import java.util.Scanner;

class Q6

{

static double p[][];//stores positions of all the balls

static double v[][];//stores velocities of all balls

static double d[];//distance travelled by each ball since beginning of time

static int i,j;//used as counters on iterations

public static void main(String args[])

{

final double div=100000;//number of time divisions considered to animate

Scanner sc=new Scanner(System.in);//scanner for input

double x,y;//temporary variables to store x and y co-ordinates

System.out.println("Enter number of balls");

int n=sc.nextInt();

System.out.println("Enter radius of balls");

double r=sc.nextDouble();

//memory allocation

p=new double[n][2];

v=new double[n][2];

d=new double[n];

System.out.println("Enter duration");

double dur=sc.nextDouble();

System.out.println("Enter ball number");

int b=sc.nextInt();

System.out.println("Enter pitions and velocities of balls");

for(i=0;i<n;i++)

{

p[i][0]=sc.nextDouble();

p[i][1]=sc.nextDouble();

v[i][0]=sc.nextDouble();

v[i][1]=sc.nextDouble();

}

for(double t=0;t<=dur;t+=dur/div)//time loop

{

for(i=0;i<n;i++)//loop to check collisions with walls

{

if(p[i][0]+r>=100 || p[i][0]+r<=0)

v[i][0]=-v[i][0];

if(p[i][1]+r>=100 || p[i][1]+r<=0)

v[i][1]=-v[i][1];

}

//loop to chek inter-ball collission

for(i=0;i<n;i++)//loop to select ball 1

{

for(j=i+1;j<n;j++)//loop to select ball 2

{

if(distance(p[i][0],p[i][1],p[j][0],p[j][1])<=2\*r)

collide(i,j);//function to process collisions

}

}

for(i=0;i<n;i++)//loop to update all balls

{

x=v[i][0]\*dur/div;//dx

y=v[i][1]\*dur/div;//dy

d[i]+=Math.sqrt(x\*x+y\*y);//distance addition over small time dt (Rectification Integration ;) )

//updating

p[i][0]+=x;

p[i][1]+=y;

}

}

double s=d[b-1]/dur;//computing average speed

System.out.println(s>=(Math.floor(s)+0.5)?Math.ceil(s):Math.floor(s));//rounding off to nearest integer and printing

}

static double distance(double x1,double y1,double x2,double y2)

{

return Math.sqrt((x1-x2)\*(x1-x2)+(y1-y2)\*(y1-y2));//distance formula (Expecting atleast this much from participants)

}

static void collide(int b1,int b2)

{

//temporary variables

double ux1=v[b1][0];

double uy1=v[b1][1];

double ux2=v[b2][0];

double uy2=v[b2][1];

// Hers's all the Physics :|

double theta=Math.atan2(p[b2][1]-p[b1][1],p[b2][0]-p[b1][0]);

v[b1][0]=(uy2\*Math.sin(theta)+ux2\*Math.cos(theta))\*Math.cos(theta)-

(uy1\*Math.cos(theta)-ux1\*Math.sin(theta))\*Math.sin(theta);

v[b1][1]=(uy2\*Math.sin(theta)+ux2\*Math.cos(theta))\*Math.sin(theta)+

(uy1\*Math.cos(theta)-ux1\*Math.sin(theta))\*Math.cos(theta);

v[b2][0]=(uy1\*Math.sin(theta)+ux1\*Math.cos(theta))\*Math.cos(theta)-

(uy2\*Math.cos(theta)-ux2\*Math.sin(theta))\*Math.sin(theta);

v[b2][1]=(uy1\*Math.sin(theta)+ux1\*Math.cos(theta))\*Math.sin(theta)+

(uy2\*Math.cos(theta)-ux2\*Math.sin(theta))\*Math.cos(theta);

}

}