

## **Lunch on Mars Planning Guidelines**

If you go to Mars, you will need to consider nutritional requirements, packaging and other waste, and weight 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 weight of your waste should be less than 2 ounces.

You must consider the weight of your lunch. Did you know that NASA estimates it will cost just over \$2800 per ounce to send stuff to Mars? So, in order to keep costs down, the total weight of your food and liquid must be less than 20 ounces. You must also include at least 8 ounces, by weight, of fluid in that total.

Finally, you need to put your meal in a package. Remember that you need to minimize waste and weight. The total weight of your container that holds all your food must be less than 2 ounces. 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 weighs 0.3 ounces. If you decide to use a different container, you must find its weight.

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

1. Weigh it using a kitchen scale (if your parents 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 weight

## **Helpful Hints for Calculating the Weight of Food**

### **Hint #1:**

In the metric system, the weight 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 weight and liquid volume. They are not the same. Interestingly, a fluid ounce of water weighs 1.043 ounces, not counting the bottle. You can use this value for any juices or sodas since they are mostly made of water. So, to calculate the weight of 12 ounces of water, I would multiply  $1.043 \times 12$  and remember to add the weight of the bottle or container. A 6 fluid ounce juice box weighs 8 ounces including the box.

### **Hint #2:**

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

1 gram = 0.0353 ounces (weight)

So, if you have the weight in grams, you multiply that by 0.0353 to get the weight in ounces.

### **Hint #3:**

Some foods may not list the weight by serving size on the package. Instead they have the total weight of the package and the number of servings in a package. To get the weight of your serving, you need to divide the total weight 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 weight! Same with your slices of bread; be sure to check the serving size.