STEMLoyola Challenges

NO SWEAT NO GAIN

Much-Match-March! Challenge

(Challenge 07)

Begins at **06:00 a.m. EAT** on **Saturday 7th March 2020**

Ends at **11:59 p.m. EAT** on **Sunday 22nd March 2020**

The Challenge contains five problems (A, B, C, D, & E) arranged in an increasing order of difficulty. Beginners are expected to solve problems A, B, and C; while experienced students are expected to solve all five problems. Score is determined by both the problems you manage to solve and how sooner you submit a correct solution

Visit contest.stemloyola.org to participate in the challenge and/or view live results

Visit contest.stemloyola.org/register to register, if you do not have an account yet

Visit challenges.stemloyola.org/article/contest-registration for registration instructions

Visit challenges.stemloyola.org to access various resources (guidelines, tutorials, articles, videos, solutions to previous challenges, etc.) that you may need to complete the challenge

Consult Mr. Albert, Mr. Samuel, or other Computer Department teachers with any questions or concerns you may have

Problem A: Babies Matching Game

Description

Alien babies play a game that humans find challenging. In the game, a parent alien shouts out a number (like 561) and the baby alien has to either reply “Match”, “Much”, “March”, or “Much-Match-March” based on the following rules:

Rule 1: If the number is divisible by 3, the reply is “March!”
Rule 2: If the number is divisible by 5, the reply is “Much!”
Rule 3: If the number is divisible by both 3 and 5, the reply is “Much-Match-March!”
Rule 4: If the number is neither divisible by 3 nor 5, the reply is “Match!”

Write a program that can simulate the alien babies brain’s logic as they play this game.

Input

The input contains a number shouted out by an alien parent. This number is guaranteed to be positive and less than a million.

Output

Print the best response that an alien baby should reply.

NB: *Kindly note that your solution will be run five times. Each time, it will be tested against a different set of input. The first few test cases are given below to help you check your solution. Some of the remaining tests will be hidden and some can be seen from the contest page for this problem.*

Test 1

Input	Output
561	March!

Test 2

Input	Output
11565	Much-Match-March!

Problem B: Teens Matching Game

Description

Alien teens play a game that is quite interesting. They usually play in groups. One of the teens shouts out a positive number that must be less than a million. The winner is the first teen to reply "March", "Match", "Much", or "Much-Match-March" according to the following rules:

Rule 1: If the product of the individual digits is greater than the sum of the individual digits, the reply is "Much!"

Rule 2: If the sum of the individual digits is greater than the product of the individual digits, the reply is "March!"

Rule 3: If the product of the individual digits is equal to the sum of the individual digits, the reply is "Match!"

Alien teens have been observed to produce a correct answer between one and two seconds. Write a program that can figure out a correct response in less than one second.

Input

The input contains a number shouted out by an alien teen. This number is guaranteed to be positive and less than a million.

Output

Print the correct response that an alien teen should reply to win the game.

NB: *Kindly note that your solution will be run five times. Each time, it will be tested against a different set of input. The first few test cases are given below to help you check your solution. Some of the remaining tests will be hidden and some can be seen from the contest page for this problem.*

Test 1

Input	Output
561	Much!

Because 5x6x1 is greater than 5+6+1

Test 2

Input	Output
11125	Match!

Because 1x1x1x2x5 is equal to 1+1+1+2+5

Problem C: Adults Don't Match

Description

Alien adults have no time to play long games. When they want to challenge each other, usually one adult alien shouts out a positive integer less than a million. Then, the other adult alien either shouts "Forward", "Backward", or "Adults Don't Match" according to two simple rules:

Rule 1: If the number is greater than the reverse of its digits, the reply is "Forward!"

Rule 2: If the number is less than the reverse of its digits, the reply is "Backward!"

Rule 3: If the number is equal to the reverse of its digits, the reply is "Adults Don't Match!"

Input

The input contains a number shouted out by one adult alien. This number is guaranteed to be positive and less than a million.

Output

Print the correct response that another adult alien should reply to win the game.

NB: *Kindly note that your solution will be run five times. Each time, it will be tested against a different set of input. The first few test cases are given below to help you check your solution. Some of the remaining tests will be hidden and some can be seen from the contest page for this problem.*

Test 1

Input	Output
561	Forward!

Because 561 is greater than 165

Test 2

Input	Output
11125	Backward!

Because 11125 is less than 52111

Test 3

Input	Output
96169	Adults Don't Match!

Because 96169 reads the same forwards and backwards

Problem D: Vending Machine

Description

The school wants to install a vending machine that sells only 250ml water bottles at a super discounted price of TZS 50 each. However, there are a few things to consider:

1. The vending machine accepts only three coins (i.e. TZS 50, 100, or 200).
2. All coins are removed at the end of the day. So, the vending machine is always empty in the morning.
3. When change needs to be returned, the vending machine does not sell water to a student if it does not have enough coins to return as change.

You are given a list of students who are currently standing in a line and want to buy water. It is at the beginning of the day, so the vending machine has enough water bottles but no coins. Determine if it is possible for the vending machine to sell water to all the students without running out of coins to return as change. Students access the vending machine on the first-come-first-served basis.

Input

The first line of the input contains the total number of students ($2 < \mathbf{N} < 1000$) who want to buy water from the vending machine. Each of the following **N** lines contains the coin that the student has and the number of bottles he/she wants to buy. It is guaranteed that the vending machine has enough water bottles to serve all students standing in the line. It is also guaranteed that each student has a correct coin for the number of bottles he/she wants to buy (i.e. a student with 50-coin will not want to buy 2 bottles).

Output

Print "YES" without quotes if it is possible for the vending machine to sell water bottles to all students in the line. Print "NO" without quotes if it is not possible.

NB: *Kindly note that your solution will be run five times. Each time, it will be tested against a different set of input. The first few test cases are given below to help you check your solution. Some of the remaining tests will be hidden and some can be seen from the contest page for this problem.*

Test 1

Input	Output
3 50 1 100 1 50 1	YES

In Test 1, the first student doesn't need change. The second student needs a TZS 50 change and the machine has one 50-coin at this point. The third student doesn't need change.

Test 2

Input	Output
3 100 1 50 1 50 1	NO

In Test 2, the first student needs a TZS 50 change and the vending machine doesn't have any coins.

Test 3

Input	Output
4 100 2 50 1 200 4 200 1	YES

In Test 3, the first, second, and third students don't need change. The fourth student needs TZS 150 change and the vending machine already has one 50-coin, one 100-coin, and one 200-coin. So, it can return the change for the fourth student.

Problem E: Fixing the Vending Machine

Description

After running a vending machine (in *Problem D*) for some time, the school realized that it is failing to serve students properly. The biggest challenge being the machine's failure to return change to students. The school wants to upgrade the vending machine so that it can return change better.

As a reminder, the vending machine sells only 250ml water bottles at a super discounted price of TZS 50 each. However, there are a few things to consider:

1. The vending machine accepts only three coins (i.e. TZS 50, 100, or 200).
2. All coins are removed at the end of the day. So, the vending machine is always empty in the morning.
3. When change needs to be returned, the vending machine does not sell water to a student if it does not have enough coins to return as change.

You are given a list of students who are currently standing in a line and want to buy water. It is at the beginning of the day, so the vending machine has enough water bottles but no coins. Determine if it is possible (in the current order or by re-arranging the students), for the vending machine to sell water to all the students without running out of coins to return as change.

Input

The first line of the input contains the total number of students ($2 < \mathbf{N} < 1000$) who want to buy water from the vending machine. Each of the following **N** lines contains the coin that the student has and the number of bottles he/she wants to buy. It is guaranteed that the vending machine has enough water bottles to serve all students standing in the line. It is also guaranteed that each student has a correct coin for the number of bottles he/she wants to buy (i.e. a student with 50-coin will not want to buy 2 bottles).

Output

Print "YES" without quotes if it is possible for the vending machine to sell water bottles to all students in the line. Print "NO" without quotes if it is not possible.

NB: *Kindly note that your solution will be run five times. Each time, it will be tested against a different set of input. The first few test cases are given below to help you check your solution. Some of the remaining tests will be hidden and some can be seen from the contest page for this problem.*

Test 1

Input	Output
3 50 1 100 1 50 1	YES

In Test 1, the first student doesn't need change. The second student needs a TZS 50 change and the machine has one 50-coin at this point. The third student doesn't need change.

Test 2

Input	Output
3 100 1 50 1 50 1	YES

In Test 2, the first student needs a TZS 50 change. Hence, it is possible for all three students to be served if the second or third student goes first to the vending machine.

Test 3

Input	Output
4 100 2 200 1 50 1 200 2	NO

In Test 3, regardless of how the students are arranged, the machine will always fail to return change to one of the students with 200-coin.