Activity 8:
Dehydrating Food for Space Flight

Objective
Determine the percentage of water reduction by dehydrating fresh food items.

Science Standards
- **Science as Inquiry:** Abilities necessary to do scientific inquiry
- **Science in Personal and Social Perspectives:** Personal Health

Mathematics Standards
- **Measurement**
- **Computation**

Materials Needed
Vegetables: fresh green beans
Fruits: fresh apples, peaches, grapes, strawberries, or bananas
Food dehydrator
Balance
Weights
Plastic zip-locking sandwich bags

Background
Freeze-drying and other drying methods remove most of the water in foods. This food type (once rehydrated) provides a more solid-type diet and adds variety to the space flight menu.

Onboard the Space Shuttle, dehydrated foods and drinks make up a significant part of the menu selection. The major reason for using these dehydrated foods and drinks is because water is produced by the fuel cells as a byproduct, making water abundantly available for Space Shuttle food preparation. A significant weight reduction is achieved by rehydratable food and drinks.

For the ISS, electrical energy requirements are best met by using a renewable energy source. Solar arrays, which convert solar energy into electrical energy, do not produce water as a byproduct. The ISS food manifest has reduced the amount of food rehydratables significantly. Drinks, however, are still best handled in a rehydratable package for storage ease.

Procedure
1. Weigh the fruit or vegetable.
2. Cut up the food into small slices or pieces.
3. Place in the food dehydrator, and dehydrate.
4. Remove from the dehydrator, and allow to cool before weighing by placing in a plastic sandwich bag (so no moisture will be reabsorbed).
5. Weigh dehydrated food, being careful to subtract the weight of the empty zip-locking plastic bag.
6. Calculate the percentage of moisture lost in the food sample using the equation:

$$\% \text{ Moisture Loss} = \frac{\text{original mass} - \text{dehydrated mass}}{\text{original mass}} \times 100$$

Extension
Explore the rehydratability of different commercial food products obtained from camping of grocery stores. Weigh a known amount of dehydrated food, and place in a container of ambient water. Allow the food to completely rehydrate. Remove the food from the container, and blot dry. Weigh the rehydrated food product, and calculate the percentage of rehydration:

$$\% \text{ Rehydration} = \frac{\text{gain in mass} + \text{original mass}}{\text{original mass}} \times 100$$

Assessment
The students will write procedures for dehydrating fruit and vegetables.