CodeVita
The TCS Global Coding Contest

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05 Hr **56** Min **44** Sec

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Coding Area

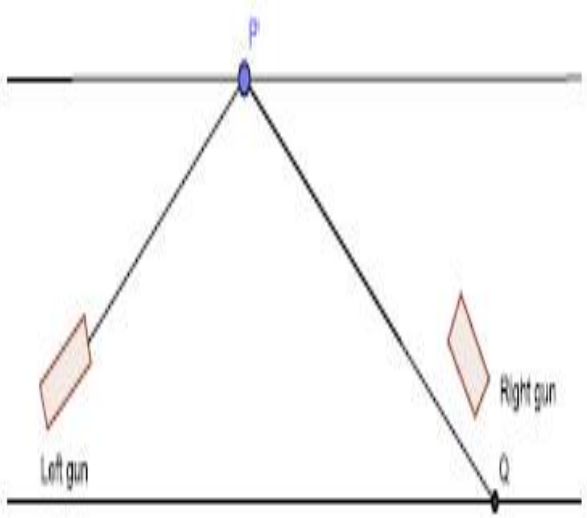
A B C D E F

ONLINE EDITOR (E)

Colliding Cannons

+ Problem Description

We have seen in many mythological movies, the arrows shot, by the opponents collide midair and one devour the other.



You wanted to simulate a similar situation for the video game you are designing. In the game, the opponents are in a tunnel and have a gun each. They can shoot bullets in any direction (within limits). The roof and floor of the tunnel are perfect surfaces and any object hitting them are bounced off according to the law of reflection (angle of incidence equals the angle of reflection), with unchanged speed. For simplicity, we can assume that the tunnel is a two dimensional horizontal strip. Of course, this being the mythological world, gravity does not exist, and the bullets travel in straight lines at constant spped until being reflected (or they collide).

The two guns are positioned at half the height (h) of the tunnel, at a distance D apart.

The two guns fire simultaneously. The trajectories of the bullets (if extended) will meet at a maximum of one point. They are said to collide if their trajectories meet, and the two bullets arrive at that point within 0.5 seconds of each other.

The shooting angle varies from -85 degrees to 85 degrees from the horizontal. For the left gun, the angles are measured anti-clockwise, and for the right gun they are measured clockwise. Hence, with a positive angle for both, the left gun shoots up and to the right, and the right gun shoots up and to the left.

Write a program to decide whether the bullets shot will collide or not. If they do, determine where will they collide. The coordinate axes for reference have origin at the midpoint of the line joining the guns, X axis along the line joining the guns. Hence, the left gun's coordinates are (-D/2,0) and the right gun's coordinates are (D/2,0). The equations for the top of the tunnel is y=h/2, and of the bottom of the tunnel is y=-h/2.

Constraints

-85<=LA,RA<=85

0<LS,RS<1000

0<h,D<10000

Input Format

The input has two lines.

The first line has two comma separated positive integers, h and D (the height of the tunnel and the distance between them). The unit of distance measurement is myth units.

The second line has four comma separated numbers (with up to two decimals each) giving LA, LS, RA and RS respectively, where LA, LS denote the angle (in degrees) and speed of firing (in myth units per second) of the left gun and RA, RS denote the angle (in degrees) and speed of firing (in myth units per second) of the right gun.

Output

If the two collide (the trajectories meet, and they arrive at the meeting point within 0.5 seconds of each other), the output is a comma separated string of the word Yes and the coordinates of the colliding point.

Yes,x,y

Here, x and y are the coordinates of the collision point, and each must be round to two decimal places

If they do not collide, the output is the word No.

No

Explanation

Example 1

Input

500,2000
30,90,40,70

Output

Yes,47.20,171.01

Explanation

The distance between the guns is 500 myth units, and the height of the tunnel is 2000 myth units. The angle of firing of the left gun is 30 degrees and the speed of the bullet from the let gun is 90 myth units per second. The angle of the right gun is 40 degrees, and the speed of the bullet from the right gun is 70 myth units per second.

The coordinates of the intersection point of the trajectories is (to two decimal places) (46.20,171.01). The time for the left bullet to reach this point is (to two places) 3.80 seconds, and for the right bullet (to two seconds) is 3.80 seconds. As this is within 0.5 seconds of each other, the collision is assumed to have taken place. Hence the output is Yes,46.20,171.01

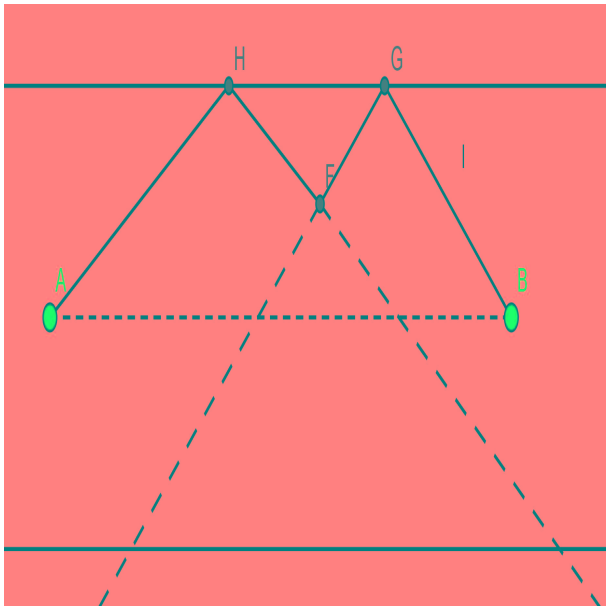
Example 2

Input

500,2000
80,70,85,70 Output
Yes,84.19,104.74

Explanation

The distance between the guns is 500 myth units and the height of the tunnel is 2000 myth units. The left gun angle is 80 degrees, and the left gun speed is 70 myth units per second. The right gun angle is 85 degrees and the speed is 70 myth units per second also.



The guns shoot, and reflect off the ceiling (at H and G respectively), and the trajectories meet at F. The coordinates of F are (84.19, 104.74). The time taken for the left bullet is 27.49 seconds, and the time for the second bullet is 27.17 seconds. As

they arrive within 0.5 seconds of each other, this is considered a collision. Hence the output is Yes,84.19,104.74

Example 3

Input

500,2000
30,170,50,160

Output

No

Explanation

The two trajectories meet at (86.82,194.47), but the left bullet takes 2.29 seconds, and the right bullet takes 1.59 seconds. Hence, they do not pass within 0.5 seconds of each other, and there is no collision.

Upload Solution [Question : E]

I, **vipul kumar** confirm that the answer submitted is my own. Took help from online sources (attributions)

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