CS1020 Take-home Lab #1

Exercise #2: Turning Knobs

(http://www.comp.nus.edu.sg/~cs1020/3_ca/labs.html)

Objective

Using **ArrayList** class.

Task Statement

A four-way knob has 4 positions: “up”, “right”, “down” and “left. The knob can only turn in the clockwise direction. For example, if the current position is “right”, it takes 3 stops to reach position “up”.

Moreover, the knob is used to control a device and the latter has two states: “on” or “off”. For every stop we take to turn the knob, the device would toggle its state. For example, if the knob’s original position is “right” and its attached device’s state is “on”, then turning the knob to “down” position would turn off the device, and turning the knob to “left” position would turn on the device again.

You are to write a program that reads in information about some knobs. Each knob has its device’s state, its current position and its target position. You are to find out for each knob what is the final state of its device, and the total number of stops you need to make to turn all the knobs to their target positions.

If the current position and target position of a knob are identical, you must turn the knob one complete round, that is, 4 stops. You should never turn a knob more than one complete round.

Input

The first line of the input contains a positive integer **N** ($1 \leq \mathbf{N} \leq 10$) which indicates the number of knobs. In the subsequent **N** lines, each line contains information about a knob. If the line begins with the word “on” it means that the initial state of the attached device is on; if the word “on” is absent, it means the device is off. The rest of the line contains the current position and target position of the knob.

(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 **N**+1 lines. The first **N** lines contains the final states of the respective devices, and the last line contains the total number of stops made to turn all the knobs.

Sample Input #1

```
2
on right up
up down
```

Sample Output #1

```
off
off
Total stop(s) = 5
```

Sample Input #2

```
3
down right
on left left
left right
```

Sample Output #2

```
on
on
off
Total stop(s) = 9
```

Skeleton Program

The following skeleton is given. Normally, you would have put the **Knob** class (the server) and **TurnKnobs** class (the client) in separate files, but to reduce the number of files submitted, you are to put them in a single file **TurnKnobs.java**.

Note that you are to use **ArrayList** to store data about the knobs. That's the objective of this exercise.

```java
/*
 * CS1020 (AY2012/3 Sem2)
 * Lab #1 Ex2
 * Author    :
 * Matric no.:
 * Description of program:
 */

import java.util.*;

class Knob {

   // Data attributes
   boolean isOn;      // is the device on?
   String currPos;    // current position of knob
   String targetPos;  // target position of knob

   // Constructor
   public Knob(boolean state, String newCurrPos, String newTargetPos) {
      // fill in the code
   }

   // Determine whether the device is on or off after num moves
   public boolean deviceIsOn(int num) {
      // fill in the code

      return false; // this is a stub
   }

   // Compute the least moves to turn the knob
   public int ChangePos() {

      return 123; // this is a stub
   }
}
```

```
// The client (driver) class
class TurnKnobs{

   public static void main(String[] args){
      // Declare a Scanner object to read input


      // Declare the necessary variables
      // eg: ArrayList<Knob> knobs = new ... (complete the line)



      // Read input and process them accordingly



      // Output the result
      // Stick to this statement to ensure that your output is
      // in the right format; the following call makes use of

      // Print result for each knob
      System.out.println("on");
      System.out.println("off");

      // Print total number of stops
      int move = 0;

      System.out.println("Total stop(s) = " + move);
   }
}
```