9 of the ten to ask a number.

1 Million, billion, trillion

each × 1,000

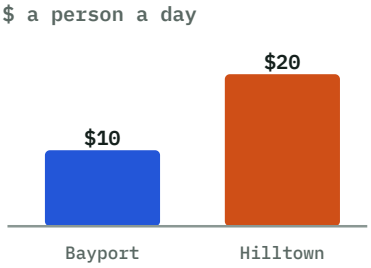
- **Coralia Gazette** (the toy island’s newspaper): “Government spends **$300 BILLION** a year!” · true, but a lot for whom, compared with what?
- million `1,000,000` → billion `1,000,000,000` = 1,000 million → trillion `1,000,000,000,000` · count the commas: **2 · 3 · 4** · short: mn · bn · tn
- In seconds · 1,000 ≈ **17 min** · 1 million ≈ **12 days** · 1 billion ≈ **32 years** · 1 trillion ≈ **32,000 years** (before farming, ≈ 12,000 years ago)
- **Order of magnitude** = a size counted in steps of × 10 (10, 100, 1,000…) · billion = 3 orders (× 1,000) above million · at $1,000 a day: $1 million ≈ **3 years**, $1 billion ≈ **2,700 years**



2 Per whom?

per capita

- **Per capita** = per person = total ÷ people · `$300 bn ÷ 30 million = 300,000 million ÷ 30 million = $10,000` a Coralian a year
- Practice: “Bayport spends **6 times** as much as Hilltown!” · $21.9 bn ÷ 6 million = **$3,650** · $3.65 bn ÷ 0.5 million = **$7,300** → 12 times the people → per person Hilltown spends **twice** as much
- Farm aid $600 million ÷ 200,000 farmers = **$3,000** each



3 Per when?

per year, per day

- Yearly → daily: ÷ 365 · `$10,000 ÷ 365 ≈ $27` a Coralian a day → a size you can feel
- A cost that lasts many years → ÷ the years · sea wall $3 bn for 100 years = `3,000 million ÷ 100` = **$30 million a year** (≈ $1 a Coralian) · lottery $900 million lost over 30 years = $30 million a year

4 Compared with what?

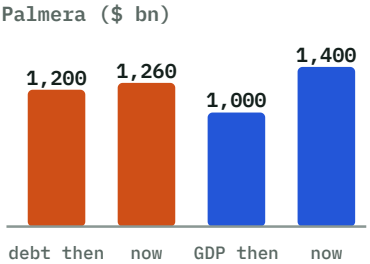
share of the whole

- **Share of GDP** = amount ÷ GDP (everything a country makes in a year, Macro Lesson 1) · `300 ÷ 1,000 = 0.3 = 30%` → 30 cents of every dollar Coralia makes
- “**Record** spending!” · last year `270 ÷ 900 = 30%` · this year `300 ÷ 1,000 = 30%` → the total broke a record, the **share did not move**
- Fine of $500 million on a firm · sales $25 bn → **2%** · profit $5 bn → **10%** ≈ 5 weeks of profit · how big = the numbers · enough or not = a judgment

5 A real budget, a debt

and a word

- US federal government (Washington, not states or cities), fiscal year 2024 = budget year (Oct 2023 – Sep 2024) · spent ≈ **$6.7 trillion** · ≈ 340 million people → ≈ **$20,000** a person, ≈ $54 a day · GDP ≈ $29.4 trillion → ≈ **23%** · too much or too little = values, not arithmetic
- **Debt-to-GDP ratio** = debt ÷ one year of GDP · Palmera $1,200 bn ÷ $1,000 bn = **120%** · 5 years on: record $1,260 bn (+5%) but GDP $1,400 bn (+40%) → **90%** · Policy Lesson 9
- The word: until **1974** the British government’s “billion” = a million million (a US trillion) · today 1,000 million in both · check an old book



6 So what?

question 9 of 10

- **Ten questions to ask a number** · 1 · Where does the axis start, and what is its scale? · 2 · Average of what: the mean or the median? · 3 · Percent of what? Percent or percentage points? · 4 · Real or nominal: did prices change too? · 5 · What else changed? Could something else explain both? · 6 · Compared with whom? Where is the control group? · 7 · Who was asked, and who was not? · 8 · Where does the series start, and is it seasonal? · **9 · Per person, per year, compared with what?**
- Size a big number in order: huge total → ÷ **people** → ÷ **time** → ÷ **the whole** → only then judge “a lot?”
- Gazette rewritten → “Coralia’s government spends $300 billion a year: $10,000 per Coralian, $27 a day, 30% of GDP, the same share as last year.” · next → Lesson 10, check the headline

Watch out: million, billion and trillion sound alike but are **1,000 times** apart · and a record in dollars is not a record in share: debt, taxes and spending grow with the economy → divide by GDP before you say “record”