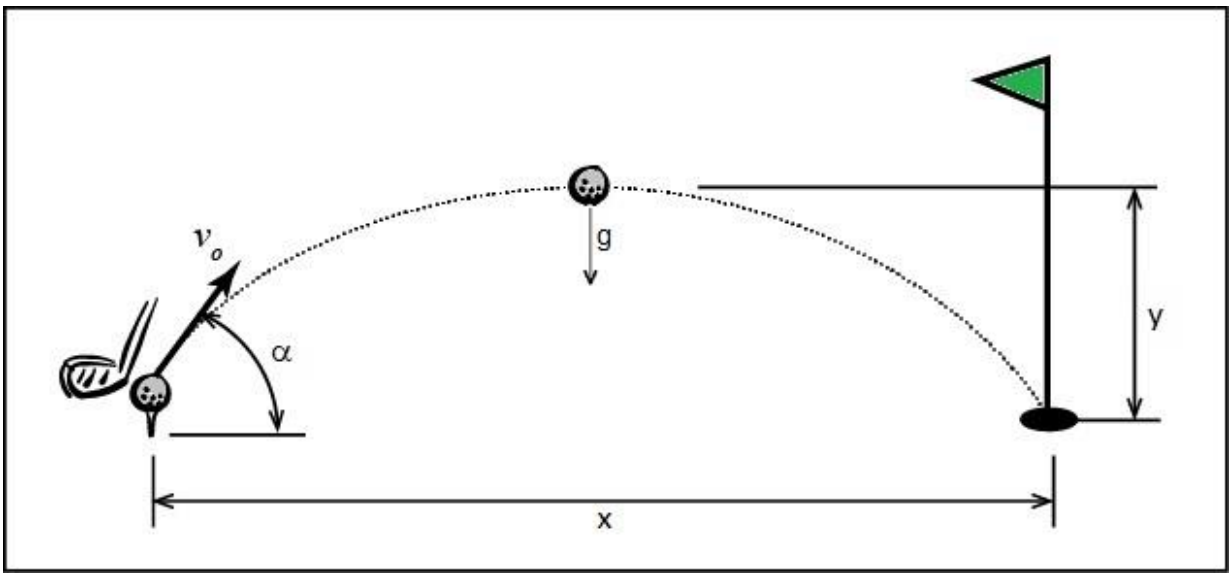
X Golf ball

X points

Introduction

When a golf ball is hit, its flight follows a curved path known as parabola. The shape of the parabola is affected by two main forces, gravity and air resistance. To keep things easier, let's assume that air resistance as negligible and just consider gravity (9.8 m/s^2).



Such movement is composed by an uniform rectilinear motion in X-axis and an uniformly accelerated rectilinear motion in Y-axis. So, the distance formulas are:

$$x = x_0 + v_0 * cos(\alpha) * t$$

$$y = y_0 + v_0 * sin(\alpha) * t - 1/2 * g * t^2$$

It is also assumed that the golf field is plain, that is final and initial heights are equal.

Given a golf ball with a diameter of 42.7 millimeters hit by a certain angle and aiming to get the ball inside a 3 meters circle around a target position, could you find out the maximum and minimum speed that must be achieved providing a precision of two decimals?

To help you in this task we recommend applying these formulas:

$$minDistance = targetDistance - 3 + (0.0427/2)$$

$$maxDistance = targetDistance + 3 - (0.0427/2)$$

$$minTime = \sqrt{\frac{2 * minDistance * sin(\alpha)}{g * cos(\alpha)}}$$

$$maxTime = \sqrt{\frac{2 * maxDistance * sin(\alpha)}{g * cos(\alpha)}}$$

$$minSpeed = \frac{minDistance}{cos(\alpha) * minTime}$$

$$maxSpeed = \frac{maxDistance}{cos(\alpha) * maxTime}$$

Input

Two lines are provided.

The first line is a positive representing the target distance in meters.

The second line has another positive defining the angle in degrees.

Output

Two lines are also at the output. The first line contains the maximum speed in meters per second. And the second line is for the minimum speed in meters per second.

Example

Input

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100
50
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Output

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The maximum speed is: 32.01 m/s.

The minimum speed is: 31.07 m/s.
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