

Directions: Read the following problem. Then follow the steps below to explore it. Write your answers on a separate sheet of paper.

In the world of finances, many things gain value over time. Some examples are stocks and bonds, savings accounts, real estate, and collector's items. Some things lose their value over time, such as cars, boats, computers, and stereos. In this problem, we want to explore how these things gain and lose money. For example, let's say that you buy a collector's edition DVD for \$15 and you expect its value to increase by about 10% each year. How much will it be worth in 10 years?

1. If the value of something increases by 10% in a year, describe in words how you would calculate its new value.
2. Make a table like the one below that goes through year 6. Fill in the table.

Year	Value of the DVD	Amount of Increase (10% of Value)	New Value for Next Year
0	\$15		
1			

3. Let's make a variable for the Value of the DVD (the second column): we'll call it V . Write an algebraic expression for the Amount of Increase each year in terms of V .
4. To get next year's value, you have to add this year's value (V) plus the amount of increase. Write and simplify an expression for next year's value in terms of V .
5. Does the Value of the DVD increase according to a *linear* relationship? Explain how you know from the table.
6. Write a recursive routine that gives the value of the DVD each year.
7. On the attached graph paper, plot the points for each Year (x) and the Value of the DVD (y). Connect the points with a smooth curve that continues across the coordinate plane.
8. According to your graph, how much do you think the DVD will be worth after 10 years?
9. Each year you multiply the value of the DVD by 1.10. So after 6 years, you have to multiply 1.10 times 1.10 times 1.10 times 1.10 times 1.10 times 1.10 (notice there are 6 of them!) times the original value of the DVD. How can we use algebra to write 1.10 times **itself** six times, and what is that idea called?

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Introduction to Exponential Relationships

Date _____
Algebra I

10. Use your calculator to fill in a table like the one below, for 6 years. Remember that to calculate something like 1.10^4 on your calculator, you would use the ^ button, like this: 1.10^4 .

x	$15 \cdot 1.10^x$
0	
1	

11. Compare this table to the first table. What do you notice?
12. This kind of relationship is called an *exponential growth* relationship (can you see why?). Now you can use the formula $15 \cdot 1.10^x$ to find the value of your collector's DVD after 10 years. How much will it be worth?