LESSON MAKER PRO

Interest Time Trials

Compare three ways money can grow or cost.

HIGH SCHOOL · MA.912.FL.3.1

MA.912.FL.3.1 "Compare simple, compound and continuously compounded interest over time."

NAME _____ DATE _____

THREE INTEREST MODELS

Use $A=P(1+rt)$ for simple interest, $A=P(1+r)^t$ for interest compounded annually, and $A=Pe^{(rt)}$ for continuous compounding. Write the rate r as a decimal and let t represent time in years. Over two or more whole years at a positive rate, annual compounding gives more than simple interest, and continuous compounding gives more than annual compounding.

WORKED EXAMPLE

A $256 deposit earns 25% interest for 4 years. Find the final amount with simple interest, annual compounding, and continuous compounding.

1. Simple: $A=256(1+0.25 \times 4)=512$.
2. Annual compound: $A=256(1.25)^4=625$.
3. Continuous: $A=256e^{(0.25 \times 4)}=256e$.

Answer: Simple: $512; annual compound: $625; continuous: $256e.

PRACTICE 6 problems

1 An account starts with $80 and earns 30% simple interest for 1 year. Find the final amount.

ANSWER _____

2 A $120 deposit earns 50% interest compounded annually for 1 year. Find the final amount.

ANSWER _____

3 A $90 deposit earns interest continuously at 100% for 1 year. Write the exact final amount.

ANSWER _____

4 A $60 deposit earns 20% interest for 3 years. Find the final amount using simple interest and annual compounding. Which amount is greater?

ANSWER _____

5 A $40 deposit earns 50% interest compounded annually for 2 years. Find the final amount and the interest earned.

ANSWER _____

6 A $70 account earns $21 in simple interest over 3 years. Find the annual interest rate.

ANSWER _____

APPLY IT Show your work

1 You set aside $500 for a used car. Three accounts each pay 20% interest for 2 years. One uses simple interest, one compounds annually, and one compounds continuously. Find the exact final amount in each account. Rank the accounts from least to greatest final amount.

WORK SPACE

ANSWER _____

2 A store offers three 2-year financing plans for a $400 laptop balance at 15% interest. The plans use simple interest, annual compounding, or continuous compounding, with the full balance due at the end. Find the amount due under each plan. Which plan costs least and which costs most?

WORK SPACE

ANSWER _____

CHALLENGE One step up

An account starts with $100 and earns a positive annual rate for 2 years. Its annually compounded final amount is $9 more than its simple-interest final amount at the same rate. Find the rate. Then find the simple-interest, annual-compound, and continuously compounded final amounts.

WORK SPACE AND ANSWER

ANSWER KEY

Interest Time Trials

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	An account starts with $80 and earns 30% simple interest for 1 year. Find the final amount.	**$104**
2	A $120 deposit earns 50% interest compounded annually for 1 year. Find the final amount.	**$180**
3	A $90 deposit earns interest continuously at 100% for 1 year. Write the exact final amount.	**$90e**
4	A $60 deposit earns 20% interest for 3 years. Find the final amount using simple interest and annual compounding. Which amount is greater?	**Simple: $96; annual compound: $103.68; annual compounding is greater.**
5	A $40 deposit earns 50% interest compounded annually for 2 years. Find the final amount and the interest earned.	**Final amount: $90; interest earned: $50.**
6	A $70 account earns $21 in simple interest over 3 years. Find the annual interest rate.	**10%**

PART 2 · APPLY IT

1. **Simple: $700; annual compound: $720; continuous: $500e$^{.4}$. Least to greatest: simple, annual compound, continuous.** Use each interest formula with P=500, r=.20, and t=2. The continuous amount is greatest because continuous compounding exceeds annual compounding at a positive rate.
2. **Simple: $520; annual compound: $529; continuous: $400e$^{.3}$. The simple-interest plan costs least, and the continuously compounded plan costs most.** Use P=400, r=.15, and t=2 in the three formulas. Compare the resulting exact amounts, with continuous compounding greater than annual compounding.

CHALLENGE

Rate: 30%. Simple: $160; annual compound: $169; continuous: $100e$^{.6}$. The continuously compounded amount is the greatest.

Accept equivalent exact forms, such as 500e$^{.4}$ or 500e$^{(0.4)}$, for continuously compounded amounts. Accept correct dollar formatting and a correct least-to-greatest ranking.