Practice Exercise #22: Redeem Coupon

http://www.comp.nus.edu.sg/~cs1020/4_misc/practice.html

Objectives:
1. Object-oriented programming

Task statement:

In general there are two types of coupons: *cash coupon* and *discount coupon*.

Cash coupon has a face value greater than 1, and can be used as cash to buy things. However, the price after discount cannot be less than zero. For example, if you use a $10.00 coupon to buy a pen worth $5.80, you would spend $0 in cash. However, you will not get any change from the shop.

However, there is an "theoretical amount" involved. In the above example, the "theoretical amount" you need to pay is -$4.20, which means you will "lose" $4.20 if you use a $10 coupon to buy the pen. If you use a $8 coupon instead, the "theoretical amount" will be -$2.20, which means you "lose" less money. The better choice is hence the $8 coupon, since you can save the $10 coupon for something more expensive.

Discount coupon has a discount rate smaller than 1. For example, if the discount rate is 0.2, it means 20% off the price. If you buy a pen worth $5.80 with this coupon, you would pay $4.64.

You are to create a Java service class **Coupon** to represent coupon. The attributes are **name** of a coupon, and **rate** which represents either the face value or discount rate of the coupon. You also need to create a method inside this class to calculate what you need to pay (the "theoretical amount") when you use a coupon.

You are also to write a client class **Redeem** to read inputs as described below, and compute the best option. If there are two or more options that give the best result, you will pick the first one among them that appears in the input (as illustrated in sample input #3 below).

Input
The first line of the input contains two positive numbers, an amount (of type **double**) and an integer **N** ($1 \leq N \leq 10$) which indicates the number of coupons. In the subsequent **N** lines, each line contains information about a coupon: its name followed by face value or discount rate.

(The above symbol **N** is used to ease explanation. In your program, you should give more descriptive variable names and follow Java naming convention.)

Output
The output contains a single line, stating which is the best coupon to use, and the amount you need to pay, correct to 2 decimal places. (Sometimes, due to rounding differences, your final value may differ from the value in the expected output in the second decimal digit. In this case, as long as your formula is correct, it will be marked as correct.)

Skeleton programs

The skeleton programs **Coupon.java** and **Redeem.java** are given.

For **Coupon.java**, you are to complete the constructor **Coupon(String name, double rate)** and the method **payment(double price)**. You are not to modify the rest of the code, or add any other methods.

Sample Input #1
```
123.35 3
sapphire 20.5
vip 0.3
ruby 30
```

Sample Output #1
```
Best choice: vip
You need to pay $86.34
```

Sample Input #2
```
100.0 3
coupon1 120
coupon2 140
coupon3 110
```

Sample Output #2
```
Best choice: coupon3
You need to pay $0.00
```

Sample Input #3
```
100.0 4
coupon1 0.05
coupon2 120
coupon3 0.1
coupon4 120
```

Sample Output #3
```
Best choice: coupon2
You need to pay $0.00
```