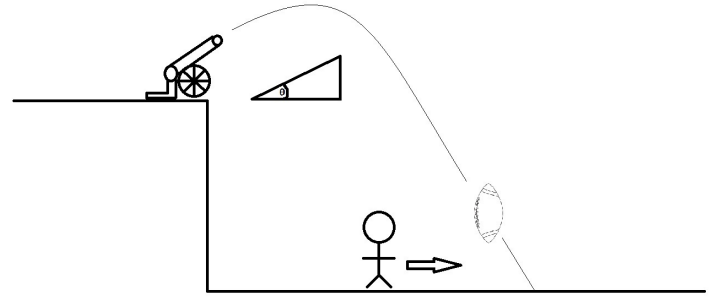


Problem F: Cannon on a Ridge

You're going to break a world record today! You're going to perform the amazing feat of catching a football at the longest distance ever. You will accomplish this by firing the football out of a cannon, running along the ground, and catching it right before it hits the ground.



Your cannon sits upon the edge of the ridge at a positive height h from the ground. You will be initially standing l metres in front of the cannon (at ground level), and when the cannon fires you may begin running along the ground in the same x-direction as the ball. You may run at any speed up to your maximum speed s . You will catch the football right when it hits the ground, at $y = 0$. Observe that you can change the firing angle of the cannon however you wish. Recall that for a cannon angled at θ radians as in the diagram, the velocity in the x-direction is $v \cos(\theta)$ and the initial velocity in the y-direction is $v \sin(\theta)$.

For this problem you may assume that the force of gravity will accelerate the football downwards at a rate of 10 m/s^2 . This means that if the ball initially has a vertical velocity of $v_y \text{ m/s}$, then the vertical velocity at some time t (as long as the football hasn't hit the ground yet) will be given by $v_y - 10t \text{ m/s}$. We will ignore any form of friction for this problem, and assume gravity is the only source of acceleration while the football is in the air.

How far is the longest possible catch? That is, what is the furthest possible x-coordinate of the football when you catch it?

Input Specification:

The input consists of a series of testcases, one per line. Each line has four integers: h , the vertical height of the ridge, v , the initial velocity of the cannon, l , your starting location when the cannon fires, and s , your maximum speed. Remember: you will only run forwards to catch the ball (or stand still), never moving backwards! Input ends on EOF.

Output Specification:

Output the maximum distance catch to 3 decimal places if it exists, or **BAD THROW** if the football can't even make it to your starting location.

Sample Input:

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200 20 50 0
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Sample Output:

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50.000
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