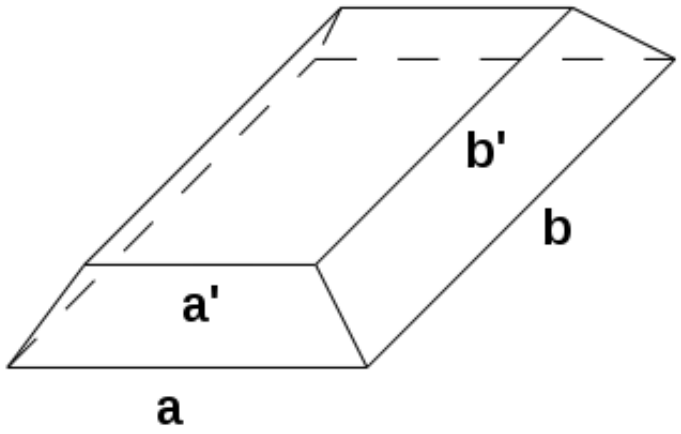
Golden bar volume

Submission deadline:	**2011-10-23 23:59:59**	462253.536 sec
Evaluation:	**0.0000**	
Max. assessment:	**3.0000** (Without bonus points)	
Submissions:	0 / 10 Free retries + 20 Penalized retries (-2 % penalty each retry)	
Advices:	0 / 2 Advices for free + 2 Advices with a penalty (-10 % penalty each advice)	

Your task is to develop a program which computes the volume of golden bars. This program may be very useful to you - as you study IT, you may get rich soon and it is helpful to have some tools to manage your treasury.

Golden bars have the shape of wooden washtub. The base is of rectangular or square shape. A golden bar is described using 5 numbers: `a`, `a'`, `b`, `b'`, and height `h`. The meaning is depicted below.



The input of your program is 5 rational numbers. The numbers represent the parameters of the golden bar. The program reads the numbers into variables, validates them, solves the volume, and prints it out. The expected output format is shown below.

If the input is invalid (e.g. input values are not rational numbers, are negative, or inconsistent), the program detects the problem and prints an error message. The format of the error message is again shown below. The following is considered invalid input:

- non-numeric value,
- invalid number (negative or zero),
- the size of the lower base `a` is smaller or equal to the size of the upper base `a'`,
- the same relation applies to bases `b` and `b'`.

If the program detects an error, it immediately stops asking for further input data, it prints out the error message and terminates. Thus, the program must validate input data as it reads them. Do not postpone the checks until entire input is read. The error message shall be printed on the standard output (do not send it to the standard error output).

Please strictly adhere the format of the output. The output must exactly match the output of the reference program. The comparison is done by a machine, the machine requires an exact match. If your program provides output different from the reference, the program is considered malfunctioning. Be very careful, the machine is sensitive event to whitespace characters (spaces, newlines, tabulators). Please note that all output lines are followed by a newline character (\n). This applies even to the last line of the output, moreover, this applies even to the error message. Download the enclosed archive. The archive contains a set of testing inputs and the expected outputs. Read FAQ to learn how to use input/output redirection and how to simplify testing of your programs.

Your program will be tested in a restricted environment. The testing environment limits running time and available memory. The exact time and memory limits are shown in the reference solution testing log. However, neither time nor memory limit could cause a problem in this simple program. Next, the testing environment prohibits the use of functions which are considered "dangerous"

(functions to execute other processes, functions to access the network, ...). If your program uses such functions, the testing environment refuses to execute the program. Your program may use something like the code below:

```
int main ( int argc, char * argv [] )
{

  ...

  system ( "pause" ); /* prevent program window from closing */
  return 0;
}
```

This will not work properly in the testing environment - it is prohibited to execute other programs. (Even if the function is allowed, this would not work properly. The program would infinitely wait for a key to be pressed, however, no one will press any key in the automated testing environment. Thus, the program would be terminated on exhausted time limit.) If you want to keep the pause for your debugging and you want the program to be accepted by the Progtest, use the following trick:

```
int main ( int argc, char * argv [] )
{

  ...

#ifndef __PROGTEST__
  system ( "pause" ); /* this is ignored by Progtest */
#endif /* __PROGTEST__ */
  return 0;
}
```

Sample program output:

```
Enter a and b:
10 20
Enter a' and b':
8 9
Enter h:
12
Volume: 1588.000000
```

```
Enter a and b:
20.5 10
Enter a' and b':
8 3
Enter h:
6
Volume: 599.500000
```

```
Enter a and b:
3 -1
Invalid input.
```

```
Enter a and b:
2 5
Enter a' and b':
1 0
Invalid input.
```

```
Enter a and b:
10 20
Enter a' and b':
```

```
10 30
Invalid input.
```

```
Enter a and b:
10 20
Enter a' and b':
5 xyz
Invalid input.
```

Advice:

- A golden bar has the shape of a truncated pyramid. The similarity is however, only an illusory. In the case of a truncated pyramid, the the upper rectangle is a scale of the base rectangle, i.e. `a/a' = b/b'`. In the case of the golden bar, the relation is not guaranteed. Therefore, the formula for truncated pyramid does not apply for the golden bar.
- Instead, divide the golden bar into primitive solids (a cuboid, 4 prisms and 4 pyramids) and sum their volume. Alternatively, integration or a Stirling approximation will provide correct formula.

Sample data: Download

Submit: [redacted] Submit

Reference