

When Sam was in seventh grade, his aunt gave him a stamp collection worth \$2,500. Sam considered selling the collection, but his aunt told him that if he saved it, it would increase in value.

1. Sam saved the collection, and its value increased by 6% each year for several years in a row. Make a table showing the value of the collection each year for the five years after Sam’s aunt gave it to him.

Year	0	1	2	3	4	5
Value	2500					

2. Look at the pattern of growth from one year to the next. Is the value growing exponentially?

3. Write an equation for the value v of the collection after n years.

4. Suppose the value of the stamps increased by 4% each year instead of by 6%. Fill in the table showing the value of the collection each year for the five years after Sam’s aunt gave it to him.

Year	0	1	2	3	4	5
Value						

***The **growth factor** of an exponential relationship is similar to the constant ratio in a geometric sequence; recursively it is the number you are multiplying by each time to find the next value.

Growth factor is “the pattern” in an exponential relationship.

In an explicit equation for an exponential relationship, the growth factor is the base of the exponent. For example, in the equation $y = 2500(1.06)^x$, the growth factor would be 1.06.

Growth factor can be thought of as a percent change. Each year the stamp collection is worth 100% of its last year’s value, plus another 6%. This percent increase is called the **growth rate**.

5. Find the growth factor for the stamp collection situation in #4.

6. Find the growth rate for the stamp collection situation in #4.

7. Write an equation that represents the value v of the stamp collection for any year n .

8. Find the growth factor for each growth rate:

- a. 5%
- b. 15%
- c. 30%
- d. 75%
- e. 100%
- f. 150%

9. How can you find the growth factor if you know the growth rate?

10. Find the growth rate for each growth factor:

- a. 1.5
- b. 1.25
- c. 1.1
- d. 2.3
- e. 1.8
- f. 1.08

11. How can you find the growth rate if you know the growth factor?

12. $Y = 3872(1.09)^x$

- a. What is the growth factor in this equation?
- b. What is the growth rate?
- c. Evaluate the equation if $x = 5$.

13. A \$15,000 investment increases in value by 2% each year.

- a. What is the growth rate?
- b. What is the growth factor?
- c. Write an explicit equation to help you find the value after x years.
- d. Find the value after 5 years.