NATURAL

SUGAR

Sweet by Nature

From the **Field**

to the **Table**

SUGAR

has been an important food ingredient for thousands of years. But, there is more to sugar's story than you may think, including

MATH, SCIENCE, HISTORY AND GEOGRAPHY.

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THE SUGAR ASSOCIATION

www.sugar.org

One Sweet History...

In Spanish they call it "azucar." "Sucre" is the French word for it, while Germans say "zucker." It's called many things in many places, but as long as it's been around, and it's been a while, Americans have always called it "sugar."

Sugar is one of the world's oldest documented **commodities**, and at one time it was so valuable that people locked it up in what was called a sugar safe.

Sugar's Old and Illustrious Timeline:

8000 B.C. In the beginning, sugar cane was valued for the sweet syrup it produced. As people migrated to different parts of the world, the good news spread, and eventually, sugar cane plants were found in Southeast Asia, India, and Polynesia.

500 B.C. A new form of sugar was discovered — sugar crystals! This major breakthrough in ancient **technology** occurred in India, when sugar cane juice was boiled until crystals developed.

325 B.C. "Honey without bees?" Could this be true? This is how sugar was first described to Alexander the Great. As his empire spread across Asia and into Africa and Europe, so did the **cultivation** of sugar cane.

200 B.C. A Chinese emperor heard about India's secret for manufacturing sugar, and he sent his **emissary** there to learn about this sweet sensation. Sugar cane was planting roots around the world.

1493 Christopher Columbus is credited with introducing sugar cane to the New World, but that was old news in places like Southeast Asia where sugar had already been making life sweeter for over 8,000 years.

1500s Sugar is a scarce luxury in Europe at this time. One teaspoon costs as much as $5, and a calf costs as much as 4 pounds of sugar!

1744 A new source for sugar was found. As luck would have it, a German scientist named Andreas Marggraf discovered that the sugar beets used to feed cows could be transformed into sugar crystals. Eureka!

1751 Closer to home, Americans first planted sugar cane in Louisiana, and another U.S. industry was born.

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That's one sweet history!

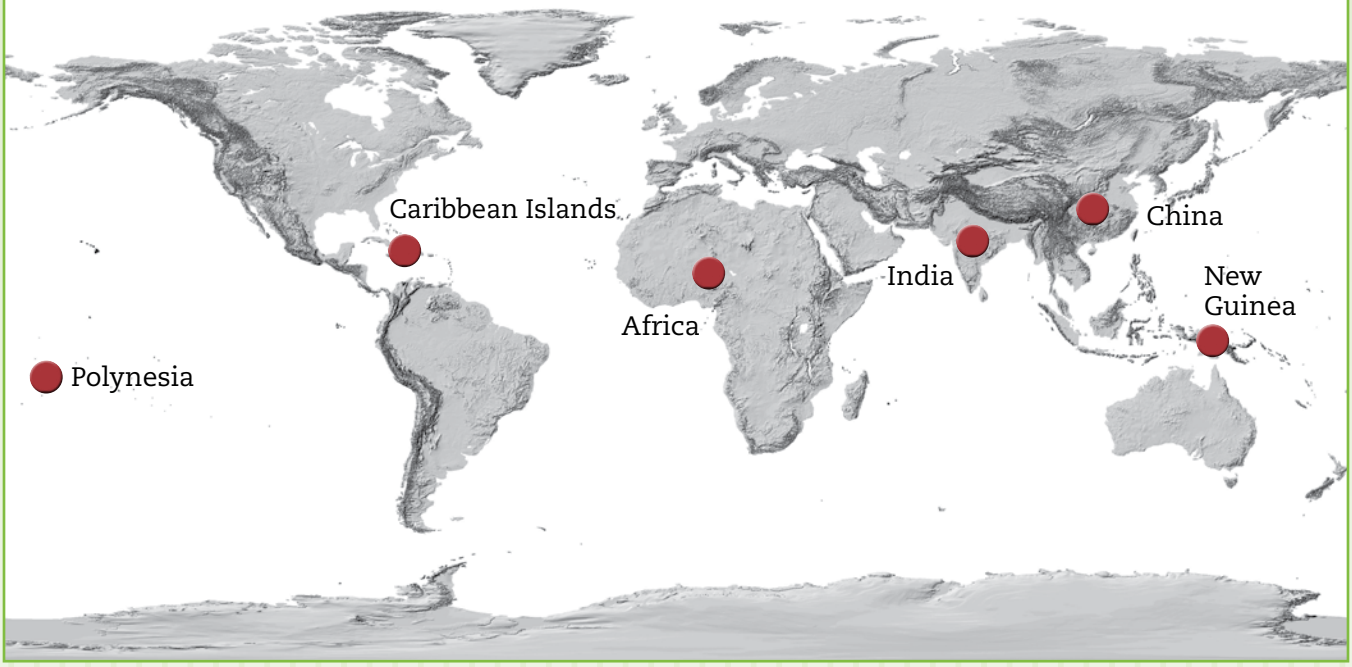
1800 Sugar beets proved to be an **indispensable** resource during the war between France and England when the English stopped the flow of sugar to Europe. By 1811, the French emperor, Napoleon, issued a decree forcing peasant farmers to plant sugar beets. Two years later, France produced 35,000 tons of sugar in over 340 factories.

1838 The first U.S. sugar beet factory was built by David Lee Child in Northhampton, Massachusetts.

Glossary

- **commodity** - *n.* a raw material or primary agricultural product that can be bought and sold
- **technology** - *n.* the use of scientific knowledge to make work easier
- **cultivation** - *n.* the use of land for growing plants
- **emissary** - *n.* a person who is sent on a mission as a representative for someone else
- **indispensable** - *adj.* absolutely necessary

Where Sugar Was First Grown



In the 1500's a teaspoon of sugar cost $5.00. Answer this question and you may be surprised at how much things have changed.

If you put 2 teaspoons of sugar in your coffee every day for a year, at $5.00 per teaspoon how much would you spend in that year?

_____

Where Does Sugar Come From?

Map it Out

Have you ever thought about where sugar comes from? If you think it comes from the grocery store, you're right, but before it's on the grocery shelves, it's in plants that are grown on farms across the United States.

In the U.S., sugar cane and sugar beets are grown in 15 states. Our **diverse** climate allows sugar farmers to grow cane in some regions, while other areas provide the perfect conditions for growing sugar beets.

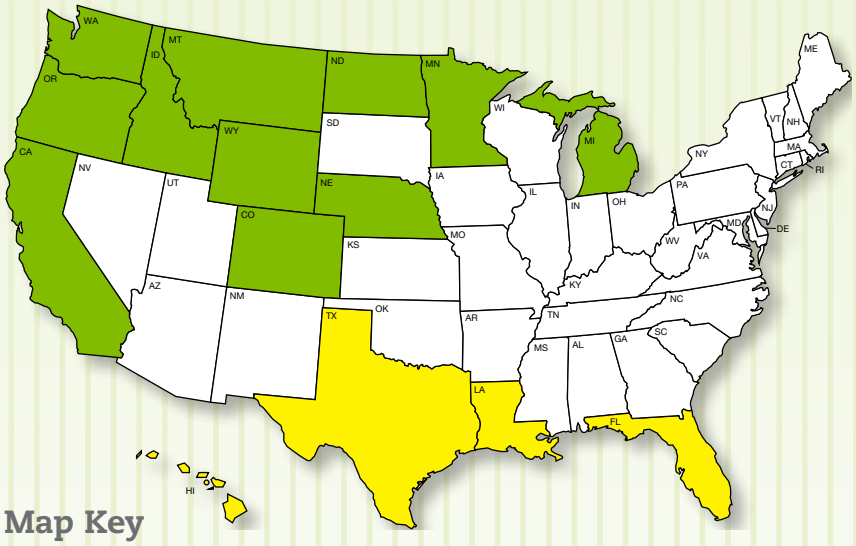
Sugar beets grow best in places where the temperatures are generally cooler. Farmers in California, Colorado, Idaho, Michigan, Minnesota, Montana, Nebraska, North Dakota, Oregon, Washington, and Wyoming plant the seeds when things are warming up in the spring. Most farmers harvest the **mature** sugar beets in the fall, before temperatures drop too low.

Sugar cane, on the other hand, is grown around the world in a region known as the tropical belt. A tropical climate is warm and has year-round **temperate** weather. The temperatures rarely dip below freezing. The sugar cane-growing regions in the United States include Hawaii, southern Texas, Louisiana, and southern Florida.

For more information about crops and climate go to http://www.usda.gov/oce/weather/pubs/Other/MWCACP

U.S. farmers produce a lot of sugar (the fifth largest **yield** in the world), but many other countries produce natural sugar, too. The countries that produce the most sugar from cane are Brazil, India, and China. The largest producers of sugar from sugar beets are France, Germany and the U.S.

The next time you see a sugar bowl, you may wonder, "cane or beet?" Regardless of the kind of plant or where it was grown, you can be sure that it is the same all natural sugar that has been safely consumed by people all over the world for thousands of years.



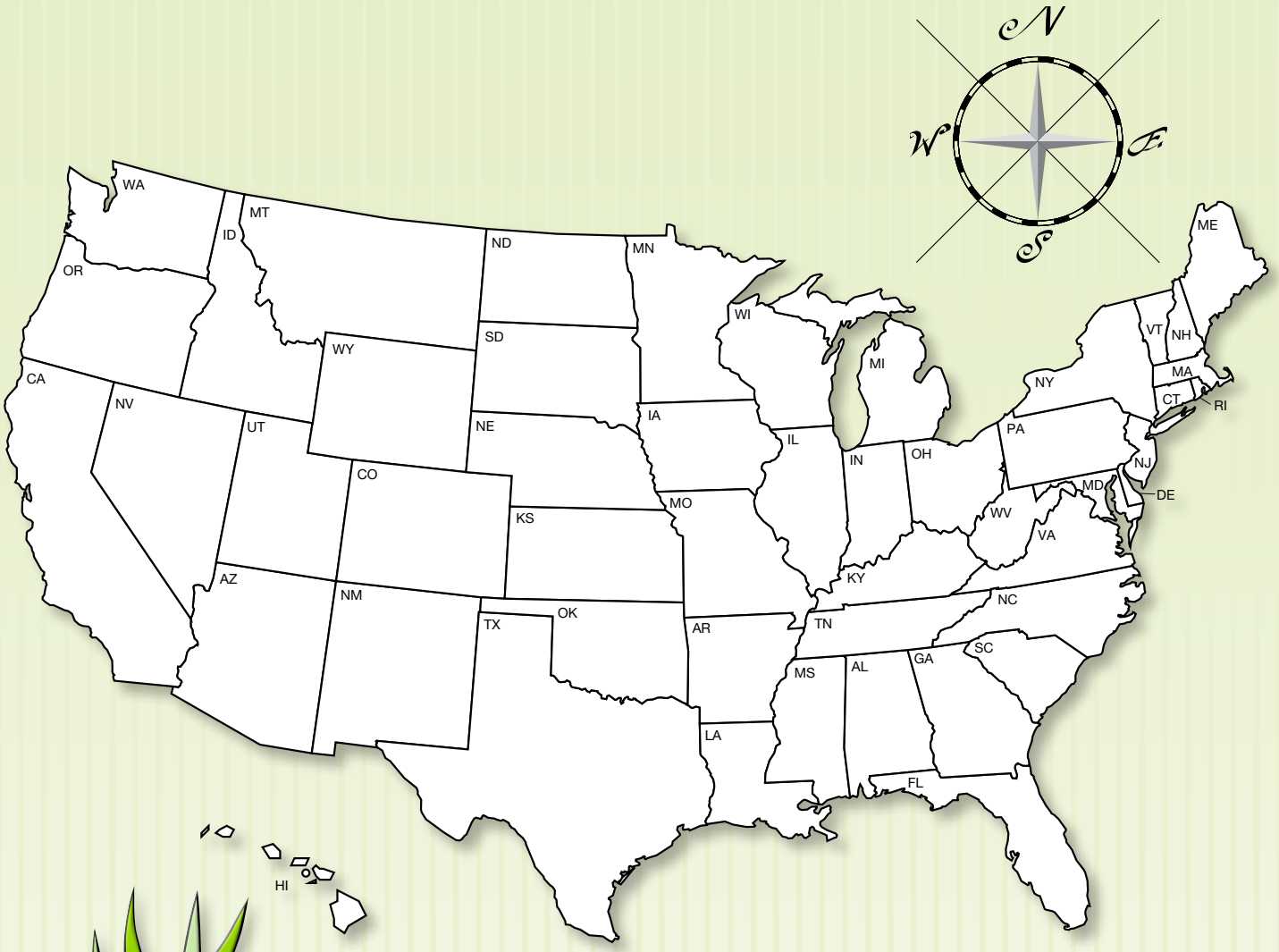
Glossary

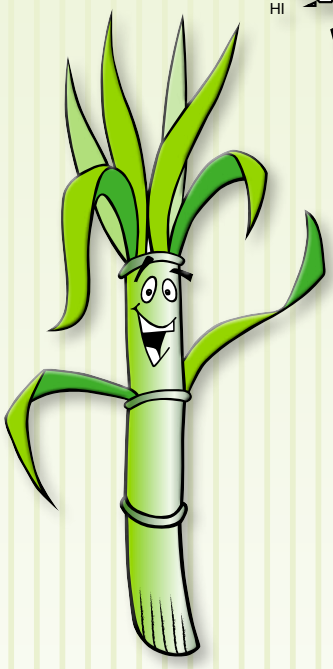
- **diverse** - *adj.* of several or many kinds; different
- **mature** - *adj.* fully grown or developed
- **temperate** - *adj.* having a climate that is not too hot or too cold
- **yield** - *n.* an amount produced

Map Key

- Sugar Cane Growing States
- Sugar Beet Growing States
- Non-Sugar Growing States

Create a colorful and informative visual aid to accompany any report or project by labeling the states where sugar cane and sugar beets grow. Choose the colors you will use for your map, and don't forget to include them in your map key.





Map Key

- [ ] Sugar Cane Growing States
- [ ] Sugar Beet Growing States
- [ ] Non-Sugar Growing States

Sugar – Captured Sunshine

You've probably heard of solar energy, but have you ever heard of sugar energy? Well, guess what? That's what sugar is — pure and simple — it's the plant's **energy**!

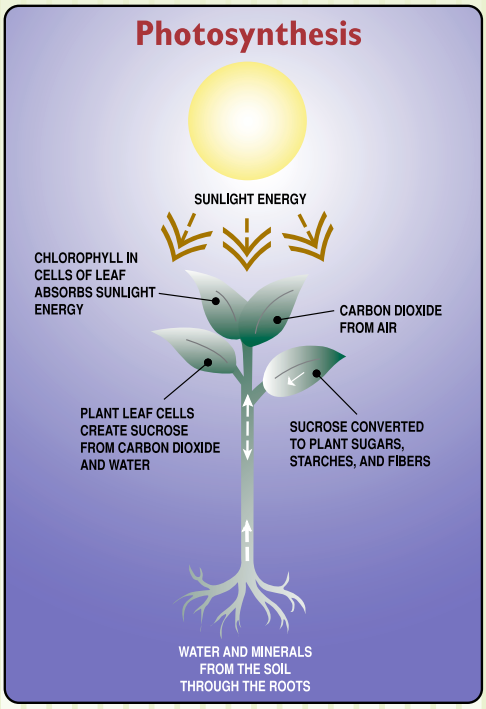
All green plants make sugar through photosynthesis. Photosynthesis is the process by which plants transform the energy from sunlight into sugar, their stored food and energy supply.

The recipe is pretty easy and contains just four natural ingredients:

- **carbon dioxide**
- soil
- sunshine
- water

This powerful combination is all Mother Nature needs to create sugar (chemical name sucrose).

Energy from the sun is absorbed by the **chlorophyll** in the cells of the plant's leaves. The leaves also take in carbon dioxide (CO_2), a gas that we release when we exhale. Water, and the minerals it carries, is soaked up by the plant's roots. The combination of these ingredients produces a chemical reaction, and sucrose, or sugar, is made. This sugar in plants provides energy for them to grow.



Synthesis of Sucrose in Plants

$C_6H_{11}O_6 - UDP$ Glucose Uridine di-phosphate	+	$C_6H_{11}O_6 - PO_4$ Fructose 6 Phosphate	→	$C_{12}H_{21}O_{12} - PO_4$ Sucrose 6 Phosphate	→	$C_{12}H_{22}O_{12}$ Sucrose

Sugar exists naturally in almost every fruit and vegetable, but two special plants are packed full of sugar. Sugar occurs in the greatest quantities in sugar cane and sugar beets.

Sugar Cane

Sugar cane is a tropical grass that grows l0-20 feet high. The sucrose that is **created** by the plant is stored in the thick stalks or canes. A stalk of sugar cane contains 12-14% sucrose.

Sugar Beets

A sugar beet is a root and grows underground, protected by the soil. Like sugar cane, sucrose, the source of energy made from photosynthesis, remains in the beet. The beet stays in the ground until it matures and weighs 2-4 pounds. A mature beet contains 17-18% sucrose.

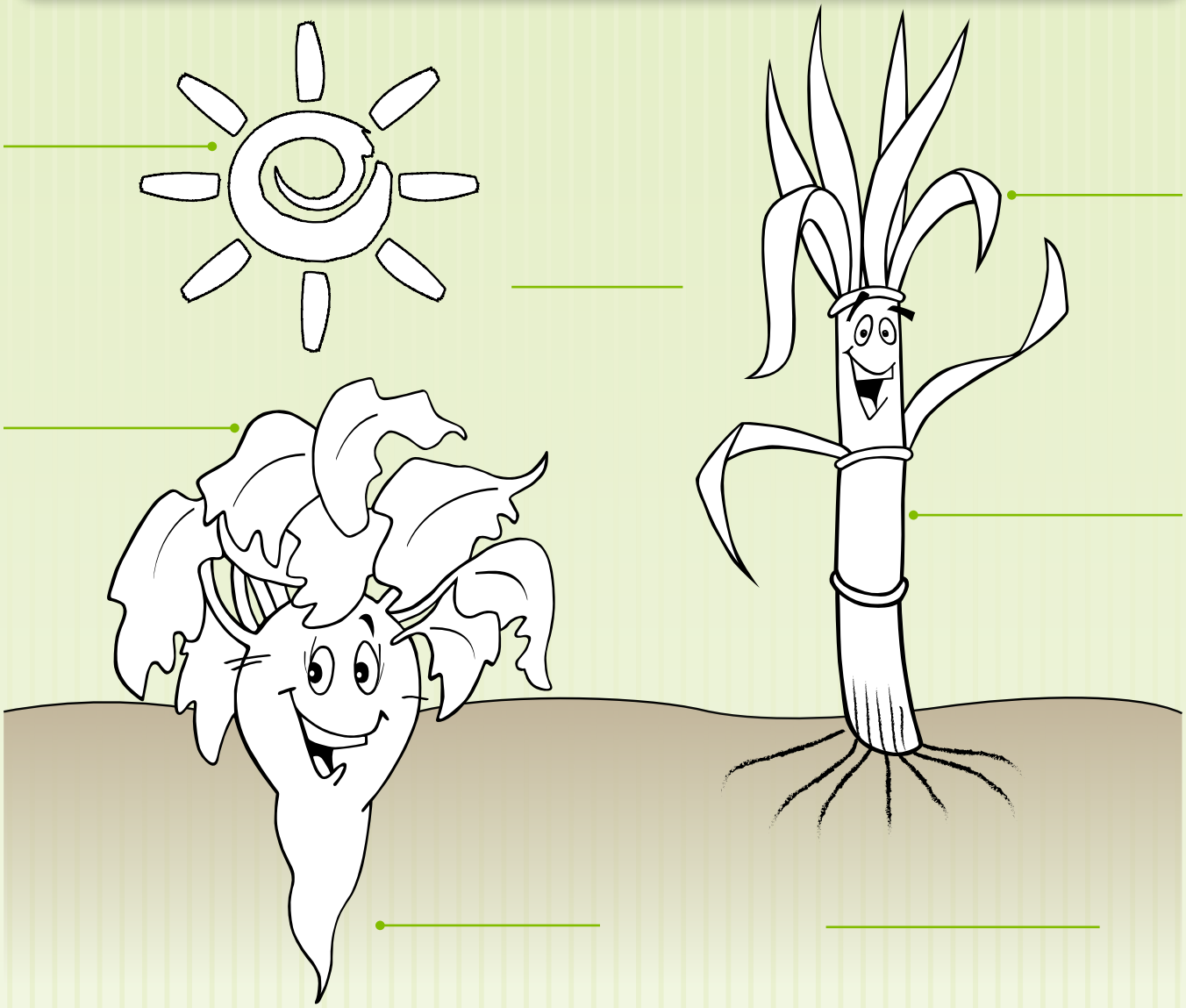
The sugar we **extract** from sugar beets and sugar cane is exactly the same as the sugar/sucrose in a peach, watermelon or carrot.

So, now you know how Mother Nature and plants produce sugar. It's pure and simple.

Glossary

- **energy** - *n.* source of usable power
- **carbon dioxide** - *n.* a natural, colorless, odorless gas
- **chlorophyll** - *n.* a green substance in the leaves of plants which helps plants make sugar from elements in air and water
- **create** - *v.* to cause to exist
- **extract** - *v.* to take or pull out

Complete this diagram to help you identify and remember the parts of the sugar beet and sugar cane plants. Use the key below to color the different parts of the plants as indicated. Use the word bank to fill in the blanks.



Color Key

YELLOW	Where plants get energy.
GREEN	Where chlorophyll is located.
LIGHT BLUE	Where plants get carbon dioxide.
BROWN	Where plants get water and minerals.
TAN	Where sugar is stored in plants.

Word Bank

One of these words can be used twice.

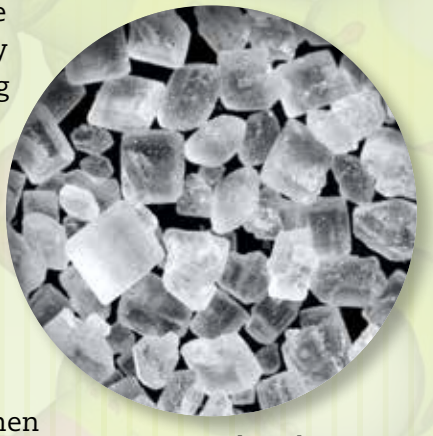
- ❑ SUN
- ❑ LEAVES
- ❑ SOIL
- ❑ AIR
- ❑ STALK
- ❑ ROOT BULB

A Closer Look at Sugar

$$C_{12}H_{22}O_{11}$$

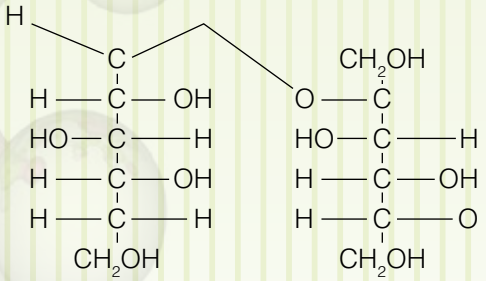
Is that some sort of a secret code? There's really no mystery. It's simply the scientific code for a sugar **molecule**. This chemical compound is the most **abundant**, pure, **organic** substance in the world.

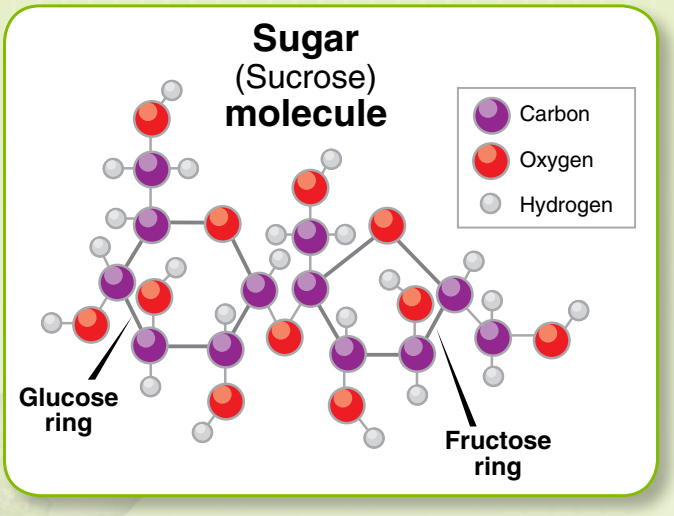
Sugar/sucrose is a naturally occurring crystalline **carbohydrate**. Carbohydrates are the foundation of our food chain. They are the chief form in which plants store energy. The energy we get from eating carrots, broccoli, apples, bananas, or potatoes comes from the carbohydrates the plant has stored in its roots, seeds, leaves, stems, or fruit. When sugar is **refined** it is simply extracted from the plant and remains in its natural form. The sugar in a carrot, apple or banana is the exact same sugar that is in your sugar bowl.



sugar crystals under a microscope

Sugar Molecule Scientific Formula:





Sucrose, or sugar, is made from a combination of carbon, hydrogen and oxygen **atoms**. While you can't see a carbohydrate, you *can* see a sugar crystal. A sugar **crystal** is made from thousands of sugar molecules bonded together. It's what you see when you look at a grain of sugar.

Glossary

- **molecule** - *n.* the smallest particle into which a substance can be divided and still remain the same substance
- **abundant** - *adj.* in great amounts; plentiful
- **organic** - *adj.* of or coming from living things
- **carbohydrate** - *n.* a substance, such as sugar, made up of carbon, hydrogen and oxygen. Carbohydrates are made by green plants.
- **refined** - *adj.* free of impurities; purified
- **atom** - *n.* the smallest unit of a chemical element
- **crystal** - *n.* a solid substance with sides and angles that naturally form a regular pattern

Making Sugar Crystals

Materials you'll need:

- 1 piece of cotton string
- 1 pencil or stick
- 1 paper clip
- 1 glass jar
- sauce pan
- measuring cup
- 1 cup water
- 2 cups sugar
- additional sugar (amount will vary)

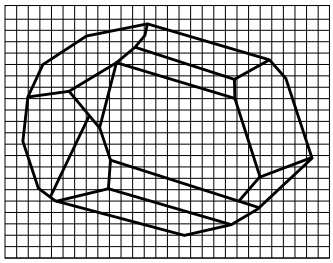
Tie a short piece of cotton string to the middle of a pencil or stick. Attach the paper clip to the loose end of the string for a weight. Next, moisten the string slightly and roll it in a bit of sugar. Lay the pencil across the top of the jar with the string hanging down inside.

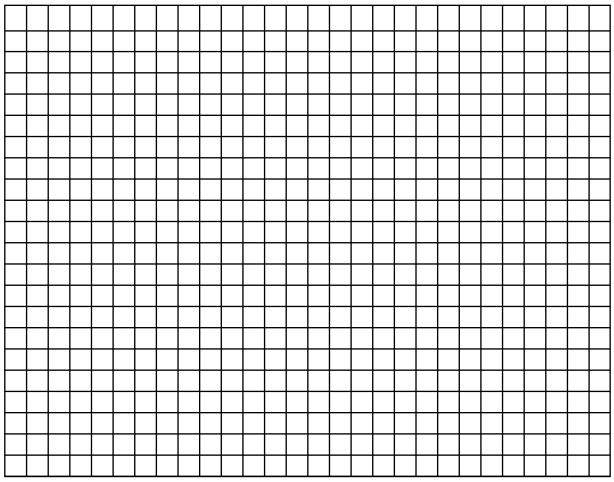
In a sauce pan, heat the water and dissolve 2 cups of sugar in it. Let it cool. Heat the sugar-water solution a second time and dissolve as much of the additional sugar as you can.

Pour the solution into the prepared jar and leave it undisturbed for a couple of days. You should start seeing crystals grow as the water evaporates.

Scale Drawing

Use the scale to draw an enlarged diagram of a sugar crystal. This would look great on a poster!





Molecule Model

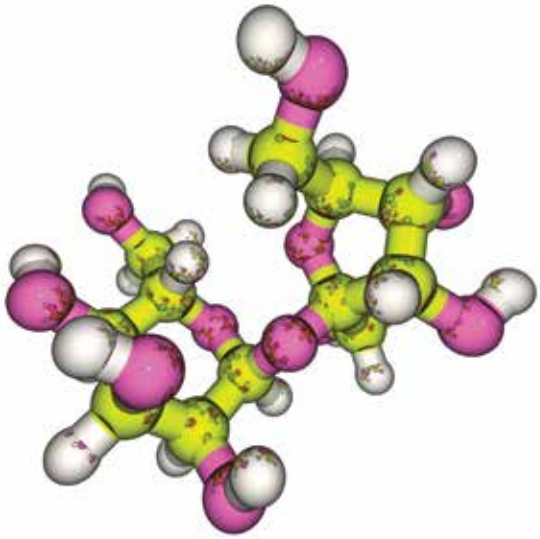
To make a sugar molecule come to life, construct a 3-dimensional model — what a cool science project!

Use the picture to the right as your guide.

Hint: Remember — use one color for each element: carbon, hydrogen and oxygen.

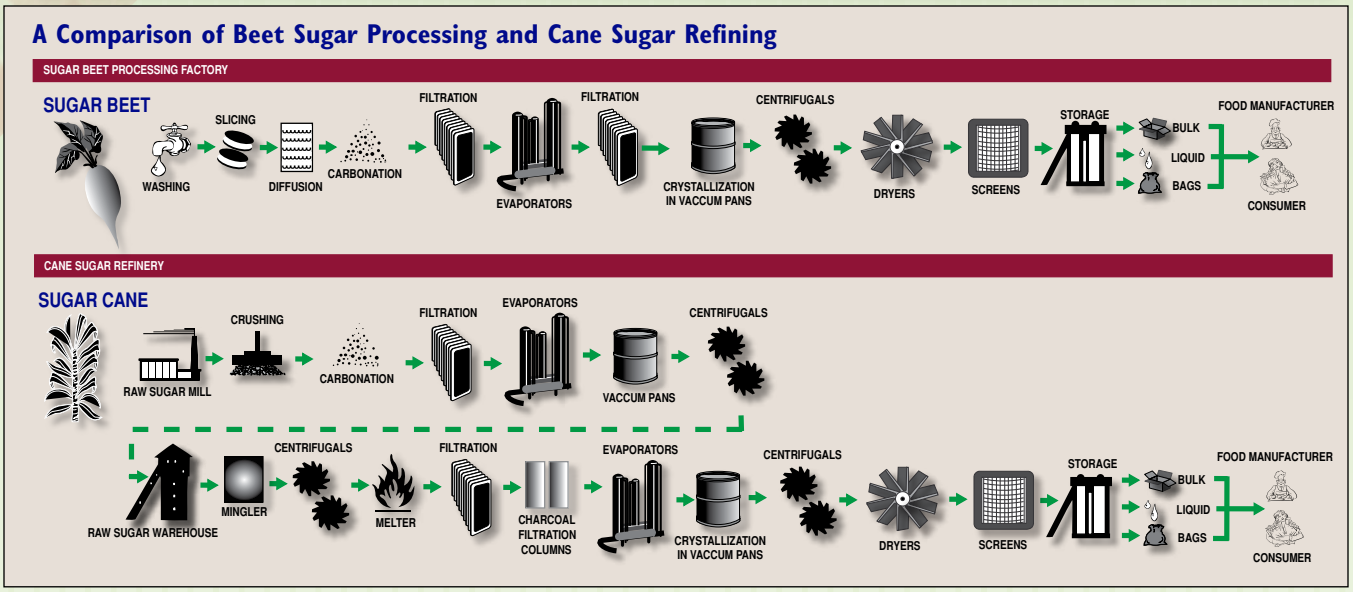
Materials you'll need:

- *Styrofoam balls - 3 colors*
- *45 toothpicks*



From the Field to the Table

Sugar comes from sugar cane and sugar beets, but how does it get out of the field and onto the table? Fortunately, nature has taken care of making the sugar; the cane and beets do that. We just have to extract and **purify** *the sugar (sucrose) from these plants. Sugar cane mills and refineries and sugar beet processing facilities are the next step once the plants leave the field.*



Sugar Cane Mills

After it's harvested, the sugar cane goes to a mill located near the field, where the raw sugar is separated from the plant and shipped to the refinery. Here's how it works:

At the mill, the sugar cane stalks are washed and cut into shreds by rotating knives. Next, huge rollers crush the juice out of the shredded **pulp**. This juice contains the sugar that will eventually find its way to your kitchen pantry and dining room table. The next three steps turn this juice into golden raw sugar:

1. *Purification* —The sugar juice is purified through a process called carbonation. Carbonation removes non-sugar plant materials like wax, fats and gums naturally present in all plant cells.

2. *Evaporation* — The sugar juice is filtered. Then the juice is boiled to remove the water in a process called **evaporation**. This leaves behind a clear, golden syrup.

3. *Crystallization* — As the water evaporates from the syrup, sugar crystals begin to form. These crystals are sent to a centrifuge. This machine works like the spin cycle on your washing machine. As it spins faster and faster, sugar crystals are washed, leaving behind golden, raw sugar.

Sugar Cane Refineries

The golden, raw sugar is transported to a sugar cane refinery where it is washed to remove the brown molasses which naturally surrounds the sugar. This washing **transforms** the crystals back into syrup. After the molasses is removed,

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the clear syrup is boiled to remove some of the water by evaporation. This thick syrup is then evaporated a second time and sugar crystals are formed.

The sugar crystals are spun in a centrifuge again to remove the excess syrup. Then the sugar is dried and packaged. By the time the sugar leaves the factory, it is ready for the table.

Sugar Beet Processing Facilities

From the field, sugar beets make only one stop — skipping the mill and heading straight for processing. The plants have already made the sugar, so the processing facility simply gets it ready for your table.

The beets are cleaned and sliced into thin strips called cossettes. These thin strips are washed in hot water, and this water **absorbs** the sugar. The non-sugar particles are removed from the sugar juice by carbonation. Next, the sugar juice is **filtered**. The filtered juice is boiled to evaporate the water and form a thick syrup, something like pancake syrup. Workers repeat this process to ensure that the syrup is pure. Again, the syrup is boiled, and this is when sugar crystals begin to form. The sugar crystals are spun in a centrifuge to remove the syrup. After one more hot bath, the sugar crystals are dried and then packaged. The next stop is the grocery store shelf.

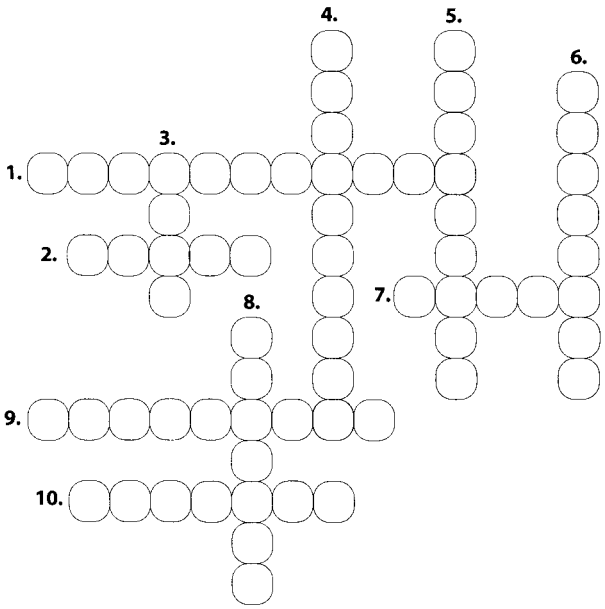
You won't be able to tell if it comes from a cane or a beet, but you can be sure that the sugar you use is 100% pure and natural.

Glossary

- **purify** - *v.* to make pure; to clean out unwanted materials
- **pulp** - *n.* the soft, juicy part of fruits and certain vegetables
- **evaporation** - *n.* the process of changing from a liquid into a vapor or gas
- **transform** - *v.* to change in form, nature, function, or appearance
- **absorb** - *v.* to take in or soak up
- **filter** - *v.* to pass through a device that cleans unwanted matter from air or liquid

Complete this crossword puzzle, and you've processed a lot of sweet information.

Crossword Puzzle



Down

3) Soft juicy part of a fruit or vegetable
4) Works like the spin cycle in a washing machine
5) To change very much in form, nature, function, or appearance
6) The sugar juice is _____ then boiled.
8) Sugar is 100% pure and _____.

Across

1) Process of changing from a liquid to a gas
2) Located near sugar cane fields
7) Sugar crystals are naturally _____-less.
9) Thin strips of beets
10) Hot water _____ the sugar.

ANSWER KEY:

DOWN	ACROSS
3. PULP	1. EVAPORATION
4. CENTRIFUGE	2. MILLS
5 TRANSFORM	7. COLOR
6. FILTERED	9. COSSETTES
8. NATURAL	10. ABSORBS

It's Sweet to the Environment

Sugar is a gift from nature. The sugar industry, as a responsible **caretaker**, gives back to the environment as much as it can. Sugar farmers, millers, producers, and scientists are respectful of sugar's value and do all that is possible to **utilize** this gift in responsible ways.

Once they leave the field, sugar cane and sugar beet plants are headed for great things. Not only do they provide the sugar we eat, but the parts of the plants that are not used for sugar have important jobs, too. They're not just thrown away.

Would you believe some parts of these plants help power the factories that purify sugar? A substance called bagasse is one of the **by-products** of sugar cane. Not only can it fuel the processing facilities, bagasse has been used to produce electricity in nearby towns!

Cows, horses, and other livestock get their energy from the sugar beet plants, too. The tops of the plants make nutritious animal **fodder**, and the **residue** from the beet pulp is used in livestock feed. When it's further processed, it can be used as fiber or in other products.

Speaking of other products, molasses (which comes from the sugar purification process) is used in hundreds of goods. Many of them might be in your home right now! If you like gingerbread, you must like molasses, too. It's one of the key ingredients. Bakers, pharmaceutical companies, distillers and other food processors use this flavorful syrup in many of their products. Ask your mom; she probably uses it, too.

The men and women working in the factories and mills **appreciate** the value of these plants and help make sure that little is wasted in sugar refining. Even professionals working outside of the mills and factories "think green." Scientists have been experimenting with sugar for years. They have discovered many products that can be made better by using sugar. But, you may wonder, how does this help the environment? Good question.

The use of **renewable** materials is environmentally responsible. Researchers have discovered a biodegradable plastic made from sugar beet pulp that is an environmentally friendly product and helps reduce solid waste.

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Glossary

- **caretaker** - *n.* one that takes care of the house or land for an owner
- **utilize** - *v.* to make use of
- **by-products** - *n.* something produced in addition to the main product
- **fodder** - *n.* dry food used for animal food; feed
- **residue** - *n.* the part left after something is removed; remainder
- **appreciate** - *n.* the act of recognizing the worth or importance of something
- **renewable** - *adj.* capable of being replaced by natural ecological cycles

Solid waste is also reduced when you recycle. When sugar is added to paper, it recycles more easily. Paper made from sugar cane plant fibers is biodegradable, compostable and recyclable. How's that for looking out for Mother Nature!

When industries, like the sugar industry, make sure they are doing their best to protect our world, they are promoting environmental stewardship. Just like you, the sugar industry is sweet on nature!

Unscramble the following words, putting one letter in each space. Then combine the circled letters to answer the question. This is a really sweet brain twister.

Q: By using renewable materials and recycling we help the _____?

1. TNUREA ___ ___ ___ ___ ___ ___
2. LMILS ___ ___ ___ ___ ___
3. LAEUV ___ ___ ___ ___ ___
4. USIREDE ___ ___ ___ ___ ___ ___ ___
5. TRCEAAKRE ___ ___ ___ ___ ___ ___ ___ ___ ___
6. NREGE ___ ___ ___ ___ ___
7. TILZIEU ___ ___ ___ ___ ___ ___ ___
8. DEFORD ___ ___ ___ ___ ___ ___
9. SOMSLAES ___ ___ ___ ___ ___ ___ ___ ___
10. SEOBPLINSER ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
11. ASEBGSA ___ ___ ___ ___ ___ ___ ___

Now you're ready to unscramble and combine the circled letters to answer the question.

12. ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

ANSWER KEY:

1. NATURE
2. MILLS
3. VALUE
4. RESIDUE
5. CARETAKER
6. GREEN
7. UTILIZE
8. FODDER
9. MOLASSES
10. RESPONSIBLE
11. BAGASSE
12. ENVIRONMENT

Sugar - More Than Just Sweet Taste!

All over the world, sugar has been an important ingredient for thousands of years.

You may not know it, but there's a lot of chemistry going on when ingredients in a recipe are put together. Sugar plays an **essential** role in the way foods look, last, and let's not forget, taste!

Sugar is made of carbon, hydrogen, and oxygen atoms. Its molecular structure ($C_{12}H_{22}O_{11}$) makes it easy to **bond** with other molecules. Sugar is also hygroscopic (absorbs moisture) this makes it an efficient natural preservative.

What are sugar's amazing powers in cooking and baking?

- Sugar grabs the available water in foods. This is important because bacteria grow in moist environments. By soaking up the water, sugar acts as a preservative which prevents the growth of the **microorganisms** that can spoil food. This is true for many products such as jams and jellies and even breakfast cereal, bread and other baked goods.
- Sugar reacts with protein in the food. The more sugar a food contains, the more brown it will become. The scientific name for this change is the Maillard reaction.
- Sugar can also brown foods through a process called caramelization. When the sugar is heated, it changes, or caramelizes. If you heat white table sugar in a pan, it will turn into a beautiful caramel sauce you can use on ice cream or fruit.
- Bread is made with baker's yeast, which feeds on sugar. When the yeast **consumes** the sugar, it releases a gas called carbon dioxide. This gas is what makes the dough rise.
- Cookies have a crumbly structure because when you beat together butter or shortening with sugar, air pockets are made, and this contributes to the **texture**. Cookies are crisp because sugar absorbs the moisture from other ingredients when baking.
- Sugar absorbs water and inhibits flour gluten development providing the proper texture in baked goods. A little sugar = dense texture like in a roll; a lot of sugar = fluffy texture like in a cake.

- Sugar helps retain moisture to extend baked goods **shelf life**.
- Sugar balances sour, bitter and spicy components in spaghetti and barbeque sauces and the dressings you put on your salad.
- Ice cream is creamy because sugar lowers its freezing point, slowing down the freezing process. This creates a smooth, creamy **consistency** that's easy to scoop.
- Vegetables have that fresh-from-the-garden taste when a little sugar is added. Sugar naturally **enhances** flavors and helps strengthen fiber and cell structure in fruits and vegetables during cooking.

For more information on baking science, go to www.homebaking.org

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Glossary

- **essential** - *adj.* very important; vital
- **bond** - *v.* to stick together
- **microorganisms** - n. an organism that can be seen only through a microscope
- **consume** - *v.* to use up
- **texture** - *n.* the look or feel of something
- **shelf life** - *n.* the period of time food stays fresh
- **consistency** - *n.* the degree of how stiff, thick, or firm something is
- **enhance** - *v.* to make greater; improve
- **versatility** - *n.* the ability to do many things well

Well, we've talked about the many functions of sugar, so now let's look at the types of sugar we use most.

Granulated Sugar

Granulated sugar is the white sugar you see in the store or on your table. These sugar crystals are formed during the purification process when the molasses surrounding the sugar crystals is removed.

Brown Sugar

Brown sugar can be made two ways. Some companies stop washing the sugar while it still has some molasses on it. Other companies wash the sugar until it's white, then add molasses back into the washed sugar. You've probably seen light brown and dark brown sugar. The difference between the two is that dark brown sugar has a stronger molasses flavor. Dark brown sugar is used in gingerbread, baked beans, and other full-flavored foods. Light brown sugar is commonly used for baking.

Confectioners' Sugar

Confectioners' sugar is also known as powdered sugar. It's powdery because the sugar particles are much finer than granulated sugar crystals. A small amount of cornstarch is added to confectioners' sugar so that the particles remain separate. This fine texture is what makes frosting smooth.

Evaporated Cane Juice

Some sugar is crystallized in a single-step process, rather than using many steps. This sugar is called evaporated cane juice. It keeps more of the flavor, color, and aroma of the cane juice.

Raw or Turbinado

Raw and Turbinado sugar have been refined to a light tan color by washing in a centrifuge to remove surface molasses.

Whether it's granulated, brown, powdered sugar, or evaporated cane juice, sugar is sweet. We all know that, but now you know that sweetening foods is only one of sugar's amazing powers. Its unique **versatility** makes sugar an essential ingredient in the foods we eat. They taste better, look more pleasing, and last longer.

Here are some pretty cool activities you can do in the kitchen. Be sure to have an adult help you. Your friends and family will be impressed with all the things you know about sugar!

1. **Make Your Own Brown Sugar** -This would be a fun demonstration!

   Brown Sugar Recipe

   - 1 cup white, granulated sugar
   - 1 tablespoon molasses
   - food processor or blender

   Pour the sugar into a food processor or blender. Add the molasses. Blend until the molasses coats the sugar. Ta da!

2. **Create Your Own Caramelized Sugar** - This is why our cooked foods turn that yummy, golden brown color. Mmmm...

   Caramelized Sugar Recipe

   - 1/2 cup sugar
   - 2 tablespoons water

   Cook over medium heat, stirring constantly, until mixture melts and begins to turn brown. Remove from heat and let cool.

3. **Conduct Your Own Taste Test** - Just a little bit of sugar can make a big improvement in how vegetables taste. Use this recipe to prepare some broccoli using 1 teaspoon of sugar in the water. Then, prepare a batch without sugar. Ask your friends and family to taste some broccoli from each batch and tell you their favorite. Create a graph to chart your results — how very scientific of you!

   Broccoli Taste Test Recipe

   - 1 cup fresh broccoli
   - 1 teaspoon sugar
   - 1/2 inch water in a saucepan

   Place ingredients in saucepan and cover. Heat to simmer and cook 5 minutes or until tender. Drain cooked broccoli. Make a new batch without the sugar.

   Now you're ready for your taste test!

A *Sweet* Part of a Healthy Diet!

You've probably heard how important it is for you to eat a nutritious, balanced diet, but did you know that sugar can make a healthy diet more **palatable**?

Sugar is a **macronutrient**. There are three different types of macronutrients: carbohydrates, proteins and fats. Sugar is a carbohydrate. Fiber and starch, which also are found naturally in plants, are also carbohydrates. Carbohydrates and proteins supply your body with 4 calories per gram, while fats provide you with a whopping 9 calories per **gram**! A whole teaspoon of sugar has only 15 calories. If you eat more calories than you **expend**, no matter if the calories come from carbohydrates, proteins, or fats, the excess energy is stored as added weight on your body. That's why it's important to balance the food you eat with regular physical activity. And, it's important to remember that foods and beverages that don't provide nutritional value (vitamins and minerals) should not be the centerpiece of your diet but consumed as treats.

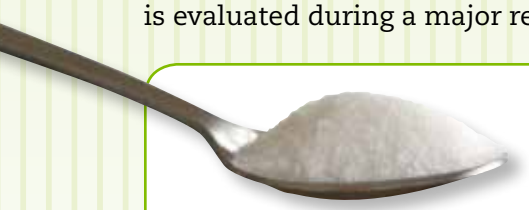
Don't forget to pay attention to your portion size. For perspective take this portion size quiz. http://hp2010.nhlbihin.net/portion

Sugar is a safe addition to a healthy, balanced diet. Sugar has been an important ingredient in people's diets for centuries and the subject of countless studies. When the full body of science is evaluated during a major review of scientific literature, experts continue to conclude that sugar consumed in moderation is not a major contributing factor in diseases such as hyperactivity, diabetes and obesity.

Listen to a diabetes expert – http://diabetes.webmd.com/video/kahn-eating-sugar-cause-diabetes

Carbohydrates can cause dental **caries** but the kind of carbohydrate isn't as important as the length of time it remains on your teeth. So, make sure you brush and floss after eating, and visit your dentist regularly!

Remember, making sure that fruits, vegetables, whole grains and other fiber and calcium rich foods are the centerpiece of your diet is important. Sugar makes many of these healthful foods palatable, which helps contribute to intakes of important vitamins and minerals. Getting ready for breakfast? Go ahead, sprinkle a little brown sugar on that bowl of nutritious oatmeal. Sugar makes healthy foods taste even better so you want to eat them!



= 15 calories

4 grams

Glossary

- **palatable** - *adj*. tasty … acceptable or agreeable
- **macronutrient** - n. a nutrient (a carbohydrate, protein, or fat) that is present in large quantities in foods
- **gram** - *n*. a unit of weight measurement. A gram weighs about as much as a small paper clip.
- **expend** - *v*. to burn up or use up
- **capacity** -*n*. ability
- **caries** - *n*. cavities; tooth decay

The Nutrition Facts panel found on food labels is the best source for learning what amount of each macronutrient is in the foods you eat. On the food label, the word "Sugars" means the sucrose, lactose and fructose that the food naturally contains, and also other added sweetening ingredients. For example, an 8 ounce glass of milk contains 12 grams of lactose and this 12 grams of lactose is included in the "Sugars" grams on the Nutrition Facts panel. This is why a yogurt may seem like it has a lot of grams of "Sugars" but remember, because of the lactose, not all the "Sugars" grams are added.

Using the information in the Nutrition Facts panels, fill in the chart below to learn the amount of macronutrients in this meal. Don't forget to check the serving size.

one apple
one cup of milk
a sandwich with 2 slices of bread
2 Tbsp peanut butter
2 Tbsp strawberry jam

Do the milk and apple have sugars? Where do they come from?

	PROTEIN	FAT	CARBOHYDRATE	SUGARS	CALORIES
Apple					
Milk					
Wheat Bread					
Peanut Butter					
Strawberry Jam					
Total					

Whole Wheat Bread

Nutrition Facts
Serving Size 1 slice (34g)
Servings Per Container 20
Amount Per Serving
Calories 90 Calories from Fat 11
% Daily Value*
Total Fat 1g 2%
Saturated Fat 0g 0%
Cholesterol 0mg 0%
Sodium 160mg 7%
Total Carbohydrate 15g 5%
Dietary Fiber 2g 8%
Sugars 2g
Protein 4g
Vitamin A 0% · Vitamin C 0%
Calcium 0% · Iron 4%
*Percent Daily Values Based on a 2000 Calorie Diet

Peanut Butter

Nutrition Facts
Serving Size 2 Tbsp (32g)
Servings Per Container 15
Amount Per Serving
Calories 190 Calories from Fat 140
% Daily Value*
Total Fat 17g 25%
Saturated Fat 3g 16%
Cholesterol 0mg 0%
Sodium 150mg 6%
Total Carbohydrate 5g 2%
Dietary Fiber 2g 8%
Sugars 2g
Protein 9g
Vitamin A 0% · Vitamin C 0%
Calcium 0% · Iron 2%
*Percent Daily Values Based on a 2000 Calorie Diet

Strawberry Jam

Nutrition Facts
Serving Size 1 Tbsp (20g)
Servings Per Container About 44
Amount Per Serving
Calories 50 Calories from Fat 0
% Daily Value*
Total Fat 0g 0%
Saturated Fat 0g 0%
Cholesterol 0mg 0%
Sodium 0mg 0%
Total Carbohydrate 13g 4%
Dietary Fiber 0g 0%
Sugars 12g
Protein 0g
Vitamin A 0% · Vitamin C 0%
Calcium 0% · Iron 0%
*Percent Daily Values Based on a 2000 Calorie Diet

Apple

Nutrition Facts
Serving Size 1 medium (125g)
Servings Per Container 1
Amount Per Serving
Calories 65 Calories from Fat 2
% Daily Value*
Total Fat 0g 0%
Saturated Fat 0g 0%
Cholesterol 0mg 0%
Sodium 1mg 0%
Total Carbohydrate 17g 6%
Dietary Fiber 3g 12%
Sugars 13g
Protein 0g
Vitamin A 1% · Vitamin C 10%
Calcium 1% · Iron 1%
*Percent Daily Values Based on a 2000 Calorie Diet

2% Low-fat Milk

Nutrition Facts
Serving Size 1 cup (236 ml)
Servings Per Container 1
Amount Per Serving
Calories 130 Calories from Fat 45
% Daily Value*
Total Fat 5g 8%
Saturated Fat 3g 15%
Cholesterol 20mg 7%
Sodium 135mg 6%
Total Carbohydrate 13g 4%
Dietary Fiber 0g 0%
Sugars 12g
Protein 8g
Vitamin A 10% · Vitamin C 2%
Calcium 30% · Iron 0%
*Percent Daily Values Based on a 2000 Calorie Diet

Project:

Use food labels at home to figure out how much of each macronutrient you eat in one day. Don't forget to include snacks. Be sure to check the serving size. If you eat two servings, double the numbers! Make a graph like the one above to show all the macronutrients you eat in a day.

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