Q10. Taking the Train (50 marks):

Dena takes the train to work every day from the Main Street Station to the City Center Station. There are two trains she can take, the red train or the blue train. Both trains start operating at 8 a.m. A red train arrives every X minutes, and a blue train arrives every Y minutes, where X and Y are both positive integers. Dena always arrives at the platform after Z minutes past 8 a.m. but before 9 a.m., and then she gets on the first train arriving at the station. However, if both trains arrive simultaneously, Dena gets on the train with relatively lower frequency. Write a programme to find out which train Dena is taking more often.

For example:

Assume that $X = 2$, $Y = 3$ and $Z = 6$.

If she arrives between 08:06 and 08:08, she takes the red train that arrives at 08:08.

If she arrives between 08:08 and 08:09, she takes the blue train that arrives at 08:09.

If she arrives between 08:09 and 08:10, she takes the red train that arrives at 08:10.

If she arrives between 08:10 and 08:12, she waits for both trains to arrive at 08:12 and takes the blue train because it is less frequent than the red train.

Since the arrival times of both trains are periodic with a period of 6 minutes, the rest of the calculation can be omitted in this example.

From the above, in conclusion, Dena is taking both trains equally often.

Write a programme to

Input, in sequence, two positive integers, X, Y, where $X \neq Y$, $1 \leq X, Y \leq 100$, and one positive real number, Z, where $0 < Z < 60$.

Output "Red" if Dena takes the red train more frequently. If she takes the blue train more frequently, then output "Blue". If she takes both trains equally often, then output "Equal".

试题 10. 乘坐火车 (50 分):

迪娜每天从 Main Street 站乘坐火车到 City Center 站上班。她可以乘坐红色或蓝色火车。两列火车均于上午 8 时开始运行，之后每隔 X 分钟就有一趟红色火车，每隔 Y 分钟就有一趟蓝色火车；其中 X 和 Y 为正整数。 迪娜总是在上午 8 时 Z 分之后，但 9 时之前，抵达站台，并乘坐先到站的火车。但是，如果两列火车同时到达，迪娜会乘坐频次相对较少的火车。试写一程式以找出迪娜更常乘坐哪列火车。

例如:

假设 $X = 2$，$Y = 3$ 和 $Z = 6$。

若她在 08:06 到 08:08 之间到达，她将会乘坐在 08:08 到站的红色火车。

若她在 08:08 到 08:09 之间到达，她将会乘坐在 08:09 到站的蓝色火车。

若她在 08:09 到 08:10 之间到达，她将会乘坐在 08:10 到站的红色火车。

若她在 08:10 到 08:12 之间到达，她会等到 08:12，并在两列火车同时到站时，选择乘坐蓝色火车，因为蓝色火车没有红色火车的班次那么频密。

在这个例子里，由于两列火车的到达时间是周期性的，且其周期为 6 分钟，其余的演算可以省略。

根据以上推算，结论是迪娜乘坐两列火车的频次一样。

试写一程式以

输入两个正整数，X，Y，并已知 $X \neq Y$，$1 \leqslant X, Y \leqslant 100$，和一个正实数，$Z$，并已知 $0 < Z < 60$。

输出"Red" 若迪娜比较频繁乘坐红色火车。若她比较频繁乘坐蓝色火车，则输出"Blue"。若她乘坐两列火车的频次一样，则输出"Equal"。

Example (例子)

Input (输入)	Output (输出)
2 3 6	Equal
33 38 36	Red
70 68 51	Blue
27 23 45	Red
58 59 57.5	Red

Q11. Robots on Mars (60 marks):

Several robots have landed on Mars and are about to perform a mission. Scientists have marked various areas of Mars with capital letters, and these areas have been verified to be safe. Each robot lands in a different area and must travel to another area. Each area is small and can only accommodate one robot.

Besides, some pathways have also been discovered among these areas. If a robot is assigned to move from area A to area B, there must be a pathway that directly connects these two areas. However, the path is so small that no two robots can pass through it at the same time.

Moreover, the network connection on Mars is very unstable. Therefore, only one robot can move at a time to avoid potential collisions. Furthermore, the pathway on Mars is relatively dangerous and might damage robots; therefore, once a robot leaves its initial area, it needs to move to the target area as quickly as possible and cannot stop on the pathway between those areas. Only when the robot arrives at the target area, then it can stop and stay safely in that area. As a result, when a robot moves from one area to another, both areas and the pathway between the areas can only have one robot, which is the moving robot; otherwise one of the robots might be in danger.

Scientists do not know if the Mars mission will be successful because they do not know if all the robots will reach their respective destinations under the above constraints. If there is a way to get all the robots to complete the mission, then the Mars mission can be a success. Any robot that fails to reach its destination will fail the overall mission. Now, scientists need your help to check if robots are up to the task of Mars.

Example 1:

The first robot plans to move from A to B, while the second robot plans to move from B to A. The Mars mission will fail - there is no way for those robots to reach their destinations without violating the constraints mentioned.

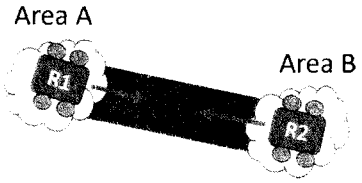

Figure 11(a): Mission fails because some robot(s) cannot reach the destination(s)

Example 2:

The first robot plans to move from A to B, while the second robot plans to move from B to C. The second robot can move first to vacant Area B, then the first robot can move from A to B. Since no constraint will be violated, the Mars mission can be successful.

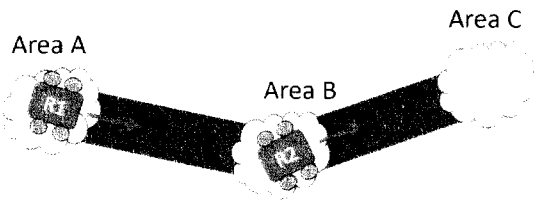

Figure 11(b): Mission succeeds because all robot(s) can reach the destination(s)