Nutrient and Indicators

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| Name: | | Period \_\_\_\_\_\_ | Date : | | |
| Laboratory Experience | | Worth 90 Lab Minutes | |
| **Bridge** | | | |
|  | Directions: Answer the following questions based on your knowledge of chemistry and biology.  A student, wearing chemical safety goggles and a lab apron, is to perform a laboratory test to determine the pH value of two different solutions. The student is given one bottle containing a solution with a pH of 2.0 and another bottle containing a solution with a pH of 5.0. The student is also given six dropping bottles, each containing a different indicator listed in Reference Table *M*.     1. State *one* safety precaution, *not* mentioned in the passage, that the student should take while performing tests on the samples from the bottles. [1] 2. Identify an indicator in Reference Table *M (above)* that would differentiate the two solutions. [1]   Compare the hydronium ion concentration of the solution having a pH of 2.0 to the hydronium ion concentration of the other solution given to the student. [1] | | |  | **Objective:**  Determine what indicators test for which nutrients. |
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| **Essential Question:**  How can I identify which indicator tests for which nutrient so I can tell what is in my food? |
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| **Mini Lesson** | |
|  | Task: You will be completing a lab on indicators for nutrients.   1. The first part of the lab is a follow the directions lab where you will problem solve to figure out what nutrient is in which solution. 2. The second part is a guided inquiry lab where you will need to figure out what nutrient(s) are in foods that you typically eat. |

**Work Period**

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|  | **Using Indicators Laboratory Part 1**  **Exploration**  *Use this space to record observations that relate to the question being investigated. Also record researched facts that might relate to the investigation as well.* |
|  | **Question**  Does an indicator only work for one specific nutrient? How will I be able to tell? |
|  | **Identify your Variables**  *Independent Variable:*    *Dependent Variable:* |
|  | **Prediction/Hypothesis**  I think that I will see \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that tells me when there is a specific nutrient because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
|  | **Experimental Design**  *Materials:*  Samples of sugar (glucose), starch, protein, and lipid (fat) solutions  4 test tubes 12 cups marker 4 pipettes (1 for each indicator)  Indicators: Benedicts, Iodine, Buirets, Sudan III  Hot plate glass beaker  *Procedure*:   1. Place 10mL of each solution into 4 test tubes (one solution per test tube, labeled). 2. Put 4-5 drops of Benedict’s solution into each test tube and place in the water bath on the turned on hot plate. 3. Wait 5 minutes and record the results in table 1. 4. Place 10mL of the starch solution into 4 cups. 5. Add 4-5 drops of Iodine to 3 cups (one solution per cup, labeled). 6. Swirl cup gently and record results in table 1. 7. Repeat steps 4-6, replacing the starch first for the lipid and then for the protein solution. |
|  | **Data Collection**  *Use this space to organize and collect your data. Remember, data can be qualitative (descriptions, words, observations) as well as quantitative (numbers, values). Use both kinds of data when you can. Organize your data into a table with a title, make a graph whenever you can, and use the variables to help you do this!* |
|  | **Data Analysis**  Based on my data, I believe that:  Benedict’s tests for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Lugol’s Iodine tests for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Biuret’s tests for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Sudan III tests for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  I know this because….. |
|  | **Evaluation**  *This is where you talk about your experiment. Discuss how your results compare to your hypothesis: do you agree or disagree with your original thoughts and use evidence from your experiment to back this up. Second, discuss sources of error (at least 2), or things that could have gone wrong in your experiment. Finally, develop a further investigation question: based on what you found out in this experiment, what else do you wonder about? Again, use your “Does \_\_\_\_\_\_\_\_ affect \_\_\_\_\_\_\_\_\_\_” format for this question.* |

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|  | **Using Indicators Laboratory Part 2**  You were asked to bring in something that you eat frequently. Use the space below to design an experiment in which you test your food sample for the essential organic nutrients. Make sure you make a prediction as to what nutrients you think you will find and why!  **Exploration**  *Use this space to record observations that relate to the question being investigated. Also record researched facts that might relate to the investigation as well.* |
|  | **Question**  What nutrients will I find in my food? |
|  | **Identify your Variables**  *Independent Variable:*    *Dependent Variable:* |
|  | **Prediction/Hypothesis:** |
|  | **Experimental Design**  Materials:  Procedure: |
|  | **Data Collection**  *Use this space to organize and collect your data. Remember, data can be qualitative (descriptions, words, observations) as well as quantitative (numbers, values). Use both kinds of data when you can. Organize your data into a table with a title, make a graph whenever you can, and use the variables to help you do this!* |
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| **Summary** | |
|  | How can I identify which indicator tests for which nutrient so I can tell what is in my food? |

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| **Closing** | |
|  | A nutritionist is trying to make a meal for an elderly woman who has dietary concerns. One of those concerns is that the woman is allergic to any product that contains protein: her body sees the protein like it would a poison and she will get very sick from it. Design a way in which the nutritionist could test foods to check for protein content before she decides if the food is safe for the woman to eat. |

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| **Independent Practice** | |
|  | **Nutrition and You**  *Directions*: Read the following article from PBS kids (in conjunction with many outside sources) about nutrition and your lifestyle. When you are done reading, create your OWN graphic organizer identifying the information you feel is the most important. You may do more than one organizer (one for each section) if it is easier for you.  **Food Smarts: What's In You?**  How much attention do you pay to what you put ON your body? Probably a lot, right? After all, wearing clothes we like helps us look and feel good.  Now, how much attention do you pay to what you put IN your body-in other words, FOOD? As we get older, we start to think about this stuff more and more. Maybe you've started making more of your own eating choices or even preparing your own meals. Maybe you've just become extra-aware of how food affects you inside and out. You're not alone!  Brian, 11, told us: "I just wish I would eat healthier. I'm not exactly on the skinny side." Jessica, 12, says, "If I could eat better, I would choose to eat less junky stuff and eat more healthy foods. I would also treat myself to candy only once a week."  Melissa, 11, writes that she would like to change how much she eats for dinner. "I always eat like 2 or 3 servings of dinner," she says. Allie, 11, wants more variety: "I would make myself like more foods."  The truth is, food adds yumminess to our lives, and it's no fun to deny ourselves something we want to eat. On the other hand, eating lots of junk food and sweets can make us feel a little gross, and maybe guilty that we're not being good to our bodies. Somewhere, there's a middle road, but it's hard to find it through all the rumors, personal opinions, and fad diets out there. IML is here to give you the facts you need to be Food Smart, along with advice on gaining good eating habits that actually work in the real world-and will hopefully stay with you for the rest of your life.  Remember: This is not a guide to losing weight! If you feel you are overweight, talk to a parent, doctor, or school nurse about (a) whether you really do need to shed some pounds and (b) finding a safe, sound way to do it.  **Food Smarts: The Food Pyramid**  All foods are not created equal. A T-bone steak tastes nothing like a bran muffin, and the two foods do totally different things to your body. If you ate just steaks, three meals a day, you'd be a very unhealthy person (unless you're a wolf-kid). Eating only muffins morning, noon, and night would be almost as bad (unless you're the Muffin Man, who lives in Drury Lane).  The truth is that your body needs a *variety* of foods -- a little bit o' this and a little bit o' that -- to stay healthy, happy, and strong. In that past, doctors and nutritionists (food experts) divided everything into what they called "The Four Food Groups." These were the Bread Group, the Dairy Group, the Fruit and Vegetable Group, and the Meat Group. The idea was that we should choose equally between them, making sure we got a little from each group during the day in order to eat a "balanced diet."  Since then, we've learned a lot more about food. The experts saw that it was healthier to choose more breads, fruits and vegetables, and fewer meats and dairy products. All of these groups are still important, of course, but it's just as important to know how much to eat from each group. These ideas led to a new guide which is called "My Pyramid."  *The MyPyramid Plan*  The new MyPyramid uses the same basic food groups, but it arranges them in a way that shows which ones we should be eating more of, and which we should eat less of:   * The pyramid is made up of vertical stripes. The widest sections are filled with the foods we should get plenty of every day, while the narrower sections represent foods we should eat less of. * From left to right, the major food pyramid sections are: Grains, Vegetables, Fruits, Milk, and Meat & Beans.     There is also a very, very thin stripe that represents Fats & Oils and "Discretionary Calories" (sweets).  Check out an interactive guide to the MyPyramid plan at http://www.mypyramid.gov/pyramid/index.html.  Let's take a closer look-  *The Grains Group*  You know it as: Breads, bagels, muffins, cereal, rice, and pasta  What's good about it:   * Carbohydrates, which our bodies like to burn as fuel, so they work as a source of quick energy. * Iron, which is good for our blood. * B vitamins, which we need for energy, growth, and our brains. * Thiamin (Vitamin B1), which strengthens the nervous system.   How much you should eat: 6 ounces every day  *The Vegetable Group*  You know it as: Carrots, broccoli, green beans, peas, lettuce, celery, etc.  What's good about it:   * Vitamin C helps us absorb iron and is important for healthy teeth and gums. * Vitamin A keeps our skin and hair healthy, and helps with growth and eyesight. * Vitamin B6 also helps us grow and improve our brain function. * Fiber helps food move through our digestive systems, is good for our hearts, and may help prevent heart disease and cancer.   How much you should eat: 2 to 2.5 cups every day  *The Fruit Group*  You know it as: Apples, oranges, bananas, pineapples, peaches, melons, grapes, etc.  What's good about it:   * Vitamin C helps us absorb iron and is important for healthy teeth and gums. * Vitamin A keeps our skin and hair healthy, and helps with growth and eyesight. * Potassium helps us work our muscles. * Fiber helps food move through our digestive systems, is good for our hearts, and may help prevent heart disease and cancer. (Keep in mind that fiber is only in whole fruit, not fruit juice.) * Carbohydrates, which our bodies like to burn as fuel, so they work as a source of quick energy.   How much you should eat: 1.5 to 2 cups every day  *The Milk Group*  You know it as: Milk, cheeses, yogurt, etc.  What's good about it:   * Calcium, which is important for strong teeth and bones. * Protein helps us grow and repair body tissues when they need it. * Riboflavin (Vitamin B2) is good for energy and body tissue growth. * Potassium helps us work our muscles. * Vitamin D helps build strong bones (this vitamin is added to some milk, but isn't found in all dairy foods).   How much you should eat: 3 cups every day  *The Meat and Beans Group*  You know it as: Red meat, poultry, fish, eggs, nuts, and dry beans  What's good about it:   * Protein helps us grow and repair body tissues when they need it. * Iron is good for your blood. * Niacin (Vitamin B3) helps convert food to energy. * Vitamin B6 helps us grow and improve our brain function. * Vitamin B12 helps make red blood cells. * Zinc is good for growth and bones, eyes, skin, hair, and nails.   How much you should eat: 5 to 5.5 ounces every day  *Fats, Oils and Sweets*  You know them as: Candy, chocolate, ice cream, cookies, fatty meats (like bacon or hamburgers), deep-fried anything (like doughnuts and French fries), and fatty sauces (like Ranch dressing and mayonnaise).  What's good about them: Not much! Fats and natural sugars are good for us in small amounts, but the truth is that our bodies get enough of them in all the other foods we eat. Too much of this stuff is what can make us overweight and develop health problems, so that's why it's at the top of the pyramid, reminding us to eat very little of it. We'll talk more about how to cut down on fats, oils, and sweets in Real World Tips and Tricks.  REMEMBER: The true amount of food you should eat from each pyramid group depends on your age, gender, and the amount of exercise you get each day. Adults do not need as many calories as most children because their bodies are not using the energy for growth anymore.  **Food Smarts: The Choices Are Yours**  Being Food Smart is not about *denying yourself* certain things or *forcing yourself* to eat something you hate. It's all about choices! Once you have the information you need, you have the power to choose good food that will help the way your body looks, feels, and functions. Here are some of the choices you can be making:  **Choose variety**. It's easy to get caught in a pattern where you just eat your favorite foods -- or the most convenient foods -- over and over. But your body needs a variety of foods from all the Food Pyramid groups to get the nutrients it needs to stay healthy. Instead of having the same thing for lunch every day, mix it up!  **Choose whole grains.** Breads, cereals, pasta, and rice should make up a big part of your diet, because they provide the carbohydrate energy your body needs. Whenever possible, choose whole grain foods rather than white ones. Because they use more of the grain, these foods have more of the good stuff. For instance, instead of white bread on your sandwich, ask for wheat. Don't like wheat? Try a few different kinds. There are so many varieties out there that you're likely to find some type of whole grain bread that tastes good. The same goes for rice; try brown, long grain, or basmati rice instead of white.  **Choose fresh.** It's very important to choose fruit and vegetables in meals and snacks. Whenever you can, eat the fresh-picked versions instead of ones that are canned or processed. The more a fruit or vegetable is left alone and unchanged from the farm or orchard, the better it is for you. When you can't get the fresh stuff, frozen vegetables can be good, and canned fruits can last you until your favorites come back into season.  **Choose fiber.** Fiber is important for good digestion, so it's important to eat plenty of foods that are high in fiber, like fruits and vegetables. Here are some ideas:   * At snack time, grab an apple or pear instead of a cookie. Too boring? Put some peanut butter on your fruit for extra protein! * Have a salad as the *main* part of your lunch or dinner, instead of as a small side dish. * Instead of a milkshake, try a whole-fruit blended smoothie.   **Choose low-fat**. Too much fat can be bad for your body, so try to avoid foods that are high in fats, especially saturated fats and trans fats. For instance:   * Pick your salad dressing carefully! Salads are great as meals, side dishes, and even snacks, but we can easily make them less healthy by adding thick, high-fat dressings. Instead of gloppy Ranch or creamy Italian, use balsamic vinegar and olive oil, or try a brand of low-fat dressing. * Skip the fries. They're very high in fat. Instead, have a baked potato, salad, or serving of fruit. Most restaurants will let you substitute something healthier for fries any day. * Try it baked. Instead of fried chicken with the skin on, try a baked or broiled chicken breast with no skin. It'll have fewer calories and less fat. This is true of other things too, like baked chips instead of deep-fried potato chips. Remember: frying adds extra oils and fats, and these are things we should only be eating in small amounts. * Choose mustard over mayo. Mustard is tasty and low-fat, while mayonnaise is very high in fat and calories. Pick mustard for your burgers and sandwiches, and use low-fat or fat-free mayo in your tuna fish salad. * Choose low-fat or skim milk instead of whole milk. Chances are, you won't notice a big difference in taste; if you do, you'll eventually get used to it. * Go easy on the butter and margarine. Do you like to drown your breakfast toast or smother your movie popcorn in lots of yellow stuff? This just adds unneeded and unhealthy fat to what used to be a good food. If you can't live without some butter on your food, experiment with how *little* of it you really need.   **Remember**: As we're growing, we do need *some* fat in our diets, and these can be found in many foods we eat anyway, including meats, milk products, nuts, and even avocadoes. It's the ADDED fats, like butter and oils, that we should only be eating in small amounts.  **Watch the sugar and salt**. We all like a little added sweetness or spice in our food; it's what helps make it so delicious! But keep these things in mind:   * Sweets are costly. Not in dollars, but rather, in calories. Some people refer to them as "empty calories" because they don't offer our bodies anything nutritious. Just like you might save expensive purchases for special occasions, make ice cream, candy, and chocolate something to have once in a while instead of every day. * Pssst-there's sugar hiding everywhere! Look at the back of a soda can. Is high fructose corn syrup or sucrose near the top of the list? These are other words for sugar, and if they're listed first or second, it means your soda is bursting with it. Instead of a sweet soda, mix some seltzer water with fruit juice (especially cranberry or grapefruit); it tastes great and is better for your body (and teeth)! Another place to look for hidden sugar is in frozen or pre-packaged foods, like TV dinners and canned pasta meals. Check your freezer and cupboards and count how many sugar-filled foods there are in your home. * Say "no salt, please." From popcorn to fries, you probably eat a lot of salty foods when you're out of the house. If you ask for no salt, you'll be making whatever you eat a little bit healthier. At the grocery stores, pick out "low sodium" (sodium is another word for salt) crackers, chips, and snacks. At the dinner table, taste your food first instead of automatically pouring the salt shaker over it. Maybe it's delicious already!   **Food Smarts: Myths And Facts**  When it comes to food and eating healthy, you probably hear a lot of opinions and "facts" from your parents, friends, relatives, and teachers. This is partly because older people may have grown up when there was different food information out there, and partly because food companies and advertising want you to believe certain things in order to get you to buy their products. Think you're a Food Smartie already? See if you know the truth behind these common myths:  **Myth**: As long as I skip a meal, I can eat whatever I want at my next meal.  **Fact**: It's never a good idea to skip a meal, and it won't make up for eating unhealthy foods, or eating too much, the next time you eat. It's important to eat three normal-sized and healthy meals a day, and even a few snacks in between, so your body has energy when it needs it.  **Myth**: As long as a food package says "all natural" on it, it's healthy to eat.  **Fact**: Even if something is labeled "all natural," it can still contain tons of sugar, unsaturated fats, or other things that can be bad for you. Some snacks labeled "all natural" can contain just as much fat as a candy bar! It's important to read the BACK of the package, where the Nutrition Facts label and ingredients list will spell it all out for you.  **Myth**: If I'm not overweight, I don't have to be careful about what I eat.  **Fact**: Even if you've never had a problem with your weight, it's important to choose healthy foods every day. If you think of your body as a machine, then you'll want to use the very best fuel to keep that machine going strong, and that means staying away from junk food. Also, if you develop poor eating habits now, you could have a lot of problems with your weight and health in the years to come.  **Myth**: I can sweeten my food as much as I want, as long as I use honey instead of sugar.  **Fact**: Chemically, honey is almost the exact same thing as sugar, and honey can even have more calories than regular sugar. Just like with sugar, try to use honey only in small amounts.  **Myth**: A fast-food cheeseburger is a balanced meal, because it has meat, cheese, bread, and vegetables.  **Fact**: Fast-food cheeseburgers, and almost everything else served at fast-food restaurants, are very high in fats, calories, and sodium. It is okay to enjoy these foods once in a while, but if you're eating them a couple times a week or more, this is too much, and you might want to try making healthier choices.  **Myth**: As long as I take a vitamin pill every day, I don't need to be careful about what I eat.  **Fact**: Some nutritionists say that it's a good idea to take vitamin pills, but these pills can't give you everything you need-not by a longshot! Eating healthy foods gives you fiber, protein, energy, and lots of very important things that vitamin pills don't give you. So a vitamin and a bag of chips is still a terrible lunch. Instead, you've got to eat a balanced and nutritious meal.  **Myth**: Sugar gives you energy. If you need a boost mid-afternoon or before playing sports, eat a candy bar.  **Fact**: "Simple" sugars like those found in chocolate, cookies, candies, and cakes definitely cause spikes in your blood sugar level, which may make you feel a quick shot of energy in your system. But after that first rush, blood sugar drops sharply, and you'll suddenly feel like you have less energy than when you started!  **Myth**: Energy bars are a good way to get needed vitamins and minerals.  **Fact**: Energy bars can be a good source of carbs, protein, and fat, but they can be abused like any other food. Eat too many, and you're doing as much damage to your body as you would eating lots of candy, cake, and cookies. They're no substitute for low-calorie, no-fat snacks like fruit and vegetables, and should only be used occasionally if you're in a pinch.  **Myth**: Carbs make you fat.  **Fact**: You may know someone who's on a "low-carb" diet-after all, it's the biggest weight-loss trend out there. These diets try to make people believe that carbs are just plain bad, but the truth is this: carbs, just like sugar and fat, will make you gain weight if you eat *too much of them*. If you eat them in average, balanced amounts, they're the best source of energy your body can find.  Create your graphic organizer(s)! |