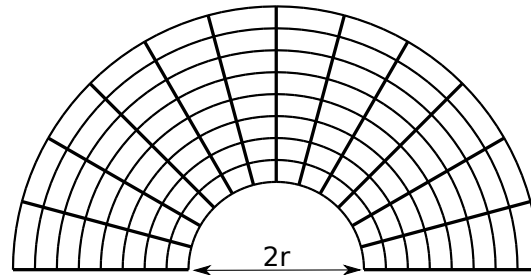


## Amphitheatre

X03147\_en

Measharans like to attend plays and concerts which take place in amphitheatres. Artists perform on a stage, which is a semicircle of radius  $r$  meters. Guests take their places in rows, which are concentric semicircles around the stage;  $i$ -th row has a radius of  $r + (i - 1)$  meters. Each row is divided into  $d$  equal sectors.



It is possible to move in two ways: move along a row (clockwise or counter-clockwise), at a speed of  $v_r$  meters per minute; or along one of  $d + 1$  sector boundaries, at a speed of  $v_d$  (downwards, i.e., towards the stage) or  $v_u$  (upwards) meters per minute.

The amphitheatres are planning to create an online system for booking seats. However, when booking for a group, it is sometimes impossible to make all the group sit together, but it is important to make it easy for the group members to reach each other. Your task is to calculate the time required to travel between two given seats.

### Input

Input consists of several cases. Each case is a single line containing nine integers:  $r$  (radius of the stage),  $d$  (number of sectors),  $v_r$ ,  $v_d$ ,  $v_u$  (speeds, as defined above),  $s_1$  (the row number of the first seat),  $\phi_1$  (the position of the first seat on the semicircle, given in degrees),  $s_2$ ,  $\phi_2$  (row number and position of the second seat). We have  $1 \leq r \leq 1000$ ,  $1 \leq d \leq 1000$ ,  $1 \leq v_r, v_d, v_u \leq 100$ ,  $1 \leq s_1, s_2 \leq 1000$ ,  $0 \leq \phi_1, \phi_2 \leq 180$ .

Input ends with a line containing 9 zeros.

### Output

For each input case output a single number – the number of minutes required to travel from the first seat to the second seat, rounded to exactly three decimal places.

#### Sample input 1

```
100 12 3 7 5 1 0 1 180
100 12 3 7 5 1 90 11 90
100 12 3 7 5 11 90 1 90
100 12 3 7 5 2 70 1 70
1 12 100 100 100 1 0 1 1
1 12 10 10 10 1 0 1 1
0 0 0 0 0 0 0 0 0
```

#### Sample output 1

```
104.720
2.000
1.429
5.990
0.000
0.002
```

In the first case, we need to traverse the whole first row, which is a semicircle of radius 100. The speed is 3 m/min, so we need  $100\pi/3$  minutes.

In the second case, we are sitting at a sector boundary, so it is enough to climb 10 meters at speed 5 m/min. The third case is similar, except that we are descending now.

In the fourth case, we are not able to climb directly, since we are not sitting at a degree boundary. We need to go 5 degrees to the sector boundary (at 75 degrees), climb 1 meter, and go 5 degrees back.

The last two cases return very small values.

### **Problem information**

Author: Eryk Kopczynski

Generation: 2026-01-25T13:23:08.762Z

© *Jutge.org*, 2006–2026.

<https://jutge.org>