

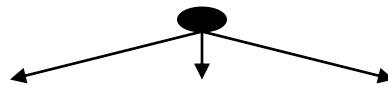
## 5.2.2 Investigating Exponential Growth: E-Mail Friendly

### INTRODUCTION

In this activity, you and your partner will use a Tree Diagram to simulate the effect of “telling three friends, who each tell three friends, who each tell three friends” and so on.

### INSTRUCTIONS

1. A letter is e-mailed out to three friends. Each of these three recipients will then e-mail it to three new friends. Continue this pattern in order to complete the first four rounds in the Tree Diagram below. (Hint: Use tiny dots to represent each e-mail that is sent so that you will have enough space to draw out the entire Tree Diagram.)



Round 1

Round 2

Round 3

Round 4

1. a) Use the information from question 1 to complete the table.

Round	Number of Letters e-mailed	First Differences	Ratio
1			
2			
3			
4			
5			

b) Consider the Tree Diagram and the data in the first four rows of the table. Predict the Number of Letters e-mailed in Round 5. Justify your prediction.

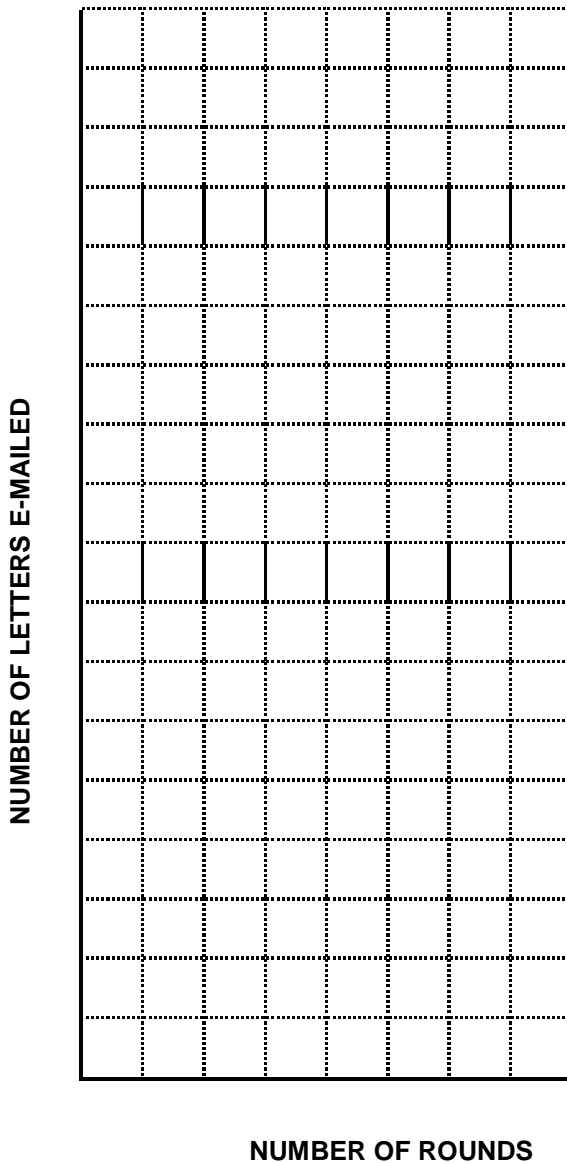
c) Comment on the patterns you see in the Number of Letters e-mailed column and the First Differences column.

d) Is there a constant ratio between consecutive values in the Number of Letters e-mailed column?

e) Comment on the value.

## 5.2.2 Investigating Exponential Growth: E-Mail Friendlyz (continued)

2. Neatly sketch a graph of your results from question 2 on the grid below. Draw a smooth curve through the points. (Note: This is DISCRETE data; however, the smooth curve assists in seeing the general shape of the graph.)



4. **Complete this statement:** As the number of rounds increases by 1, the number of letters e-mailed \_\_\_\_\_
5. Predict how many letters will be e-mailed during the 9<sup>th</sup> round. Show how you determined this.
6. During which round will the number of letters e-mailed exceed 200 000 for the first time? Show how you determined this.

7. Pyramid schemes work similarly to this e-mail simulation in that individuals must find others willing to invest in (or purchase a product from) a “company”. Consider a pyramid scheme where people are asked to invest \$1000 each and are required to find four more investors to do the same. How much **total** money will be invested in this “company” after three rounds? (Hint: Draw a tree diagram.) **NOTE: Pyramid schemes are illegal because they usually involve fraud.**