Cutting Logs and Bagels
Early Elementary Circle

November 20th, 2011

1. How many pieces will you get if you cut a log with 3 cuts?

What about 10 cuts?

What about 27 cuts?

What about 2011 cuts?

Do you notice a general pattern?

PIECES = CUTS ± _ _ _ _ _

2. How many cuts do you have to make to cut a log into 3 pieces?

What about 10 pieces?

What is the general rule here?

CUTS = PIECES ± _ _ _ _ _ _

3. Now suppose that you have 2 logs. You cut each log some number of times so that all together there are 4 cuts.

   (a) how many pieces do you get?

   (b) Given that the number of cuts is 4, does the number of pieces you get depend on the number of cuts on each log?

4. You still have 2 logs and make some cuts on both of them. The total number of cuts is 10. How many pieces do you get?

5. Looking at questions 3 and 4, do you see a general pattern with the number of pieces and cuts when you have 2 logs?

PIECES = CUTS ±_ _ _ _ _ _

6. What happens when you cut three logs? Investigate this idea, and see what general pattern you can find.

7. The Tin Man says that he got 10 pieces after making just five cuts. How many logs did he start with?

8. The Tin Man says that he can also get 10 pieces of wood by making only three cuts. Do you believe him? If yes, how can he do it? If no, why not?

9. No you have a bagel instead of a log. If you cut it with 3 cuts, how many pieces do you get? (1 cut is cutting the bagel from the hole to the edge. Thuse, one cut DOES NOT create two pieces.)

10. What if you cut it with 5 cuts?

    10 cuts?

    What happens if you make just one cut? What is the general rule here? Does it work for any number of cuts?

11. Suppose you have 2 bagels. You cut each bagel some number of times so that all together there are 4 cuts. How many pieces do you get? Does it depend on how many cuts you choose to put on each log?

12. What happens if you take two bagels and make a total of 7 cuts on them. How many pieces can you get? Can you come up with a general rule for the number of pieces you can get by cutting two bagels?

13. Now suppose you have 3 bagels and you make 3 cuts. How many pieces can you get?

14. Dorothy says she got 4 pieces after making 3 cuts. How many bagels could she have had to start with?