Space Nutrition

NAME: ______________________

One challenge NASA scientists face is providing a balanced, nutritious diet for astronauts. Crews on the International Space Station or even as far away as the Moon can be resupplied with food from Earth in a matter of days. When traveling to another planet, however, a crew must either pack enough food for the entire journey (and the trip home!) or find a way to produce food during the mission. With our current technology, it takes about six months to get to Mars and we will stay there for several months. How much food needs to be packed for such a trip?

1. Calculate how much food you eat on a typical day. Keep a record of *everything* you eat for one day and use that to calculate your total grams of food per day. (Don't include water, just food.) *HINT: Look at food labels to figure out how many grams are in a serving and what the serving size is.* **grams** per day ($\boldsymbol{g}$) = ________

2. At this rate, how much food would a crew of four need for a six-month one-way trip to Mars? *Hint: Assume the trip begins on January 1st and it is not a leap year.*

number of **days** ($\boldsymbol{d}$) = ________ number of **astronauts** ($\boldsymbol{a}$) = _______

(g)(d)(a) = _____________ kilograms

3. How much food would this crew need for a two-year Mars mission? __________ kilograms

4. According to the book "Space Nutrition," 50-60% of your calories should come from carbohydrates, 30% from fats and 10-15% from proteins. Look back at the list of foods you ate in one day and calculate the number of grams of each type of food in your diet.

carbohydrates ($\boldsymbol{c}$) = _______g **fats** ($\boldsymbol{f}$) = _______g **proteins** ($\boldsymbol{p}$) = _______g

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5. Now calculate the total number of calories from each type of food. Proteins and carbohydrates provide 4 calories per gram of food. Fats provide 9 calories/gram.

c = _______calories ***f*** = _______calories ***p*** = _______calories

What were your **total** (***t***) calories for the day? ***t*** = ___________calories

6. Use the number values above to complete the equations below and calculate the percentage of each type of food calories in your diet. Then color in the pie chart and the key.

100 (*c* ÷ *t*) = _________% carbohydrates

100 (*f* ÷ *t*) = _________% fats

100 (*p* ÷ *t*) = _________% proteins

KEY
- ☐ carbohydrates
- ☐ fats
- ☐ proteins

7. Create a bar graph showing the difference between your diet and the ideal astronaut diet. Assume that the astronaut's diet is a perfect average of the ranges given in "Space Nutrition."

Color in the key to match your graph.

PERCENTAGE (%) OF CALORIES

SOURCE OF CALORIES

KEY

ASTRONAUT'S DIET
- ☐ carbohydrates
- ☐ fats
- ☐ proteins

STUDENT'S DIET
- ☐ carbohydrates
- ☐ fats
- ☐ proteins

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8. Based on this data, what changes could you make to improve your diet?

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9. Now it is your turn to pack the spacecraft! Select a nutritious diet for a two-year Mars mission (see #3 above). Complete the chart below, listing the total number of kilograms for each type of calorie* and giving examples of foods rich in these nutrients.

*To calculate each amount, multiply the total kg by the desired percent and then divide by 100. *For example, if the total in #3 were 450 kg, 50% of that would be 450 X 50 ÷ 100 = 225 kg.*

CARBOHYDRATES (50-60%)	FATS (30%)	PROTEINS (10-15%)
Kilograms: ____________________	Kilograms: ____________________	Kilograms: ____________________
Foods:________________________	Foods:________________________	Foods:________________________
______________________________	______________________________	______________________________
______________________________	______________________________	______________________________
______________________________	______________________________	______________________________
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