LESSON MAKER PRO

Interest Growth Lab

Track how money changes over time.

HIGH SCHOOL · MA.912.FL.3.4

MA.912.FL.3.4 "Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth."

NAME _____ **DATE** _____

INTEREST MODELS

With simple interest, use $A=P(1+rt)$, which can also be written $A=P+Prt$. Since Pr is the same dollar amount added each year, simple interest is linear. With compound interest, use $A=P(1+r)^t$, and with continuous compounding, use $A=Pe^{(rt)}$, which are exponential because equal time periods multiply the balance by a factor.

WORKED EXAMPLE

$500 earns 6% simple interest for 3 years. Find the final amount.

1. Convert 6% to 0.06.
2. Find the interest: $I=500(0.06)(3)=90$.
3. Add the interest: $A=500+90=590$.

Answer: $590

PRACTICE 6 problems

1 $240 earns 5% simple interest. Write an equation for the amount A after t years. Is the relationship linear or exponential?

ANSWER _____

2 $180 earns 4% simple interest for 2 years. Find the final amount.

ANSWER _____

3 $200 is compounded annually at 10%. Write an equation for the amount A after t years. Is the relationship linear or exponential?

ANSWER _____

4 $160 is compounded annually at 25% for 2 years. Find the final amount.

ANSWER _____

5 $80 earns interest compounded continuously at 50%. Write an equation for the amount A after t years. Is the relationship linear or exponential?

ANSWER _____

6 Two accounts each start with $400 and earn 10% for 2 years. One uses simple interest and one is compounded annually. Find both final amounts. Which account has more money?

ANSWER _____

APPLY IT Show your work

1 Jordan puts $300 into a simple-interest account at 8% for 4 years to save for a used laptop that costs $390. How much will Jordan have? Will Jordan have enough to buy the laptop? State whether the growth is linear or exponential.

WORK SPACE

ANSWER _____

2 Talia wants a $360 tablet in 2 years. She deposits $250 in an account that compounds annually at 20%. How much will she have after 2 years? Will she have enough? State whether the growth is linear or exponential.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Account S starts with $200 and earns 25% simple interest each year. Account C starts with $200 and earns interest continuously, with $C(t)=200e^{(kt)}$ and $e^k=5/4$. After 2 years, which account has more money? Show the amount in each account and explain why one model is linear and the other is exponential.

WORK SPACE AND ANSWER

Interest Growth Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	$240 earns 5% simple interest. Write an equation for the amount A after t years. Is the relationship linear or exponential?	**A=240+12t; linear**
2	$180 earns 4% simple interest for 2 years. Find the final amount.	**$194.40**
3	$200 is compounded annually at 10%. Write an equation for the amount A after t years. Is the relationship linear or exponential?	**$A=200(1.10)^t$; exponential**
4	$160 is compounded annually at 25% for 2 years. Find the final amount.	**$250**
5	$80 earns interest compounded continuously at 50%. Write an equation for the amount A after t years. Is the relationship linear or exponential?	**$A=80e^{(0.50t)}$; exponential**
6	Two accounts each start with $400 and earn 10% for 2 years. One uses simple interest and one is compounded annually. Find both final amounts. Which account has more money?	**Simple interest: $480; compound interest: $484; the compounded account has more money.**

PART 2 · APPLY IT

1. **$396; yes, Jordan will have $6 more than the laptop cost; linear growth** Find simple interest with I=Prt=300(0.08)(4)=96, then add it to the principal. Simple interest adds the same $24 each year, so the model is linear.
2. **$360; yes, exactly enough; exponential growth** Use $A=250(1.20)^2=360$. Each year the balance is multiplied by 1.20, so the model is exponential.

CHALLENGE

Account S: S(t)=200+50t, so S(2)=$300. Account C: $C(2)=200(e^k)^2=200(5/4)^2=\$312.50$. Account C has $12.50 more. Account S is linear because it adds $50 each year. Account C is exponential because it is multiplied by 5/4 each year.

Accept equivalent simple-interest equations, such as A=240(1+0.05t), and money written with or without a trailing zero. For continuous compounding, accept equivalent exact forms that use $e^{(rt)}$ or the given yearly multiplier.