LESSON MAKER PRO

Factor Detective

Connect exponential factors to percent change.

HIGH SCHOOL · MT.CORE.ALG.EXP.3

MT.CORE.ALG.EXP.3 "Understand the relationship between growth/decay factor and growth/decay rate."

NAME _____ DATE _____

FACTOR AND RATE

A growth factor is 1 plus the growth rate written as a decimal. A decay factor is 1 minus the decay rate written as a decimal. To find a rate from a factor, find its distance from 1 and write that difference as a percent.

WORKED EXAMPLE

A quantity is multiplied by 0.65 each hour. Find the percent change per hour and tell whether it is growth or decay.

1. 0.65 is less than 1, so the quantity decays.
2. Find the difference: 1 - 0.65 = 0.35.
3. Write 0.35 as 35%.

Answer: 35% decay per hour

PRACTICE 6 problems

1 A quantity has a growth factor of 1.08. What is its growth rate?

ANSWER _____

2 A quantity has a decay factor of 0.72. What is its decay rate?

ANSWER _____

3 A quantity grows by 12% each year. What is its yearly growth factor?

ANSWER _____

4 A quantity decays by 45% each day. What is its daily decay factor?

ANSWER _____

5 In $y = 500(0.94)^t$, what percent decrease occurs each time t increases by 1?

ANSWER _____

6 In $y = 300(1.6)^t$, what percent increase occurs each time t increases by 1?

ANSWER _____

APPLY IT Show your work

1 A student starts a video channel with 50 followers. The follower count grows by 20% each week. What is the weekly growth factor, and how many followers will the channel have after 2 weeks?

WORK SPACE

ANSWER _____

2 A pair of headphones costs $80. A store marks down its current price by 25%, then marks down the new price by 25% again. What is the factor for each markdown, and what is the final price?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A club's membership grows by 10% one month and drops by 10% the next month. What is the combined factor, and what percent change is this overall? Show your reasoning.

WORK SPACE AND ANSWER

Factor Detective

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A quantity has a growth factor of 1.08. What is its growth rate?	**8%**
2	A quantity has a decay factor of 0.72. What is its decay rate?	**28%**
3	A quantity grows by 12% each year. What is its yearly growth factor?	**1.12**
4	A quantity decays by 45% each day. What is its daily decay factor?	**0.55**
5	In $y = 500(0.94)^t$, what percent decrease occurs each time t increases by 1?	**6%**
6	In $y = 300(1.6)^t$, what percent increase occurs each time t increases by 1?	**60%**

PART 2 · APPLY IT

1. **Growth factor: 1.2; followers after 2 weeks: 72** Convert 20% to 0.20 and add 1 to get 1.2. Then calculate 50 * 1.2 * 1.2 = 72.
2. **Factor for each markdown: 0.75; final price: $45** Subtract 0.25 from 1 to get 0.75. Then calculate $80 * 0.75 * 0.75 = $45.

CHALLENGE

The combined factor is 1.10 * 0.90 = 0.99, so membership decreases by 1% overall.

Accept equivalent decimal forms for factors, such as 1.20 for 1.2. For the challenge, students must apply the second percent change to the new amount, not the original amount.