Compound Interest

Name: _____	Date: _____	Score: _____ / 17

Here is the exciting part about **compound interest**: you earn interest not only on your original deposit but also on the interest that has already been added—so your money grows faster and faster over time! The formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$ captures it all: P is your starting amount, r is the annual rate, n is how many times per year interest compounds, and t is the number of years. Unlike simple interest, which adds the same dollar amount every period, compound interest produces a curve that gets steeper as the balance grows. Even small changes in rate or time can lead to surprisingly big results, which is why understanding this formula helps you make smart choices about savings, investments, and loans!

Key Concepts & Quick Review

Compound Interest Formula:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A	total amount after t years
P	principal (starting amount)
r	annual interest rate (as a decimal)
n	number of times interest is compounded per year
t	time in years

Compounded annually means $n = 1$, so the formula simplifies to $A = P(1 + r)^t$.
Interest earned $= A - P$.

Examples

① You deposit \$500 at 4% annual interest compounded annually. How much do you have after 3 years?

Think It Through: $A = 500(1 + 0.04)^3 = 500(1.04)^3 = 500 \times 1.124864 = \$562.43$. Interest earned $= 562.43 - 500 = \$62.43$.

Answer: *\$562.43*

② You invest \$1,000 at 6% compounded semi-annually ($n = 2$) for 2 years. Find the total amount.

Think It Through: $A = 1{,}000\left(1 + \frac{0.06}{2}\right)^{2 \cdot 2} = 1{,}000(1.03)^4 = 1{,}000 \times 1.12551 = \$1{,}125.51$.

Answer: *\$1,125.51*

Practice Problems

Find the total amount A. Round to the nearest cent. Interest is compounded annually ($n = 1$) unless stated otherwise.

1. Find the compound amount for principal _____ \$200, annual rate 5%, and time 2 years.
2. Find the compound amount for principal _____ \$400, annual rate 3%, and time 3 years.
3. Find the compound amount for principal _____ \$1,000, annual rate 4%, and time 2 years.
4. Find the compound amount for principal _____ \$750, annual rate 6%, and time 3 years.
5. Find the compound amount for principal _____ \$300, annual rate 8%, and time 2 years.
6. Find the compound amount for principal _____ \$500, annual rate 2%, and time 5 years.
7. Find the compound amount for principal _____ \$600, annual rate 10%, and time 2 years.
8. Find the compound amount for principal _____ \$1,200, annual rate 3%, and time 4 years.
9. Find the compound amount for principal _____ \$250, annual rate 7%, and time 3 years.
10. Find the compound amount for principal _____ \$800, annual rate 5%, and time 4 years.
11. Find the compound amount for principal \$1,000, annual rate 4%, compounded twice per year for 3 years. _____
12. Find the compound amount for principal \$500, annual rate 6%, compounded quarterly for 2 years. _____
13. Find the compound amount for principal _____ \$2,000, annual rate 3%, and time 5 years.
14. Find the compound amount for principal _____ \$350, annual rate 9%, and time 2 years.
15. Find the compound amount for principal _____ \$900, annual rate 2.5%, and time 3 years.

Study Tips

- Always convert the rate to a **decimal** before substituting: $5\% = 0.05$.
- Compound interest grows **exponentially** — doubling the time more than doubles the interest earned.
- Compare simple and compound interest for the same principal, rate, and time to see how compounding earns you more money.

Word Problems

16. Maria puts \$800 into a savings account that pays 5% interest compounded annually. How much money will she have after 3 years? _____

17. Jake borrows \$1,500 at 8% interest compounded annually. If he pays back the full amount after 2 years, how much total must he pay? How much of that is interest? _____

Answer Keys

1) $220.50
2) $437.09
3) $1,081.60
4) $893.26
5) $349.92
6) $552.04
7) $726.00
8) $1,350.61
9) $306.26
10) $972.41
11) $1,126.16
12) $563.25
13) $2,318.55
14) $415.84
15) $969.20
16) $926.10
17) Total: $1,749.60; Interest: $249.60

Step-by-Step Explanations

Strategy: For Converting Between Measurement Systems, write the conversion factor with the unit you want on top, then multiply so unwanted units cancel. Unit cancellation is the built-in proof that the conversion was set up the right way.

Practice 1: Convert 8 inches to centimeters. **Answer:** $20.32\ cm$

In the opening example, use the standard conversion factor: each inch is 2.54 centimeters.

Practice 15: Convert 36 inches to centimeters. **Answer:** $91.44\ cm$

For the end-of-set item, the same inches-to-centimeters factor works; only the starting number changes.

Word-problem notes:

16. Answer: $250 \div 28.35 \approx 8.8$ ounces.

$250\ g \times \frac{1\ \text{oz}}{28.35\ g} \approx 8.8$ oz.

17. Answer: $1{,}500\ m = 1.5\ km$; $\frac{1.5}{1.609} \approx 0.93\ mi$.

Convert meters to km first: $1{,}500 \div 1{,}000 = 1.5\ km$. Then $1.5 \div 1.609 \approx 0.93\ mi$.

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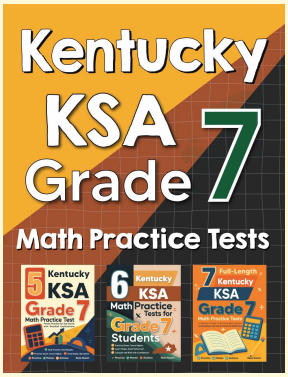

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