

Round 1C 2017

**A. Ample Syrup**[B. Parenting Partnering](#)[C. Core Training](#)[Contest Analysis](#)[Questions asked](#)

## Submissions

## Ample Syrup

9pt	Not attempted 3597/5554 users correct (65%)
16pt	Not attempted 3089/3483 users correct (89%)

## Parenting Partnering

12pt	Not attempted 1730/2292 users correct (75%)
20pt	Not attempted 1049/1298 users correct (81%)

## Core Training

15pt	Not attempted 1756/2359 users correct (74%)
28pt	Not attempted 15/389 users correct (4%)

## Top Scores

EgorKulikov	100
KalininN	100
anar	100
GlebsHP	100
okaduki	100
phidnight	100
AndreiNet	100
Gleb	100
bmerry	72
Tehnar	72

**Problem A. Ample Syrup**

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the [Quick-Start Guide](#) to get started.

Small input  
9 points

Solve A-small

Large input  
16 points

Solve A-large

**Problem**

The kitchen at the Infinite House of Pancakes has just received an order for a stack of  $K$  pancakes! The chef currently has  $N$  pancakes available, where  $N \geq K$ . Each pancake is a cylinder, and different pancakes may have different radii and heights.

As the sous-chef, you must choose  $K$  out of the  $N$  available pancakes, discard the others, and arrange those  $K$  pancakes in a stack on a plate as follows. First, take the pancake that has the largest radius, and lay it on the plate on one of its circular faces. (If multiple pancakes have the same radius, you can use any of them.) Then, take the remaining pancake with the next largest radius and lay it on top of that pancake, and so on, until all  $K$  pancakes are in the stack and the centers of the circular faces are aligned in a line perpendicular to the plate, as illustrated by this example:



You know that there is only one thing your diners love as much as they love pancakes: syrup! It is best to maximize the total amount of exposed pancake surface area in the stack, since more exposed pancake surface area means more places to pour on delicious syrup. Any part of a pancake that is not touching part of another pancake or the plate is considered to be exposed.

If you choose the  $K$  pancakes optimally, what is the largest total exposed pancake surface area you can achieve?

**Input**

The first line of the input gives the number of test cases,  $T$ .  $T$  test cases follow. Each begins with one line with two integers  $N$  and  $K$ : the total number of available pancakes, and the size of the stack that the diner has ordered. Then,  $N$  more lines follow. Each contains two integers  $R_i$  and  $H_i$ : the radius and height of the  $i$ -th pancake, in millimeters.

**Output**

For each test case, output one line containing Case # $x$ :  $y$ , where  $x$  is the test case number (starting from 1) and  $y$  is the maximum possible total exposed pancake surface area, in millimeters squared.  $y$  will be considered correct if it is within an absolute or relative error of  $10^{-6}$  of the correct answer. See the [FAQ](#) for an explanation of what that means, and what formats of real numbers we accept.

**Limits**

$1 \leq T \leq 100$ .  
 $1 \leq K \leq N$ .  
 $1 \leq R_i \leq 10^6$ , for all  $i$ .  
 $1 \leq H_i \leq 10^6$ , for all  $i$ .

**Small dataset**

$1 \leq N \leq 10$ .

**Large dataset**

$1 \leq N \leq 1000$ .

**Sample**

Input

Output

```

4          Case #1: 138230.076757951
2 1        Case #2: 150796.447372310
100 20     Case #3: 43982.297150257
200 10     Case #4: 625.176938064
2 2
100 20
200 10
3 2
100 10
100 10
100 10
4 2
9 3
7 1
10 1
8 4

```

In Sample Case #1, the "stack" consists only of one pancake. A stack of just the first pancake would have an exposed area of  $\pi \times R_0^2 + 2 \times \pi \times R_0 \times H_0 = 14000\pi \text{ mm}^2$ . A stack of just the second pancake would have an exposed area of  $44000\pi \text{ mm}^2$ . So it is better to use the second pancake.

In Sample Case #2, we can use both of the same pancakes from case #1. The first pancake contributes its top area and its side, for a total of  $14000\pi \text{ mm}^2$ . The second pancake contributes some of its top area (the part not covered by the first pancake) and its side, for a total of  $34000\pi \text{ mm}^2$ . The combined exposed surface area is  $48000\pi \text{ mm}^2$ .

In Sample Case #3, all of the pancakes have radius 100 and height 10. If we stack two of these together, we effectively have a single new cylinder of radius 100 and height 20. The exposed surface area is  $14000\pi \text{ mm}^2$ .

In Sample Case #4, the optimal stack uses the pancakes with radii of 8 and 9.

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