

Planning a Lunch on Mars

Guidelines

If you go to Mars, you will need to consider nutritional requirements, packaging and other waste, and mass requirements.

First, consider nutritional requirements. For a balanced meal that provides the substances that your body needs to stay healthy, you need to eat something from each of the 4 basic food groups: breads/cereals, fruits/vegetables, dairy products, and meat/fish/protein. You also need to stay hydrated, so you must include a fluid (drink).

Then you need to consider how much waste will be left over from your meal. This includes any packages the food or drinks came in as well as any food or parts of food, such as apple cores or orange peels, that are not eaten. The mass of your waste should be less than 57 grams.

You must consider the mass of your lunch. Did you know that NASA estimates it will cost just over \$100 per gram to send stuff to Mars? So, in order to keep costs down, the total mass of your food and liquid must be less than 568 grams. You must also include at least 236 milliliters, which is about 8 fluid ounces, of fluid in that total.

Finally, you need to put your meal in a package. Remember that you need to minimize waste and mass. Consider using a 1- gallon ziplock bag for your container. The bag can be folded to take up less space on the ship and it has a mass of about 10 grams. If you decide to use a different container, you must find its mass.

So, to get the mass of each of the items in your lunch, you will have to do one of the following:

1. Use a kitchen scale (if you have one)
2. Look on the package the food came in to find the serving size. You might have to do some math (see hint #3 below)
3. Look online to see if you can find an approximate mass in grams

Helpful Hints for Calculating the Mass of Food

Hint #1

If the mass of your food or serving size is given in ounces, you can convert to grams.

1 ounce = 28.35 grams

So, if you have the mass in ounces, you multiply that by 28.35 to get the mass in grams.

Hint #2

In the metric system, the mass would be measured in grams and the liquid volume measured in milliliters or liters. The English measurement system is a little weird in that “ounces (oz)” are a measurement of both mass and liquid volume. They are not the same. Interestingly, a fluid ounce of water has a mass of 1.043 ounces, not counting the bottle. You can use this value for any juices or sodas since they are mostly made of water. To convert fluid ounces of a mostly water drink to grams, you would multiply fluid ounces by 29.57. Remember to add the mass of the bottle or container.

Hint #3

Some foods may not list the mass by serving size on the package. Instead, they have the total mass of the package and the number of servings in a package. To get the mass of your serving, you need to divide the total mass listed on the package by the number of servings. Remember, this assumes you are eating a serving size. So, if you put double cheese on your sandwich, be sure to double that mass! Same with your slices of bread; be sure to check the serving size.