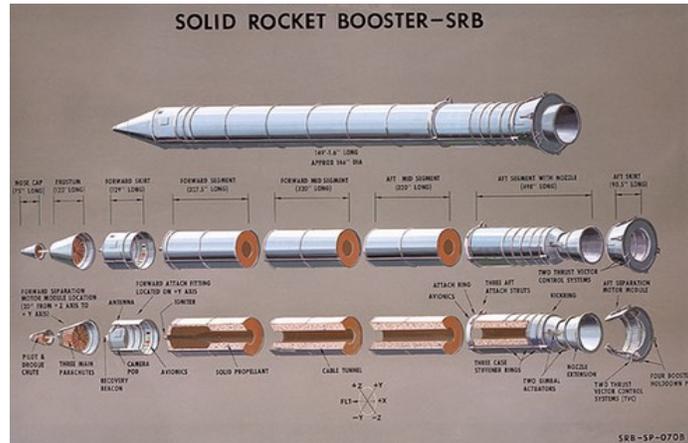


# CS118 Programming Assignment

## SRB3

According to NASA<sup>1</sup>, the shuttle's solid rocket boosters were each 149.16 feet long and 12.17 feet in diameter. They each contained 1,100,000 pounds of propellant.



While you are working at NASA, the SRB manager asks you to figure what amount of propellant would 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.

If the user puts in legitimate values continue with the rest of the program; otherwise, use a **while loop for each input** to repeatedly ask the user for the value again until s/he provides a positive value.

Once the user has provided good values (and not until), collect a descriptive name from the user describing how the new values are different (such as “Longer”, or “Bigger Diameter”, or “200% larger”).

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**.

Once you have that part of the program working correctly, modify the program so that it can repeat. After the calculation is complete and the results displayed, ask the user “Do you want to repeat the calculations? (Y/N)”. If the user replies “Y” (capitalized) or “y” (lowercase) then repeat the calculations. You may assume the user will enter only “Y”, “y”, “N”, or “n”.

See the back for 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 `math` module constant `pi` for the calculations.

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

## Run 1:

What is the new length (in feet)? 175  
What is the new diameter (in feet)? 10  
What do you want to call these new specs? Longer / Thinner

	Original Values	Longer / Thinner
	-----	-----
Length	149.16 feet	175.00 feet
Diameter	12.17 feet	10.00 feet
Propellant (lb)	1100000 lb	871359 lb
Propellant (kg)	499400 kg	395597 kg

Would you like to repeat the calculation? (Y/N) n

## Run 2:

What is the new length (in feet)? -25.7  
What is the new length (in feet)? 0  
What is the new length (in feet)? 31.5  
What is the new diameter (in feet)? 67  
What do you want to call these new specs? Really short

	Original Values	Really short
	-----	-----
Length	149.16 feet	31.50 feet
Diameter	12.17 feet	67.00 feet
Propellant (lb)	1100000 lb	7040756 lb
Propellant (kg)	499400 kg	3196503 kg

Would you like to repeat the calculation? (Y/N) y

What is the new length (in feet)? 131.5  
What is the new diameter (in feet)? 67  
What do you want to call these new specs? Pretty fat!

	Original Values	Pretty fat!
	-----	-----
Length	149.16 feet	131.50 feet
Diameter	12.17 feet	67.00 feet
Propellant (lb)	1100000 lb	29392363 lb
Propellant (kg)	499400 kg	13344133 kg

Would you like to repeat the calculation? (Y/N) n