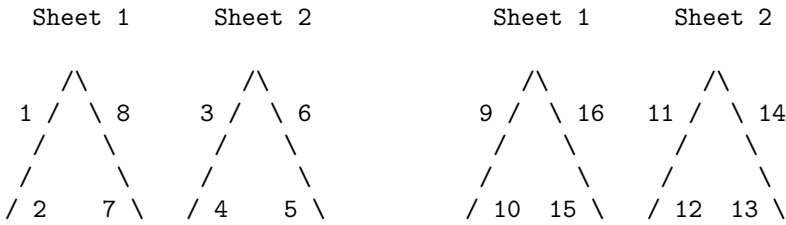Have you ever imagined how you can make a book by yourself? Let's suppose you already have an hardcover of the right size. The next tasks are printing the contents of the book onto sheets of paper (4 pages per sheet, 2 per side), followed by folding the sheets in half, and then stitching the sheets along the bisection to the cover. Simple, isn't it?

Not quite so! There are a couple of problems that must be solved. For instance, there is a rather low limit to the number of sheets you can stitch at a time (say, up to 32), and then there is the challenge of printing the pages in the right order. If your book has hundreds pages you will have to do multiple stitches, one for each section of sheets of paper. A book signature is a section of sheets of printed paper folded in half, ready to be stitched.

Let's see an example: you want to make a mini-book with just 16 pages, but the needle and thread you use only allow stitching 2 sheets of paper at a time. In these conditions your book will have 2 signatures, each containing (2 sheets of paper × 4 pages per sheet) = 8 pages per signature. The following figure shows a top view of the folded sheets with numbers indicating the book pages that you printed on each side.

```
  Signature 1: pages 1-8            Signature 2: pages 9-16

   Sheet 1        Sheet 2            Sheet 1        Sheet 2

     /\             /\                 /\             /\
   1 /  \ 8      3 /  \ 6           9 /  \ 16     11 /  \ 14
    /    \        /    \             /    \         /    \
   /      \      /      \           /      \       /      \
  / 2    7 \    / 4    5 \         / 10   15 \    / 12   13 \
```

To finish making the mini-book you place sheet 2 inside sheet 1 (of signature 1) and stitch them both to the hard cover. The operation is repeated for sheets 1 and 2 of signature 2. And there you have it: a hand-made mini-book!

Input

The input file contains several test cases. For each of them, the input is a single line containing two integer numbers n and m separated by a semi-colon. The first integer indicates the number of pages of the book; the second integer is the size of the signature, measured in sheets of paper. For example, `16;2` reflects the mini-book scenario described previously ($0 < n \leq 10000, 0 < m \leq 32$).

Note: if the number of pages of the book is not a multiple of (4 pages per sheet × number of sheets per signature) you must add empty pages at the end of the book. For instance, if the mini-book had 15 pages you would have to adjust the book size to 16.

Output

For each test case, the output must follow the description below. The outputs of two consecutive cases will be separated by a blank line.

The output contains instructions for printing the signatures. For each signature you must indicate what pages will be printed on each side of the each sheet of paper. See the sample output for the exact output format; watch carefully that only lowercase letters are used as well as the positions of spaces, colon, and semi-colon symbols.

Sample Input

```
9;2
```

Sample Output

```
signature 1
 sheet 1: pages 2 and 7 (front); pages 8 and 1 (back)
 sheet 2: pages 4 and 5 (front); pages 6 and 3 (back)
signature 2
 sheet 1: pages 10 and 15 (front); pages 16 and 9 (back)
 sheet 2: pages 12 and 13 (front); pages 14 and 11 (back)
```