

6 Cutting logs

Warm-up

Problem 6.1 *Use Roman numerals to write today's date.*

The date: _____ / _____ / _____

Problem 6.2 *Six soldiers must cross a deep river with no bridge. They spot two children playing with a small boat nearby. The boat can only take two children or one soldier. Can all the soldiers make it across the river?*

Cut the log

Problem 6.3 *You are about to cut a log with a hand saw.*



- *You make three cuts. How many pieces do you get?*

I get _____ pieces.

- *How about ten cuts? I get _____ pieces.*

- *What about 27 cuts? I get _____ pieces.*

- *How about 3000 cuts? I get _____ pieces.*

Problem 6.4

- *How is the number of pieces related to the number of cuts? Do you see a pattern?*

$$PIECES = CUTS + \underline{\hspace{2cm}}$$

- *How many pieces does each cut add?*

Each cut adds _____ piece.

Problem 6.5 *How many cuts do you need to cut a log into three pieces?*



I need _____ cuts.

Problem 6.6

- *How many cuts do you need to cut a log into six pieces?*



I need _____ cuts.

- *How about ten pieces?*

I need _____ cuts.

- *Do you see a pattern? CUTS = PIECES - _____*

Problem 6.7 *This time you have two logs. Make four cuts total. The number of cuts on each log is your choice, but the total number of cuts must be four.*

- *First try. How many pieces do you get?*



I get _____ pieces.

- *Second try. How many pieces do you get?*



I get _____ pieces.

- *Do you get the same number of pieces each time? Why or why not?*

Problem 6.8 *You have two logs and make a total of ten cuts on these logs. How many pieces do you get? Use the space below to make pictures.*

Answer: *If I make ten cuts on two logs, I get _____ pieces.*

Problem 6.9

- *You have two logs. How is the number of pieces related to the total number of cuts you make?*



$$PIECES = CUTS + \underline{\hspace{2cm}}$$

- *How about three logs? Draw pictures to find the pattern.*

$$PIECES = CUTS + \underline{\hspace{2cm}}$$

Problem 6.10

- *The Tin Man says that he got ten pieces of wood after making five cuts. How many logs did he start with?*

The Tin Man started with _____ logs.

- *Looking at a different pile, the Tin Man says that he can get ten pieces of wood by making only three cuts. Is this possible? If you think it is, show how. If you think it is not, explain why.*

Let us now cut bagels instead of logs. The rule is that a cut should go from the hole in the center to the edge of the bagel. Note that one cut DOES NOT make two pieces. Cut the bagel on the picture below to see how it works.



Problem 6.11

- *If you cut a bagel with three cuts, how many pieces do you get?*



I get _____ pieces.

- *How many pieces do you get if you cut a bagel with five cuts?*

I get _____ pieces.

- *How about ten cuts?*

I get _____ pieces.

- *What is the general rule? Does it work for any number of cuts?*

Problem 6.12 *You have two bagels.*



- *Make four cuts total. How many pieces do you get? Does it depend on how many cuts you make on each bagel?*

- *Take two bagels and make the total of seven cuts on them. How many pieces can you get? Try to find a general rule for the number of pieces you can get cutting two bagels.*

Problem 6.13 *Alice got four bagel slices after making three cuts. How many bagels could she have started with? The problem has three different solutions. Try to find all of them.*

Problem 6.14 *Bob found a part of an old book. The last page is 92. The first page number is made of the same digits. How many pages are there?*

Homework

- Finish solving all the problems from the class.
- Make your own problem about cutting logs or bagels. Write it down on an index card. Bring the card to the next class. You can ask your parents to help you write down the problem. We will solve some of your problems together.