Name: _____ Date: _____

Student Exploration: Identifying Nutrients

Vocabulary: carbohydrate, disaccharide, lipid, monosaccharide, polysaccharide, protein, starch

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. What are the major types of nutrients you can get from food? _____

   _____

2. How are these nutrients used by your body? _____

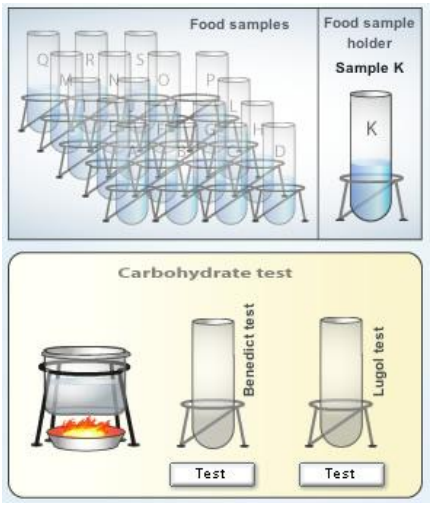
   _____

   _____

   _____

Gizmo Warm-up

Have you ever wondered what is in your food? Scientists use a variety of tests to determine the nutritional content of food. You will learn four of those tests with the *Identifying Nutrients* Gizmo™.



1. Below the **Food samples** label, drag tube **A** into the **Food sample holder**. Below the **Benedict test**, click the **Test** button. What is done in the Benedict test?

   _____

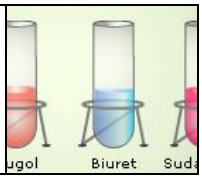
   _____

   _____

2. The Benedict test is a test for **monosaccharides**; simple sugars like glucose or fructose (fruit sugar). In contact with monosaccharides, the Benedict solution turns from blue to pink.

   Does **Sample A** contain monosaccharides? _____

   Note: **Disaccharides** such as sucrose (table sugar) and lactose (milk sugar) are more complex than monosaccharides. The Benedict test does not detect disaccharides directly.

Activity A: **Identifying nutrients**	Get the Gizmo ready: • Click **Reset**. • Drag **Sample A** into the **Food sample holder**.	

Introduction: Most food is composed of three types of molecules: **carbohydrates**, **proteins**, and **lipids**.

- Carbohydrates such as **starches** and sugars are major source of energy. Simple sugars are found in sweets and fruits. Starches are found in potatoes, cereal, pasta, flour, and other plant products.
- Proteins are used in body structures such as muscles, skin, and hair. Rich sources of proteins include meats, dairy products, and beans.
- Lipids (fats and oils) are used for energy, insulation, and as an essential building block of cells. Meats, dairy products, and oily plants such as olives are rich in lipids.

Question: How do you test for carbohydrates, proteins, and lipids?

1. Test: Under the **Benedict test**, click **Test**. Does sample A contain monosaccharides? _____ (Recall that a pink color is a positive test for monosaccharides.)

2. Test: The Lugol test uses iodine to test for starch, a **polysaccharide** (complex sugar). Iodine turns dark purple in the presence of starch.

   Under **Lugol test**, click **Test**. Does sample A contain starch? _____

3. Test: The Biuret test uses a solution of potassium hydroxide (KOH) and copper sulfate ($CuSO_4$) to test for protein. The Biuret solution turns purple when proteins are present.

   Under **Biuret test**, click **Test**. Does sample A contain proteins? _____

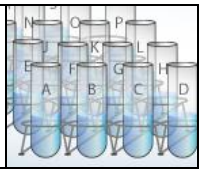
4. Test: The Sudan Red test uses a fat-soluble dye, Sudan Red, to indicate the presence of lipids. When lipids are present, the dye will be absorbed into the lipids, and will appear as concentrated spots of color in the test tube. (No spots indicates that lipids are not present.)

   Under **Sudan Red test**, click **Test**. Does sample A contain lipids? _____

5. Summarize: What nutrients does sample A contain? _____

6. Analyze: What kind of food is sample A most likely to be? (Circle your choice)

   A. Apple juice B. Baked beans C. Oatmeal D. Scrambled eggs

Activity B: **Nutrients and food types**	Get the Gizmo ready: • Click **Reset**.	

Question: What nutrients does each food sample contain?

1. Collect data: Use the four available tests to find the nutritional content of samples E, G, and M. (Sample A has been done for you as an example.) Record results on the table below.

	Carbohydrate Tests		**Protein Test**	**Lipids Test**	**Test results – are these nutrients present?**			
Food sample	**Benedict test**	**Lugol test**	**Biuret test**	**Sudan Red test**	**Mono-saccharides**	**Starches**	**Proteins**	**Lipids**
A	**+**	**–**	**–**	**–**	**Yes**	**No**	**No**	**No**
E								
G								
M								

2. Analyze: Look at the results for samples A, E, G, and M.

   A. Is sample E most likely to be steak, bread, or butter? Justify your answer.

   _____

   B. Is sample G most likely to be table sugar, pasta, or olive oil? Justify your answer.

   _____

   C. Is sample M most likely to be chicken, rice, a mango, or butter? Justify your answer.

   _____

3. Draw conclusions: Why is it important to understand the nutritional content of food?

   _____

   _____

   _____

(Activity B continued on next page)

Activity B (continued from previous page)

4. Practice: Determine the nutritional content of the remaining food samples.

	Carbohydrate Tests		Protein Test	Lipids Test	Test results – are these nutrients present?			
Food sample	Benedict test	Lugol test	Biuret test	Sudan Red test	Mono-saccharides	Starches	Proteins	Lipids
B								
C								
D								
F								
H								
I								
J								
K								
L								
N								
O								
P								
Q								
R								
S								

5. Think and discuss: If possible, discuss these food samples with your classmates and teacher. Try to come up with a type of food that corresponds to each sample.

6. Extend your thinking: In general, a balanced diet contains relatively even amounts of carbohydrates, proteins, and lipids. Too much sugar (monosaccharides and other simple sugars) is unhealthy. Fruits and vegetables are important sources of vitamins and minerals.

   Do you consider your diet balanced and healthy? Why or why not? _____

   _____

   _____

   _____