Bell Work 2/3/2015

Simplify the following:

$(4x^2y^3w)^4$

$4^4 \; x^{2\cdot 4} \; y^{3\cdot 4} \; w^4$

$4^4 x^8 y^{12} w^4$

$\frac{\cancel{12}x^2y^6}{\cancel{12}x^5y^2}$

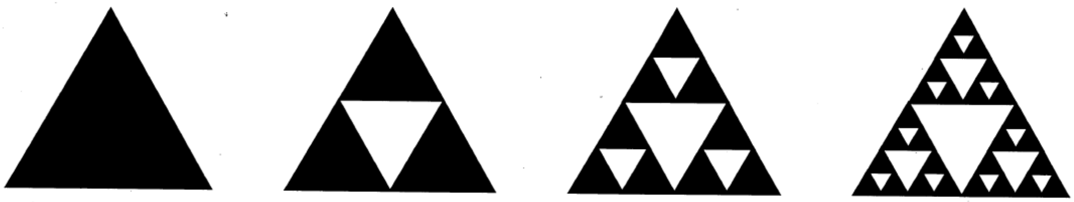
$x^{2-5} \; y^{6-2}$

$x^{-3} \; y^4$

$\frac{y^4}{x^3}$

Homework from Monday

2. The Sierpinski Triangle is a type of progression where an equilateral triangle has $\frac{1}{4}$ of its area removed to create a new shape. Then $\frac{1}{4}$ of its remaining area is taken away. A series of these triangles is shown below, starting with an area of 64.



$A_0 = 64$ $A_1 = 48$ $A_2 = ?$ $A_3 = ?$

(a) If we remove $\frac{1}{4}$ of the area, what fraction of the area remains?

$3/4$

(b) Multiply 64 by the fraction you found in (a). What value do you get?

$64(3/4) = 48$

(c) Find the areas of the third and fourth pictures above by multiplying by the fraction you found in (a).

$A_2 = 48 \cdot 3/4 = 36$

$A_3 = 36 \cdot 3/4 = 27$

(d) Find a formula for the area, A, that remains after n removals of area.

$A = 64(3/4)^n$

(e) How much area remains after 10 removals?

$A = 64(3/4)^{10} = \boxed{3.604}$

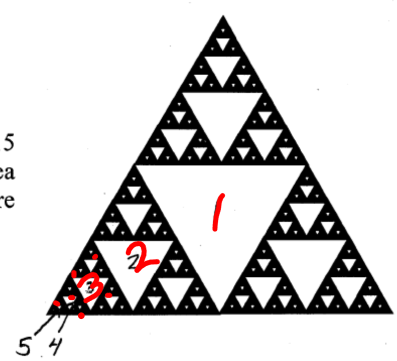
(f) How much area remains after 20 removals?

$A = 64(3/4)^{20} = \boxed{.203}$

(g) Will the area ever reach zero? Explain your thinking.

No, because you are always taking 3/4 of the previous area.

(h) If the Sierpinski triangle to the right had an original area of 15 square centimeters before any area was removed, what is the area of the figure shown to the right to the nearest tenth of a square centimeter? Show the calculation that leads to your answer.



$A = 15(3/4)^5$

$= 3.6 cm^2$

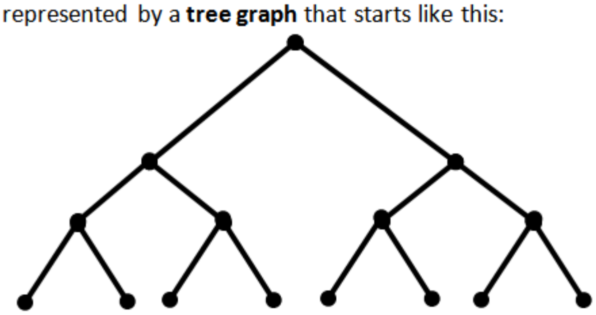
Calling Trees

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:

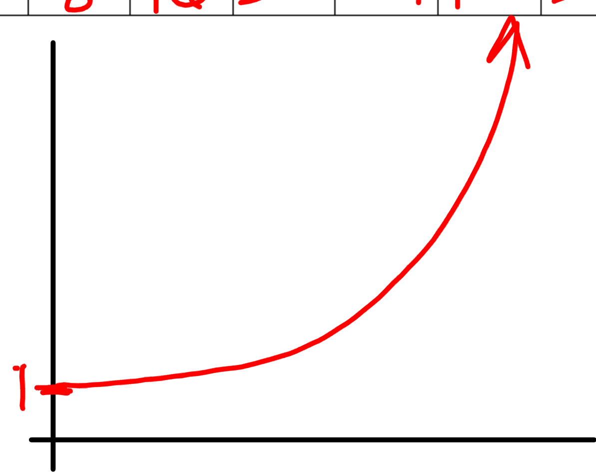


1. What do the vertices of this tree graph represent?

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	8	16	32	64	128	256	512	1024



Doubles
Multiply by 2

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?

exponential curve (not linear)

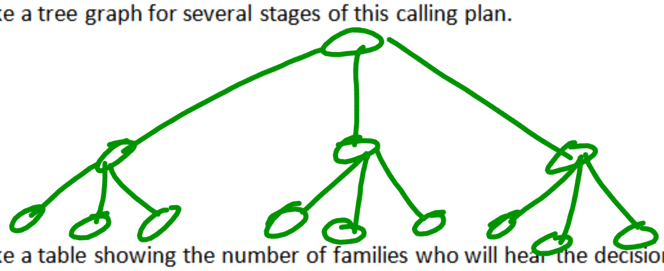
c. How many stages of the tree will be needed before all 750 families know the decision? How many telephone calls will be required?

1,024 calls

10 stages

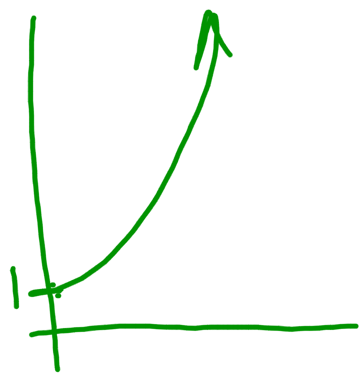
3. How will word pass through the club if each person in the tree calls three other families, instead of just two?

   a. Make a tree graph for several stages of this calling plan.



   b. 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	9	27	81	243	729	2187	6561	19683	59044



triples
multiply by 3

c. 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?

exponential curve (not linear, faster than doubling)

d. How many stages of the tree will be needed before all 750 families know the decision? How many telephone calls will be required?

2,187 calls

7 stages