1 //\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
 2 //  
 3 // Name: Derek Gallardo  
 4 // Date: July 3rd, 2022  
 5 // Version: 1.0.0  
 6 // Programming Language: Java  
 7 // Java Version: 17  
 8 // Description: Calculate the trajectory of a projectile based on launch angles and launch velocities.   
 9 // It will create a matrix of all of the possible trajectories as well as the trajectories to help a team hit the target range.   
10 //  
11 //\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
12   
13 import java.util.\*;  
14 import java.io.\*;  
15   
16 public class ProjectTester {  
17   
18 private static String inputFile = "input.txt";  
19   
20 private static int[] getArrayInt(int number, Scanner input) {  
21   
22 int[] array = new int[number];  
23   
24 for (int i = 0; i < number; i++)  
25 array[i] = input.nextInt();  
26   
27 return array;  
28 }  
29   
30 public static void main (String[] args) throws Exception {  
31   
32   
33 Scanner input = new Scanner(new File(inputFile));  
34 int setList = input.nextInt();  
35   
36 for (int i = 0; i < setList; i++) {  
37   
38 int[] speed = getArrayInt(input.nextInt(), input);  
39   
40 int[] angles = getArrayInt(input.nextInt(), input);  
41   
42 Trebuchet trebuchet = new Trebuchet(speed, angles);  
43   
44 trebuchet.trebuchetTable();  
45   
46 double minTraj = input.nextFloat();  
47   
48 double maxTraj = input.nextFloat();  
49   
50 // List Best Traj Values  
51 System.out.println(" ");  
52 System.out.println("Best Trajectory values: ");  
53 List<String> bestTrajValues = trebuchet.getTrajValues(minTraj, maxTraj);  
54   
55 for (String value : bestTrajValues) {  
56 System.out.print(value + " ");  
57 }  
58 System.out.println(" ");  
59   
60   
61   
62 // input.close();   
63   
64 }   
65   
66 }  
67   
68 }

1 import java.util.\*;  
 2   
 3 public class Trebuchet {  
 4   
 5   
 6 // Private variables for array elements  
 7 private int[] speedElements;  
 8 private int[] angleElements;  
 9 private double[][] traj;  
10   
11 // Trebuchet Constructor  
12 public Trebuchet( int[] speedElements, int[] angleElements ) {  
13   
14 this.speedElements = Arrays.copyOf(speedElements, speedElements.length);  
15 this.angleElements = Arrays.copyOf(angleElements, angleElements.length);  
16 this.traj = new double[this.speedElements.length][this.angleElements.length];  
17   
18 // Include Traj Calculation  
19 calculateTraj();  
20   
21 }  
22   
23 // Get Traj values of Trebuchet  
24   
25 private double getTraj(int trajSpeed, int trajAngle) {  
26   
27 double trajDistance;  
28 trajDistance = Math.pow(trajSpeed,2) \* Math.sin(2 \* Math.toRadians(trajAngle)) / 9.8;  
29 return trajDistance;  
30 }  
31   
32 // Calculate Traj of Trebuchet  
33   
34 private void calculateTraj() {  
35   
36 for (int col = 0; col < this.speedElements.length; col++) {  
37 for (int row = 0; row < this.angleElements.length; row++) {  
38 this.traj[col][row] = getTraj(this.speedElements[col], this.angleElements[row]);  
39 }  
40 }  
41   
42 }  
43   
44 // Print the Trebuchet Table  
45   
46 public void trebuchetTable() {  
47   
48 int angleNumbers = this.angleElements.length;  
49   
50 System.out.print("\n");  
51 System.out.print("Projectile Table");  
52   
53 System.out.print("\n");  
54 System.out.println("------------------------------");  
55   
56 System.out.print(String.format("\n%-10s", "Speed"));  
57 for (int i = 0; i < angleNumbers; i++) {  
58 System.out.print(String.format("%16d deg", this.angleElements[i]));  
59 }  
60   
61 for (int i = 0; i < this.speedElements.length; i++) {  
62 System.out.print(String.format("\n%10d", this.speedElements[i]));  
63   
64 for (int j = 0; j < angleNumbers; j++) {  
65 System.out.print(String.format("%20.3f", this.traj[i][j]));  
66 }   
67 }   
68 }   
69   
70 // Get List of Trebuchet Values  
71   
72 public List<String> getTrajValues(double min, double max) {  
73 List<String> pairs = new ArrayList<String>();  
74   
75 for (int i = 0; i < this.speedElements.length; i++) {  
76 for (int j = 0; j < this.angleElements.length; j++) {  
77   
78 if ((min <= this.traj[i][j]) && (this.traj[i][j] <= max))  
79 pairs.add(this.speedElements[i] + " " + this.angleElements[j]);  
80   
81 }  
82 }  
83   
84 System.out.println("------------------------------");  
85   
86 if (!pairs.isEmpty()) {  
87 return pairs;  
88 } else {  
89 return pairs;   
90 }  
91   
92 }  
93 }