Problem 2

Magnificent Views   [Novice teams only]

3 points

JAVA: program name must be prob02.class
C /C++ program name must be: prob02.exe

Task Description

A telescope is typically composed of two optical elements: the primary or objective, which is usually a large lens or curved mirror, and the eyepiece. The objective is mounted securely in a tube or truss and it is only removed for cleaning or transport. Eyepieces, however, are fitted into a focusing tube and can be easily swapped to provide different levels of magnification. The design of the eyepiece also determines its field of view, which is an angular measure of the width of the view in the eyepiece.

Write a program to compute magnification and true field of view for combinations of objectives and eyepieces. Magnification M is computed by dividing the focal length of the objective f_o by the focal length of the eyepiece f_e. Focal lengths are commonly specified in millimeters. True field of view F_T is computed by dividing the eyepiece's apparent field of view F_A by the magnification M. Field of view is commonly expressed in degrees.
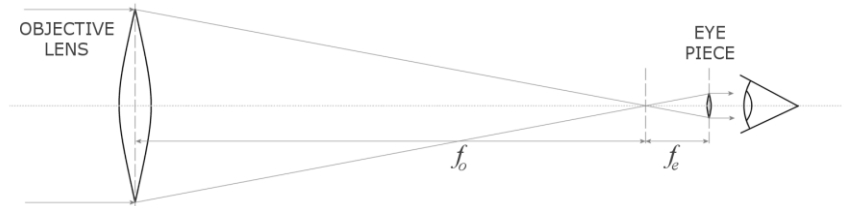
$$M = f_o / f_e$$
$$F_T = F_A / M$$

Program Input

The program will read a series of lines from the keyboard. The three numbers on each line represent, in order, the focal length of the objective, the focal length of the eyepiece, and the apparent field of view of the eyepiece. The program should exit when it reads an input line with three zeros.

```
1000 25 60
1000 7.9 55
750 15 65
500 12 66
1000 20 35
0 0 0
```

Program Output

The program must print the magnification and true field of view for each line of input. Results should be rounded to two places after the decimal. Rounding errors within +/- 0.01 will be accepted. Errors greater than +/- 0.01 will be judged incorrect.

```
40.00 1.50
126.58 0.43
50.00 1.30
41.67 1.58
50.00 0.70
```