

Biology Challenge #5

In the previous challenge, you wrote a Python program that used the genetic code to translate RNA into proteins, which are strings of amino acids. In this challenge, you'll write a Python program that calculates the mass of any protein entered by the user.

Take a look at this table, which lists all twenty amino acids and some information about them:

Amino Acid	Short	Abbrev.	Formula	Mon. Mass§ (Da)	Avg. Mass (Da)
<u>Alanine</u>	A	Ala	C ₃ H ₅ NO	71.03711	71.0779
<u>Cysteine</u>	C	Cys	C ₃ H ₅ NOS	103.00919	103.1429
<u>Aspartic acid</u>	D	Asp	C ₄ H ₅ NO ₃	115.02694	115.0874
<u>Glutamic acid</u>	E	Glu	C ₅ H ₇ NO ₃	129.04259	129.1140
<u>Phenylalanine</u>	F	Phe	C ₉ H ₉ NO	147.06841	147.1739
<u>Glycine</u>	G	Gly	C ₂ H ₃ NO	57.02146	57.0513
<u>Histidine</u>	H	His	C ₆ H ₇ N ₃ O	137.05891	137.1393
<u>Isoleucine</u>	I	Ile	C ₆ H ₁₁ NO	113.08406	113.1576
<u>Lysine</u>	K	Lys	C ₆ H ₁₂ N ₂ O	128.09496	128.1723
<u>Leucine</u>	L	Leu	C ₆ H ₁₁ NO	113.08406	113.1576
<u>Methionine</u>	M	Met	C ₅ H ₉ NOS	131.04049	131.1961
<u>Asparagine</u>	N	Asn	C ₄ H ₆ N ₂ O ₂	114.04293	114.1026
<u>Pyrrolysine</u>	O	Pyl	C ₁₂ H ₁₉ N ₃ O ₂	237.14773	237.2982
<u>Proline</u>	P	Pro	C ₅ H ₇ NO	97.05276	97.1152
<u>Glutamine</u>	Q	Gln	C ₅ H ₈ N ₂ O ₂	128.05858	128.1292
<u>Arginine</u>	R	Arg	C ₆ H ₁₂ N ₄ O	156.10111	156.1857
<u>Serine</u>	S	Ser	C ₃ H ₅ NO ₂	87.03203	87.0773
<u>Threonine</u>	T	Thr	C ₄ H ₇ NO ₂	101.04768	101.1039
<u>Selenocysteine</u>	U	Sec	C ₃ H ₅ NOSe	150.95364	150.0489
<u>Valine</u>	V	Val	C ₅ H ₉ NO	99.06841	99.1311
<u>Tryptophan</u>	W	Trp	C ₁₁ H ₁₀ N ₂ O	186.07931	186.2099
<u>Tyrosine</u>	Y	Tyr	C ₉ H ₉ NO ₂	163.06333	163.1733

When we calculate the mass of a protein, we sum up the **monoisotopic masses** of each amino acid in the protein. In the table above, the column labeled “Mon. Mass§ (Da)” lists the monoisotopic mass of each amino acid. The units **Da** stand for **dalton**, which is the standard unit of measurement for representing mass at atomic scale.

Your challenge is to write a Python program that accepts any protein from the user and calculates its correct mass, in daltons. For example, if your program is given the protein:

MAGRET

It should calculate the sum:

$131.04049 + 71.03711 + 57.02146 + 156.10111 + 129.04259 + 101.04768$

then tell the user:

This protein's mass is 645.29044 Da.

Don't forget that your program should allow the user to input any protein they want. As with the previous challenge, you may find a Python dictionary useful in helping you solve this challenge.