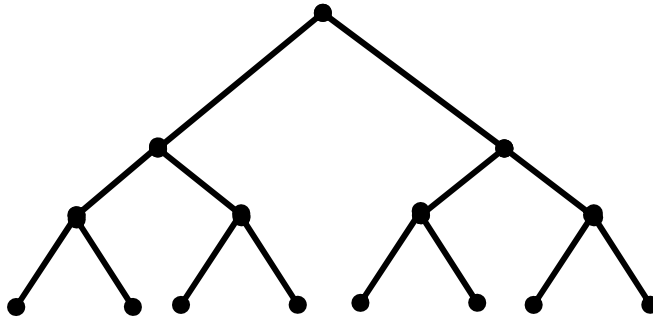


# Have You Heard About...?

Some organizations need to spread accurate information to many people quickly. One way to do this efficiently is to use a telephone calling tree. For example:

*The Silver Spring Soccer Club has boys and girls from about 750 families who play soccer each Saturday in the fall. When it is rainy, everyone wants to know if the games are canceled. The club president makes a decision and then calls two families. Each of them calls two more families. Each of those families calls two more families, and so on.*

This calling pattern can be represented by a **tree graph** that starts like this:



1. What do the vertices of this tree graph represent?
  
2. At the start of the calling process, only the president knows whether the games are on or not. In the first stage of calling, two new families get the word. In the next stage, four others hear the decision, and so on.
  - a. Make a table showing the number of families who will hear about the decision at each of the next eight stages of the calling process. Then plot the data.

Stage of Calling Tree	0	1	2	3	4	5	6	7	8	9	10
Families Informed	1	2	4								

- b. How does the number of families hearing the message grow as the calling tree progresses in stages? How is that pattern of change shown in the plot of the data?
  
- c. How many stages of the tree will be needed before all 750 families know the decision? How many telephone calls will be required?

3. How will word pass through the club if each person in the tree calls three other families, instead of just two?
- Make a tree graph for several stages of this calling plan.

- Make a table showing the number of families who will hear the decision at each of the first ten stages of the calling process. Then plot the data.

Stage of Calling Tree	0	1	2	3	4	5	6	7	8	9	10
Families Informed	1	3									

- How does the number of families hearing the message increase as the calling tree progresses in stages? How is that pattern of change shown in the plot of the data?
  - How many stages of the tree will be needed before all 750 families know the decision? How many telephone calls will be required?
4. In each of the two calling trees, you can use the number of phone calls at any stage to calculate the number of calls at the next stage.
- Use the words *NOW* and *NEXT* to write equations showing the patterns.
  - Explain how the equations match the patterns of change in the tables (*stage, number of families informed*) data.
  - Describe how the equations can be used with your calculator or computer to produce the tables you made in Activities 2 and 3.
  - Write an equation relating *NOW* and *NEXT* that could be used to model a telephone calling tree in which each family calls four other families.