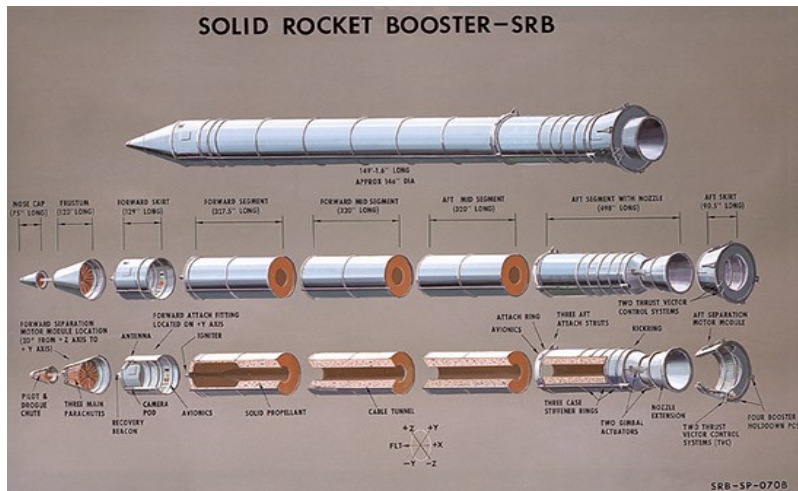


CS118 Programming Assignment

SRB2

According to NASA¹, the shuttle's solid rocket boosters are each 149.16 feet long and 12.17 feet in diameter. They each contain 1,100,000 pounds of propellant.



While you were working at NASA, the SRB manager asks you to figure what amount of propellant will be required if they change the dimensions of the booster. Write a Python program that computes the mass of propellant required for different lengths and diameters (both in feet) provided by the user. These values should be obtained from the user using the `raw_input()` function, **but you must verify that they are positive, non-zero values.**

Collect both values first. If both (hint: use a logical AND) are legitimate values, have the program finish the task; otherwise (hint: else) [if either or both value(s) is/are not legitimate] print out an error message indicating what was entered incorrectly (length and/or diameter). If both values are in error, then your program should display two error messages. After your error message(s) display, the program should come to an end. Do this by having the program run out of code to execute.

Assuming the user provides good values, collect a descriptive name from the user for the new values (such as “My New SRB Design”) and then compute the mass of propellant. For all calculations, assume the SRB is a perfect cylinder, and the density of the propellant is constant for all configurations of the booster.

Print a **nicely laid-out** summary of the original information and the user-provided information, including calculated values for both. To do this, use escape sequences (`\t`, `\n`) and format modifiers for placeholders. Use the user-provided description as the title for the user-provided column. Display the mass of propellant in the original and new configurations as pounds and kilograms. Report distances to two decimal places and masses as whole numbers. See the back for some example runs.

Constraints:

- Your program code must include your algorithm with code fitting steps of the algorithm.
- Make variables for every rocket attribute.
- Conversion factors should be stored in variables before being used.
- Your program must calculate all values from raw numbers – you cannot externally compute a value and use it in the program. All calculated values should be stored in appropriately-named variables.
- Use the built-in constant `pi` for the calculations.

Remember the 5-step process – Identify the inputs and outputs, then manually solve the problem. After you can do that, lay out the algorithm that follows the steps you took when you manually solved the problem. Make the program work with legitimate values first; then modify the program to handle illegitimate values.

¹ <http://science.ksc.nasa.gov/shuttle/technology/sts-newsref/srb.html>

Example program runs:

Run 1:

Length of SRB (feet): 175
Diameter of SRB (feet): 10
Describe: My New SRB Design

	Original Values	My New SRB Design
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Length	149.16 feet	175.00 feet
Diameter	12.17 feet	10.00 feet
Propellant (lb)	1100000 lb	871359 lb
Propellant (kg)	500000 kg	396072 kg

Run 2:

Length of SRB (feet): -25.7
Diameter of SRB (feet): 10
ERROR!! Length is not a positive value!!
--> Terminating program...

Run 3:

Length of SRB (feet): 0
Diameter of SRB (feet): -2.5
ERROR!! Length is not a positive value!!
ERROR!! Diameter is not a positive value!!
--> Terminating program...

Run 4:

Length of SRB (feet): 50
Diameter of SRB (feet): 50
Describe: My New SRB Design

	Original Values	My New SRB Design
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Length	149.16 feet	50.00 feet
Diameter	12.17 feet	50.00 feet
Propellant (lb)	1100000 lb	6223994 lb
Propellant (kg)	500000 kg	2829088 kg