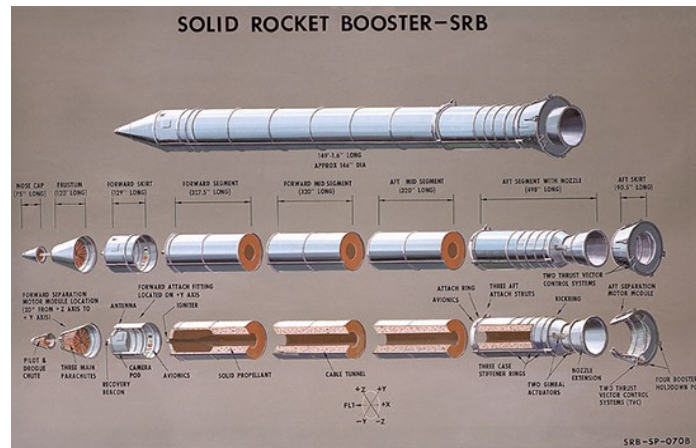


# CS118

## SRB3

According to NASA<sup>1</sup>, 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 are 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 Python3 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 `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 numeric input to repeatedly ask the user for the value again until s/he provides a positive value.

Once the user has provided good values, collect a descriptive name from the user for the new values.

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. 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 and only those variables 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 `math.pi` for the calculations.

Have the program ask the user if s/he wishes to repeat as "Do you wish to run this program again? ". Should the user answer "Yes" (in any uppercase, lowercase, or mixed case) or "Y" (in uppercase or lowercase) have the program execute again – do this using a **WHILE** loop. [Remember to avoid the Taboo items!] You will probably want to refresh your memory of the string methods `upper()` and `lower()`. Each time before the code begins collecting new inputs, be sure to clear the Spyder console.

Length of SRB (feet): 175

Diameter of SRB (feet): 10

Describe the change in dimensions: 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)	500000 kg	396072 kg

Do you want to repeat the calculations (Yes/No)? YES

Length of SRB (feet): -25.7

Length of SRB (feet): 0

Length of SRB (feet): 31.5

Diameter of SRB (feet): 67

Describe the change in dimensions: 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)	500000 kg	3200344 kg

Do you want to repeat the calculations (Yes/No)? yes

Length of SRB (feet): -25.7

Length of SRB (feet): 0

Length of SRB (feet): 31.5

Diameter of SRB (feet): 67

Describe the change in dimensions: 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)	500000 kg	3200344 kg

Do you want to repeat the calculations (Yes/No)? yeS

Length of SRB (feet): 50

Diameter of SRB (feet): 50

Describe the change in dimensions: Short & Squat

	Original Values	Short & Squat
	-----	-----
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

Do you want to repeat the calculations (Yes/No)? no