Activity 4: Classifying Space Food

**Objective**
To classify the space food manifested on the Space Shuttle or International Space Station food lists into the major food groups found in the Food Pyramid Guide.

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

**Materials Needed**
Baseline Space Shuttle Food and Beverage List (Appendix A)
International Space Station Daily Menu Food List (Appendix B)
USDA Food Guide Pyramid (Appendix G)

**Background**
The Food Guide Pyramid has been established to help people maintain a diet that is adequate in nutritional value. Maintaining good health in space is important, and to help do this, a good diet is imperative. Balanced meals of good nutritional food will help ensure that the astronauts will be able to perform their jobs in space.

The U.S. Department of Agriculture (USDA) has made recommendations for a healthy diet. Foods are grouped according to the nutrients they provide. Many foods, such as corn, are hard to place into a specific group. Sweet corn can be counted as a starchy vegetable, but corn tortillas are in the grain group. Dry beans and peas (legumes) can be counted as either a starchy vegetable or a meat.

The following is a web site that can be used to obtain more indepth information about the Food Guide Pyramid and nutrition:
http://www.usda.gov/fcs/cnpp/using.htm

**Food Groups and Suggested Daily Servings Chart**

<table>
<thead>
<tr>
<th>Food Groups</th>
<th>Suggested Daily Servings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain (Bread, Cereal, Rice, and Pasta)</td>
<td>6 to 11 servings</td>
</tr>
<tr>
<td>Fruit</td>
<td>2 to 4 servings</td>
</tr>
<tr>
<td>Vegetable</td>
<td>3 to 5 servings</td>
</tr>
<tr>
<td>Meat (Meats, Poultry, Fish, Eggs, and Nuts)</td>
<td>2 to 3 servings</td>
</tr>
<tr>
<td>Dairy (Milk, Yogurt, and Cheese)</td>
<td>2 to 3 servings</td>
</tr>
<tr>
<td>Oil</td>
<td>Use sparingly</td>
</tr>
<tr>
<td>(Fats and Sweets)</td>
<td></td>
</tr>
</tbody>
</table>

**Procedure**
Using the Baseline Space Shuttle Food and Beverage List or the International Space Station Daily Menu Food List, classify the foods into the major groups as shown above.

**Discussion**
1. Which foods did you find that can fit into more than one food group?
2. In your opinion, which food group had the better selection of foods?
3. Why is it important to maintain good health in space?
4. How does a balanced diet maintain good health?
**Extensions**

1. Have the class design their own ISS food menu for a 30-day crew rotation or Space Shuttle food menu for a 7-day rotation. Have them analyze how many times a particular food or drink item was served and if some items were served in combination with another (such as fish always served with french fries). Avoid monotonous or repetitive selection by increasing the variety of food choices.

2. Using a computer, create a data base file. Design a data base template that includes fields such as day (1, 2, 3, etc.), meal (breakfast, lunch, dinner, and a possible snack), and the six major food groups (grain, vegetable, fruit, dairy, meat, and oil). Enter the information from the menus and determine which meals are balanced ones by searching for any empty fields in the food groups.

**Assessment**

The students will compare and contrast their findings.
## Appendix A: Baseline Space Shuttle Food and Beverage List

### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/S</td>
<td>Artificial Sweetener</td>
<td>Chicken, Teriyaki (R)</td>
</tr>
<tr>
<td>(B)</td>
<td>Beverage</td>
<td>Cookies,</td>
</tr>
<tr>
<td>(FF)</td>
<td>Fresh Food</td>
<td>Butter (NF)</td>
</tr>
<tr>
<td>(IM)</td>
<td>Intermediate Moisture</td>
<td>Shortbread (NF)</td>
</tr>
<tr>
<td>(I)</td>
<td>Irradiated</td>
<td>Crackers, Butter (NF)</td>
</tr>
<tr>
<td>(NF)</td>
<td>Natural Form</td>
<td>Eggs, Scrambled (R)</td>
</tr>
<tr>
<td>(R)</td>
<td>Rehydratable</td>
<td>Mexican Scrambled (R)</td>
</tr>
<tr>
<td>(T)</td>
<td>Thermostabilized</td>
<td>Seasoned Scrambled (R)</td>
</tr>
</tbody>
</table>

- **Beef w/BBQ Sauce (T)**
- **Beef, Dried (IM)**
- **Beef Patty (R)**
- **Beef Steak (I)**
- **Beef Stroganoff w/Noodles (R)**
- **Beef, Sweet n Sour (T)**
- **Beef Tips w/Mushrooms (T)**
- **Bread (FF)**
- **Breakfast Roll (FF)**
- **Brownies (NF)**

- **Candy**
  - Coated Chocolates (NF)
  - Coated Peanuts (NF)
  - Gum (NF)
  - Life Savers (NF)

- **Cereal**
  - Bran Chex (R)
  - Cornflakes (R)
  - Granola (R)
  - Granola w/Blueberries (R)
  - Granola w/Raisins (R)
  - Grits w/Butter (R)
  - Oatmeal w/Brown Sugar (R)
  - Oatmeal w/Raisins (R)
  - Rice Krispies (R)

- **Cheddar Cheese Spread (T)**

- **Chicken**
  - Chicken, Grilled (T)
  - Chicken Salad Spread (T)
  - Chicken, Sweet n Sour (R)

- **Cheddar Cheese Spread (T)**

- **Chicken**
  - Chicken, Grilled (T)
  - Chicken Salad Spread (T)
  - Chicken, Sweet n Sour (R)

- **Cheddar Cheese Spread (T)**

- **Chicken**
  - Chicken, Grilled (T)
  - Chicken Salad Spread (T)
  - Chicken, Sweet n Sour (R)

- **Granola Bar (NF)**

- **Ham (T)**
  - Ham Salad Spread (T)

- **Jelly**
  - Apple (T)
  - Grape (T)

- **Macaroni and Cheese (R)**

- **Noodles and Chicken (R)**

- **Peach Ambrosia (R)**
  - Peaches, Diced (T)
  - Peaches, Dried (IM)

- **Pears, Diced (T)**
  - Pears, Dried (IM)

- **Pineapple (T)**
  - Strawberries (R)

- **Strawberry (T)**
  - Trail Mix (IM)
Nuts,
  Almonds (NF)
  Cashews (NF)
  Macadamia (NF)
  Peanuts (NF)
  Trail Mix (IM)

Peanut Butter (T)

Potatoes au Gratin (R)

Puddings,
  Banana (T)
  Butterscotch (T)
  Chocolate (T)
  Tapioca (T)
  Vanilla (T)

Rice and Chicken (R)
Rice Pilaf (R)

Salmon (T)

Sausage Patty (R)

Shrimp Cocktail (R)

Soups,
  Chicken Consomme (B)
  Mushroom (R)
  Rice and Chicken (R)

Spaghetti w/Meat Sauce (R)

Tortillas (FF)

Tuna,
  Tuna (T)
  Tuna Salad Spread (T)

Turkey,
  Turkey Salad Spread (T)
  Turkey, Smoked (I)
  Turkey Tetrazzini

Vegetables,
  Asparagus (R)
  Broccoli au Gratin (R)
  Carrot Sticks (FF)
  Cauliflower w/Cheese (R)
  Celery Sticks (FF)
  Green Beans and Broccoli (R)
  Green Beans/Mushrooms (R)
  Italian (R)
  Spinach, Creamed (R)
  Tomatoes and Eggplant (T)

**Beverages (B)**

Apple Cider

Cherry Drink w/A/S

Cocoa

Coffee,
  Black
  w/A/S
  w/Cream
  w/Cream and A/S
  w/Cream and Sugar
  w/Sugar

Coffee (Decaffeinated),
  Black
  w/A/S
  w/Cream
  w/Cream and A/S
  w/Cream and Sugar
  w/Sugar

Coffee (Kona),
  Black
  w/A/S
  w/Cream
  w/Cream and A/S
  w/Cream and Sugar
  w/Sugar

Grape Drink
Grape Drink w/A/S

Grapefruit Drink

Instant Breakfast,
  Chocolate
  Strawberry
  Vanilla

Lemonade
Lemonade w/A/S

Lemon-Lime Drink

Orange Drink
Orange Drink w/A/S
Orange-Grapefruit Drink
Orange Juice
Orange-Mango Drink
Orange-Pineapple Drink
Peach-Apricot Drink

Pineapple Drink

Strawberry Drink

Tea,
  Plain
  w/A/S
  w/Cream
  w/Lemon
  w/Lemon & A/S
  w/Lemon & Sugar
  w/Sugar

Tropical Punch
Tropical Punch w/A/S

**Condiments**

- Catsup (T)
- Mayonnaise (T)
- Mustard (T)
- Pepper (Liquid)
- Salt (Liquid)
- Tabasco Sauce (T)
- Taco Sauce (T)
## Appendix B: International Space Station
### Daily Menu Food List

<table>
<thead>
<tr>
<th>Refrigerated</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dairy</strong></td>
<td>Chicken, pot pie</td>
</tr>
<tr>
<td></td>
<td>Chicken, stir fried with diced red pepper</td>
</tr>
<tr>
<td></td>
<td>Chicken, teriyaki with spring vegetables</td>
</tr>
<tr>
<td></td>
<td>Duck, roasted</td>
</tr>
<tr>
<td></td>
<td>Meatball, porcupine (turkey)</td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td>Pork:</td>
</tr>
<tr>
<td></td>
<td>Bacon</td>
</tr>
<tr>
<td></td>
<td>Bacon, Canadian</td>
</tr>
<tr>
<td></td>
<td>Ham, baked with candied yams</td>
</tr>
<tr>
<td></td>
<td>Pork, chop, baked with potatoes au gratin</td>
</tr>
<tr>
<td></td>
<td>Pork, sausage, patties</td>
</tr>
<tr>
<td></td>
<td>Pork, sweet and sour with rice</td>
</tr>
<tr>
<td><strong>Frozen</strong></td>
<td>Seafood:</td>
</tr>
<tr>
<td></td>
<td>Fish, baked</td>
</tr>
<tr>
<td></td>
<td>Fish, grilled</td>
</tr>
<tr>
<td></td>
<td>Fish, saut ed</td>
</tr>
<tr>
<td></td>
<td>Lobster, broiled tails</td>
</tr>
<tr>
<td></td>
<td>Scallops, baked</td>
</tr>
<tr>
<td></td>
<td>Seafood, gumbo with rice</td>
</tr>
<tr>
<td></td>
<td>Shrimp, cocktail</td>
</tr>
<tr>
<td></td>
<td>Tuna, noodle casserole</td>
</tr>
<tr>
<td><strong>Meat and Eggs</strong></td>
<td>Eggs:</td>
</tr>
<tr>
<td></td>
<td>Egg, omelet, cheese</td>
</tr>
<tr>
<td></td>
<td>Egg, omelet, vegetable</td>
</tr>
<tr>
<td></td>
<td>Egg, omelet, ham</td>
</tr>
<tr>
<td></td>
<td>Egg, omelet, sausage</td>
</tr>
<tr>
<td></td>
<td>Egg, omelet, vegetable and ham</td>
</tr>
<tr>
<td></td>
<td>Egg, omelet, vegetable and sausage</td>
</tr>
<tr>
<td></td>
<td>Eggs, scrambled with bacon, hash browns sausage</td>
</tr>
<tr>
<td></td>
<td>Quiche, vegetable</td>
</tr>
<tr>
<td></td>
<td>Quiche, lorraine</td>
</tr>
<tr>
<td><strong>Pasta mixtures</strong></td>
<td>Pasta mixtures:</td>
</tr>
<tr>
<td></td>
<td>Lasagna, vegetable with tomato sauce</td>
</tr>
<tr>
<td></td>
<td>Noodles, stir fry</td>
</tr>
<tr>
<td></td>
<td>Spaghetti with meat sauce</td>
</tr>
<tr>
<td></td>
<td>Spaghetti with tomato sauce</td>
</tr>
<tr>
<td></td>
<td>Tortellini with tomato sauce, cheese</td>
</tr>
<tr>
<td>Category</td>
<td>Items</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Other:</td>
<td>Egg rolls, Enchilada, cheese with Spanish rice, Pizza, cheese, Pizza, meat, Pizza, vegetable, Pizza, supreme</td>
</tr>
<tr>
<td>Fruit</td>
<td>Apples, escalloped, Peaches, sliced with bananas, blueberries, Peaches with bananas, grapes, strawberries, Strawberries, sliced</td>
</tr>
<tr>
<td>Soups</td>
<td>Beef, stew, Broccoli, cream of, Chicken, cream of, Chicken noodle, Mushroom, cream of, Won ton</td>
</tr>
<tr>
<td>Grains</td>
<td>Biscuits, Bread, Cornbread, Dinner roll, Garlic bread, Sandwich bun, wheat/white, Toast, wheat/white, Tortilla</td>
</tr>
<tr>
<td>Breakfast items:</td>
<td>Cinnamon roll, French toast, Pancakes, buttermilk, Pancakes, apple cinnamon, Waffles</td>
</tr>
<tr>
<td>Pasta:</td>
<td>Fettuccine alfredo, Macaroni and cheese, Spaghetti</td>
</tr>
<tr>
<td>Rice:</td>
<td>Fried, Mexican/ Spanish, White</td>
</tr>
<tr>
<td>Starchy Vegetables</td>
<td>Corn, whole kernel, Potato, baked, Potatoes, escalloped, Potatoes, oven fried, Potatoes, mashed, Yams, candied, Succotash, Squash corn casserole</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Asparagus tips, Beans, green, Beans, green with mushrooms, Broccoli, Broccoli au gratin, Broccoli, Carrot coins, Cauliflower au gratin, Chinese vegetables, stir fry, Mushrooms, fried, Okra, fried, Peas, Peas with carrots, Squash, acorn with apple sauce and cinnamon, Zucchini, spears, fried</td>
</tr>
<tr>
<td>Desserts</td>
<td>Cakes: Angel food cake, Brownie, chocolate, Chocolate fudge, Shortcake, Yellow cake with chocolate frosting</td>
</tr>
<tr>
<td>Dairy:</td>
<td>Ice cream, chocolate, Ice cream, strawberry, Ice cream, vanilla, Yogurt, frozen</td>
</tr>
</tbody>
</table>
Pies and Pastry:
- Cheesecake, chocolate
- Cheesecake, plain
- Cobbler, peach
- Pie, apple
- Pie, coconut cream
- Pie, pecan
- Pie, pumpkin

Beverages
- Apple juice
- Grape juice
- Grapefruit juice
- Lemonade
- Orange juice

Condiments
- Margarine
- Grated cheese

Cereals
- Hot cereal:
  - Oatmeal
  - Cream of wheat
  - Grits

Thermostabilized

Fruit
- Applesauce
- Fruit cocktail
- Peaches
- Pears
- Pineapple

Salads
- Chicken salad
- Tuna salad
- Turkey salad
- Vegetable:
  - Bean salad, three
  - Pasta salad
  - Potato salad, German
  - Sauerkraut

Soups
- Chili
- Clam chowder
- Egg drop
- Miso, Japanese
- Vegetable

Desserts
- Pudding, butterscotch
- Pudding, chocolate
- Pudding lemon
- Pudding, tapioca
- Pudding, vanilla

Condiments
- Barbecue sauce
- Catsup
- Chili con queso
- Cocktail sauce
- Cranberry sauce
- Dill pickle chips
- Dips, bean
- Dips, onion
- Dips, ranch
- Honey
- Horseradish sauce
- Jelly, assorted
- Lemon juice
- Mayonnaise
- Mustard
- Mustard, hot Chinese
- Orange marmalade
- Peanut butter (chunky, creamy, whipped)
- Picante sauce
- Sweet and sour sauce
- Syrup, maple
- Taco sauce
- Tartar sauce

Salads
- Fruit juices:
  - Cranberry
  - Cranberry apple
  - Cranberry raspberry
  - Gatorade, assorted
  - Pineapple
  - Pineapple grapefruit
  - Tomato
  - V-8
Milk:
- Skim
- Low fat
- Chocolate (low fat or skim)
- Whole

Natural Form

Fruit
- Apples, dried
- Apricots, dried
- Peach, dried
- Pear, dried
- Prunes
- Raisin
- Trail mix

Grains
- Animal crackers
- Cereal, cold
- Chex mix
- Crackers, assorted
- Baked chips, tortillas
- Baked chips, potato
- Pretzels
- Goldfish
- Tortilla chips
- Potato chips
- Rye krisp, seasoned

Desserts
- Cookies:
  - Butter
  - Chocolate chip
  - Fortune
  - Rice krispies treat
  - Shortbread

Snacks
- Beef jerky

Nuts:
- Almonds
- Cashews
- Macadamia
- Peanuts

Candy:
- Candy-coated chocolates
- Candy-coated peanuts
- Lifesavers
- Gum (sugar free)

Eva Food
- In-suit fruit bar

Rehydratable

Beverages
- Apple cider
- Cherry drink
- Cocoa
- Coffee (assorted)
- Grape drink
- Grapefruit drink
- Instant breakfast, chocolate
- Instant breakfast, vanilla
- Instant breakfast, strawberry
- Orange drink
- Orange mango drink
- Orange pineapple drink
- Tea (assorted)
- Tropical punch

Irradiated Meat
- Beef steak
- Smoked turkey
Appendix G: USDA Food Guide Pyramid

Source: U.S. Department of Agriculture/Department of Health and Human Services