

## Future Value of Investments

### Part A; Multiple Representations

Table 1 illustrates the growth of an investment over a 5 year period.

Each figure in the Future Value column represents the value of the investment at the end of the annual compounding period  $t$ . e.g., at the end of the 12<sup>th</sup> year, my investment is worth \$5630.48.

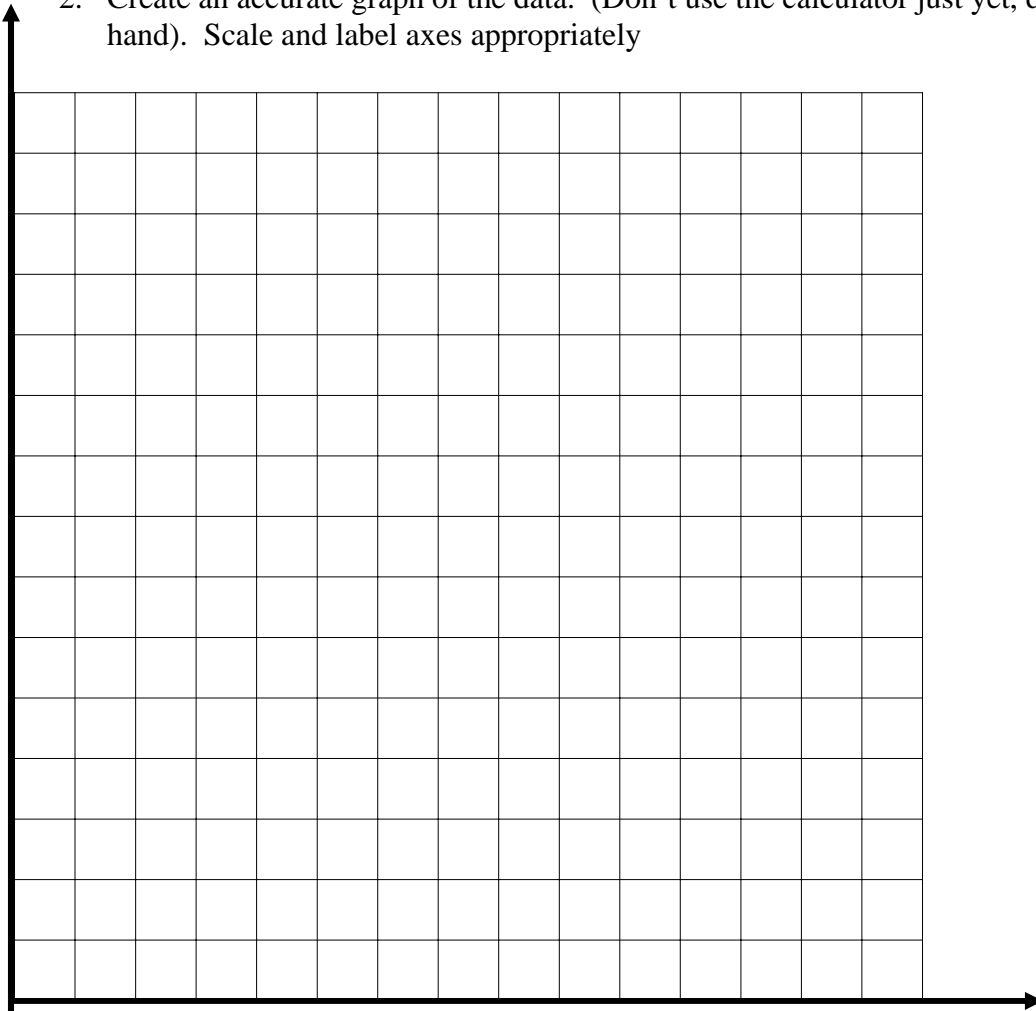
Table 1

| <u>t</u> | <u>Future Value</u> |
|----------|---------------------|
| 12       | \$ 5630.48          |
| 13       | \$ 6024.61          |
| 14       | \$ 6446.34          |
| 15       | \$ 6897.58          |
| 16       | \$ 7380.41          |

1. What *family* of functions might be represented in the table? Provide mathematical support for your answer.

**Strategy:** A powerful problem-solving strategy is the use of *simpler problems* to make sense of more difficult problems. One way to attack problem #1 might be to investigate some simple functions you are already familiar with. For instance, you could look at the functions:  $f(x) = 2x$ ,  $g(x) = x^2$  and  $h(x) = 2^x$  (or any other such functions you are comfortable with). Then you could look at what aspects of the function (in particular, rate of change) are the same as the table above.

2. Create an accurate graph of the data. (Don't use the calculator just yet, do the graph by hand). Scale and label axes appropriately



3. Use your graph to answer the following:
- Based on the graph, what kind of function do you think it is? Has your assessment of this function changed as a result of creating a graph? Explain your reasoning?

- b. Is this graph discrete? Continuous? Neither? Justify your reasoning.
- c. Describe the inputs and outputs.
- d. If you knew the value of the y-intercept, what would it mean in the context of the problem?
4. Find an algebraic representation of this function. Explain two ways to arrive at this function (Now you can use the calculator if you wish).



**Part B: Extension**

6. Generalize the function you found in # 4 to represent any investment  $P$ , invested at the rate  $r$ , compounded once a year for  $t$  years.

**Part C: Pedagogy**

7. Think back to your analysis of the first table in this activity.
  - a. How do you expect your students to use information in the form of tables? What types of inferences or analyses do you hope they use?

- b. How can you support these analysis skills or *habits of mind* in your classroom?