Down To Earth: Mission Orbital Eats

Activity 1: Bread vs. Tortilla Challenge

1. Find a desk or table that is in an area without any sort of moving air.
2. Lay the black piece of paper or black napkin on your flat surface.
3. Make a list of the order in which you will test each piece. You'll need this when you're reviewing your photos to gather your data.
4. Gather your bread and tortilla.
5. Sit in the chair and pick up one of the pieces of bread.
6. Be sure to lean over the piece of black paper or black napkin, then take a bite of the bread.
7. Check for crumbs on the piece of paper or napkin. If you don't have any, take another bite or two.
8. Once you have crumbs, take a photo of the black paper or black napkin.
9. Shake the crumbs off the black paper or black napkin and repeat steps 5-8 for each of the pieces of bread and the tortilla.
10. Compare the photos.

Type of Bread/Tortilla	**Observations**

Which type of bread left the most crumbs? Which left the least?

Down To Earth: Mission Orbital Eats

Do you have a hypothesis for why that might have occurred?

Do some research to figure out how the types of bread were made. Does your hypothesis explain why certain breads may have left more crumbs?

Attach photos of your results below.

Down To Earth: Mission Orbital Eats

Activity 2: Mapping Bread vs. Tortilla Crumbs

1. Replace the black napkin with a piece of graph paper, or draw a grid on your black paper using a white marker or piece of chalk.
2. Repeat steps 3-8 from Activity 1, above.
3. In addition, record where the individual crumbs landed. Mark the blocks where there are crumbs with a pencil or pen. (If you want to use the same paper several times, be sure to get a clear photo rather than marking your paper.)
    a. Count the number of blocks that have crumbs and record the total.
    b. Look at where the crumbs fell on the paper. Are there any patterns?
4. Repeat for each type of bread and the tortilla. Compare your results.

Type of Bread/Tortilla	**Number of blocks with crumbs**	**Observations**

Based on the data you collected, which food produced the most crumbs? How do you know? Provide evidence to support your claim.

Down To Earth: Mission Orbital Eats

Did bread send crumbs flying further than the tortilla or vice versa? What evidence supports your conclusion?

Based on your experiment, which of the foods you tested would you suggest for use on the International Space Station? Why?

Attach a copy of your bar chart, if you made one.

Down To Earth: Mission Orbital Eats

Activity 3: Beyond Bread vs. Tortilla

Try different types of food besides bread. For example, you could:

- Experiment with chips, crackers, cookies, raw vegetables, or fruit.
- Test foods from each of the five food groups: fruits, vegetables, grains, protein, and dairy.
- Get creative with your choices! Pick some of your favorite foods. How many crumbs does pizza leave behind? What about a burger?

Type of Food	Produced crumbs?	Observations

Remember, in a microgravity environment, droplets of water float just like crumbs do. How can you test for that? Could a juicy apple be as dangerous as a piece of crusty bread?

Down To Earth: Mission Orbital Eats

Design A Meal For Space

Once you have compared additional foods, use that information to develop a crumb-free menu for the ISS. Some ideas:

- Make a menu of your favorite foods.
- Research ancient food, like the Itanoni corn, and imagine how it might be used on the ISS.
- Create a menu that represents a particular culture, such as Japanese, Italian, Russian, or French.
- Consider other variables that may affect a menu on the ISS, such as packaging, storage, and nutritional needs. NASA's Food for Spaceflight Activity has many ideas!

As you work on the challenge, consider these questions:

- Food does much more than just provide energy; it's also a great way for people to feel at home. What comfort food would you want to have if you lived in space?
- If you were headed to Mars (which takes seven to ten months each way), do you think you'd get tired of eating the same types of food? NASA discovered that meal fatigue can lead to loss of appetite and astronauts may not get enough nutrients as a result. Do you think people on Earth feel that way about the food in their own environments? How could you combat that problem?
- It's hard to get fresh food on the space station—and many places on Earth. That's why NASA is working to grow food in space. What is one food you can add to your menu that you think would grow well in space?

Describe your meal for space below. Why would it make a good meal on the space station? Explain.