ep·i·cu·ri·os·i·ty

ep·i·cu·ri·os·i·ty

noun \e-pi-kyu̇r-ē-'ä-s(ə-)tē\

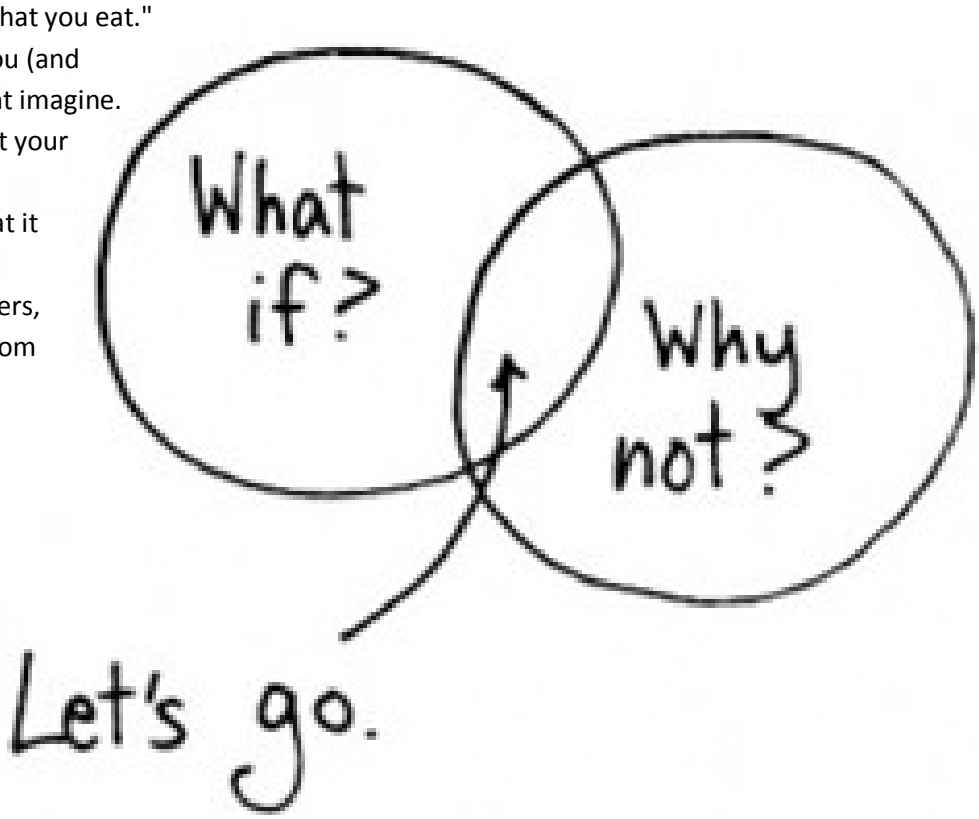
: the desire to learn or know more about something or someone related to food and drink

: something related to food and drink that is interesting because it is unusual

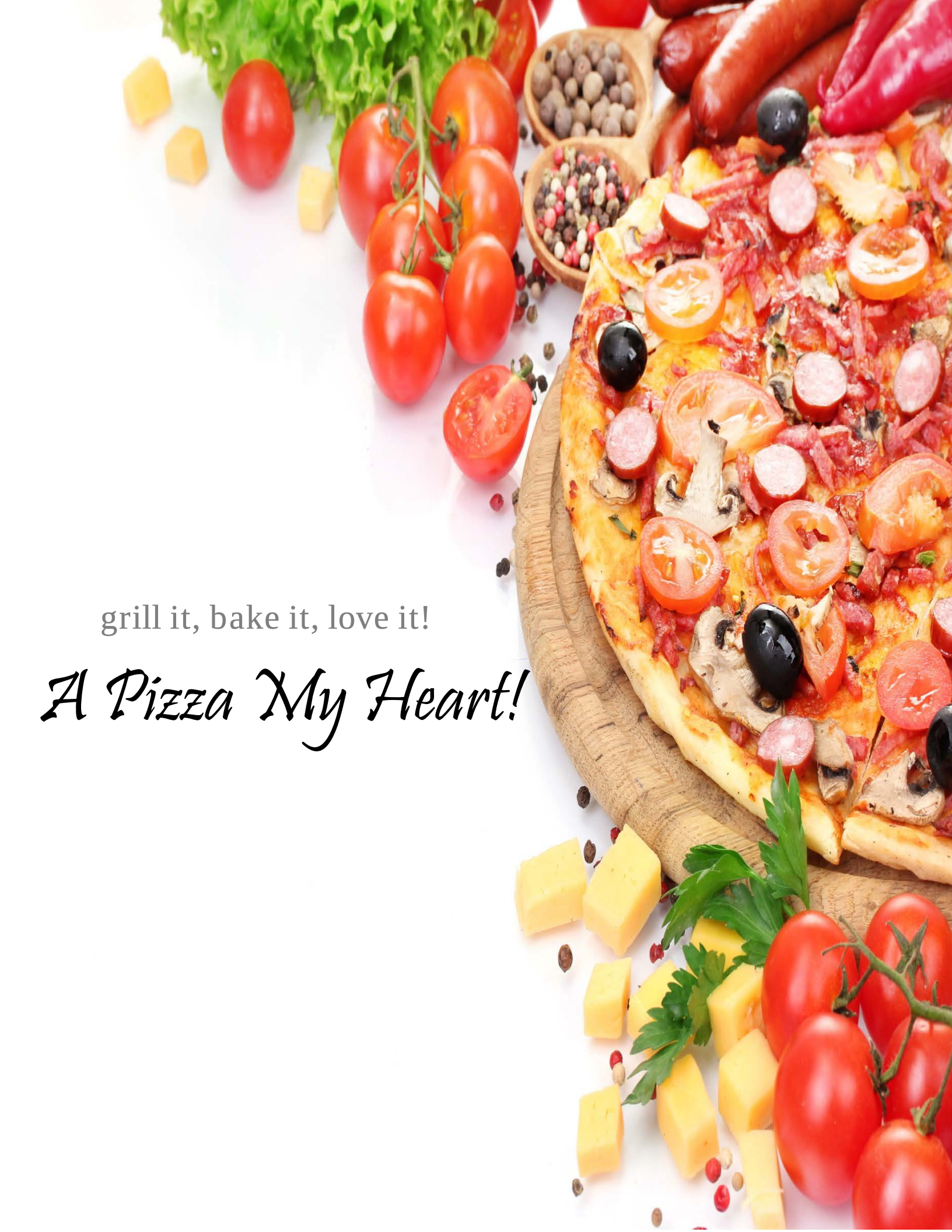
Edible Innovations

What is food science? Hear how much fun it is from the scientists themselves! "They pay me to play with food!" Watch now at: https://www.youtube.com/watch?v=72eHulakdLc

The old saying goes "you are what you eat." So what does that say about you (and America?) More than you might imagine. Have you ever wondered about your food? Where it's from, how it's processed, how it's made, what it does and doesn't contain? You have questions, let's find answers, and fabulous favorites made from scratch!



Index



grill it, bake it, love it!

A Pizza My Heart!

piz•za

noun \ˈpēt-sə\

: a dish made typically of flattened bread dough spread with a savory mixture usually including tomatoes and cheese and often other toppings and baked —called also *pizza pie*.

A Slice of History: Pizza through the Ages

Think Italian cuisine and three dishes immediately come to mind: spaghetti, tomato, and pizza, yet none of them originated in Italy!

Pizza lovers can suck down several sauce-laden slices in mere minutes (every second, Americans eat 350 slices of pizza. That's 23 pounds per person, per year. As a nation we buy over 3 billion pizzas annually), pizza didn't develop out of nothing.

Some form of pizza, or another, has been around for a long time! Archeologists have found evidence of pizza (flat flour cakes believed to be topped with oils and herbs) in Pompei in 79AD! Later Pompei and Neopolis would become centers of pizza, and Neopolis would eventually become Naples, the home of pizza.

Technically an independent kingdom, Naples was notorious for its throngs of working poor, or lazzaroni. Unlike the wealthy minority, these Neapolitans required inexpensive food that could be consumed quickly, they had to get back to work! Pizza—flatbreads with various toppings, eaten for any meal and sold by street vendors or informal restaurants—met this need. Judgmental Italian authors often called their speedy eating habits 'disgusting.'" These early pizzas eaten by Naples' poor featured the tasty garnishes beloved today, such as tomatoes, cheese, oil, anchovies and garlic; and ones people today might not like so much like pork fat and lard.

Now, one of our favorite toppings wasn't possible till about 1522, when explorers brought tomatoes from Peru back to Italy. It's hard to imagine Italian food without the tomatoes these days. Interestingly it took a while before Italians would even touch or eat tomatoes. Why? Because everyone thought they were poisonous.

Italy unified in 1861, and King Umberto I and Queen Margherita Teresa Giovanni visited Naples in 1889. Legend has it that the traveling pair became bored with their steady diet of fancy French *haute cuisine* and asked for an assortment of pizzas (common man's food). Don Raffaele Esposito, who owned Pietro Il Pizzaiolo, was asked to prepare a special dish in honor of the Queen's visit. Esposito consulted his wife, who was the real pizza expert, and together they developed a pizza featuring tomatoes, mozzarella cheese, and basil, food that would represent the colors of Italy and the colors of the Italian flag. They named it the Margherita Pizza, after the city's royal guest of honor and it was the variety the queen enjoyed most. From then on, the story goes, that particular topping combination was permanently dubbed pizza Margherita in her honor.

Queen Margherita's blessing could have been the start of an Italy-wide pizza craze. After all, flatbreads with toppings weren't unique to the lazzaroni or their time—they were consumed, for instance, by the ancient Egyptians, Romans and Greeks. (The latter ate a version with herbs and oil, similar to today's focaccia.) And yet, even with the Queen's royal approval, until the 1940s, pizza would remain little known in Italy beyond Naples' borders.

An ocean away, immigrants to the United States from Naples were replicating their trusty, crusty pizzas in New York and other American cities, including Trenton, New Haven, Boston, Chicago and St. Louis. The Neapolitans were coming for factory jobs, as did millions of Europeans in the late 19th and early 20th centuries; they weren't seeking to make a culinary statement.

Back in Italy they would use buffalo mozzarella and oregano. In the States, when they couldn't get those ingredients, they would substitute with what was available, cow's milk mozzarella and sweet marjoram.

The first documented United States pizzeria was G. (for Gennaro) Lombardi's grocery store on Spring Street in Manhattan, licensed to sell pizza in 1905! (Prior to that, the dish was homemade or purveyed by unlicensed vendors.) Gennaro Lombardi, began selling his pizza for the princely sum of a nickel per pizza (only $1.02 in today's money). Lombardi's, still in operation today though no longer at its 1905 location has the same oven as it did originally in 1905!

The most elemental form of NY pizza, often called Neapolitan-American, shares much in common with the original Neapolitan type: a thin crust, a very light covering of tomato sauce, and a smattering of fresh mozzarella cheese. But they differ in cooking technique, size, and texture. In Naples, the pies are cooked with wood and the center of the pizza tends to be soft and floppy. Neapolitan pies are intended for one person and a knife and fork is required. The original NY pies were larger, averaging a 14"-16" diameter, and were cooked in coal fired ovens until crisp from edge to edge.

Hungry History

In this exclusive Hungry History video, host Ian Knauer serves up pizza history, from the flatbreads of ancient Pompeii to today's pies. He also takes us through the steps of making a classic Margherita pizza at home. Did you know oil is a key ingredient in pizza crust-helping to fry the dough from the inside out, giving you an extra crispy crust? Follow his recipe (taken from his cookbook "The Farm: Rustic Recipes for a Year of Incredible Food") or another to turn your classroom into an authentic pizza parlor. Watch now at: http://www.history.com/news/hungry-history/pizzas-past-and-present-video

Lombardi's thrived in Little Italy, feeding legions of factory workers and immigrants longing for a taste of home. It was so popular that Lombardi soon entirely stopped selling groceries and started selling pizza exclusively. Numerous employees struck out on their own, fanning out across the city and spreading the distinctive style of pizza.

Relatively quickly, the flavors and aromas of pizza began to intrigue non-Neapolitans and non-Italians. And as the soldiers came home from Italy and Europe after WW2, they came home talking about and seeking to satisfy the taste they had acquired for Italian pizza while liberating Europe. Soon, pizzerias where opening in neighborhoods all over the city, not just Italian-American ones.

As Italian-Americans, and their food, migrated from city to suburb, east to west, especially after World War II, pizza's popularity in the United States boomed. No longer seen as an "ethnic" treat, it was increasingly identified as a fast, fun food.

Postwar pizza finally reached Italy and beyond. "Like blue jeans and rock and roll, the rest of the world, including the Italians, picked up on pizza just because it was American." Regional, decidedly non-Neapolitan variations emerged, eventually including Chicago's deep dish, New York's thin crust, California's *extra* thin crust, Sicilian style, and more. Reflecting local tastes, toppings can run the gamut from Gouda cheese in Curaçao to hardboiled eggs in Brazil. Yet international outposts of American chains like Domino's and Pizza Hut also thrive in about 60 different countries.

Sicilian Style?

Characterized by a rectangular shape due to being pan cooked, with a crust that is generally over an inch thick, this style of pizza originated in the bakeries, not the pizzerias, of Sicily, where it is sold as Sfinciuni. In Sicily, Sfinciuni is topped with a tomato sauce spiked with anchovies and onions under a canopy of breadcrumbs rather than the tomato sauce and cheese we see in NYC.

Today you can still get different kinds of pizza all around the country like dessert pizzas (chocolate-cherry-berry pizza, anyone?), and decidedly different pizzas like today's gourmet pizzas topped with anything you can imagine, like barbecued chicken, asparagus, truffles, quail eggs, crusts made with duck fat, pizzas covered in smoked salmon, or global ingredients like boquerones and merguez sausage. There's an increasing number of interesting vegetarian and vegan combinations such as seitan sausage, Daiya non-dairy cheese and cornmeal-crusted mushrooms and the option for whole wheat or gluten-free crust. Perhaps one of the quirkiest American pizza variations is the Rocky Mountain pie (also called The Legendary Colorado Style Pizza) a thick pie (rather like a deep dish) topped with mountains of ingredients, baked with a supersized, braided doughy crust to save for last. Then you dip it in honey and have it for dessert.

And you can occasionally snag a chance to pay for a class with a renowned pizza chef that allows attendees to get in on the secrets of making pizza for only a few hundred bucks. The world of pizza has certainly expanded, but it all started with one, the Margherita—cheese, tomatoes, basil, and a little olive oil.

Did You Know?

- During World War II, Ira Nevin served in Naples and returned like so many other GIs with an appreciation for pizza. But Nevin had a secret weapon: His suburban New York family was in the oven business. Nevin came home and invented the first gas-fired, ceramic deck pizza ovens. Cleaner and more efficient than coal-fired models, they lured entrepreneurs to open pizzerias, and pizza spread faster than melted mozzarella.

Pomodoro! The Red Menace

How the 'strange and horrible' tomato conquered Italy, and America

So thoroughly have New World foods been integrated into the European diet that today people find it difficult to imagine Italy without tomatoes, France without haricots verts, and Ireland without potatoes. However, it Europeans a long time to accept some of the new foods (well into the 1700s people looked on potatoes with fear and contempt, and some thought they caused leprosy), and it took a long while for Italy to adopt the tomato as its national vegetable-like fruit.

Ah, the height of tomato season, when fat red beefsteaks, purple and green heirlooms, and tiny, sweet Sungolds beckon at the farmers market. They're wonderful in crisp salads, as refreshing gazpachos, and all on their own. Perhaps most of all, tomatoes are synonymous with Italian foods. Without the tomato, pizza would be bread and cheese, spaghetti would seem naked. Meatballs without red sauce? Impossible! But the tomato's role in Italian food is fairly recent.

It has always bothered some that Italians call the tomato a "*pomodoro*", a golden apple, and have done so since the early 16th century. Don't they know that most tomatoes are red, not yellow, and that they aren't exactly "apples" either?

Historians have come up with a few different answers we'll go through. One is that when explorers (after conquistador Hernan Cortes's conquest of Mexico he brought tomatoes to Spain) first brought tomatoes to Europe from the New World (where it was domesticated by the Maya, then cultivated by the Aztecs), they also brought over tomatillos. Tomatoes (called "tomatl" by the natives) and tomatillos were considered interchangeable (they are botanical and culinary cousins, but tomatillos aren't tomatoes), and many tomatillos are yellow. Italy and most of the rest of Europe soon took a pass on the tomatillo (Francisco Hernandez, a personal physician to King Philip II of Spain, was sent to the New World to write a huge compendium on animals and plants. He was dismayed and disgusted by the appearance of the tomatillo, and considered it the same thing as a tomato), but the name stuck. "Pomodoro" it was.

The tomato belongs to the nightshade family, along with a number of poisonous plants, not to mention tobacco, and its smell on the vine is not always reassuring that it is something good to eat. Along with other edible members of the nightshade family introduced to Europe at the same time - potatoes, capsicums, aubergines - tomatoes were at first hard to figure out, hard to do something with. And there were a few obstacles in the way, what do you call it, what can you do with it, and what if you'd never

seen anything like it? When it arrived on the scene in Italy, it was strictly a curiosity for those who studied plants — not something anyone faint of heart would consider eating.

For this reason, tomatoes were grown mainly as ornamentals (decorations) in gardens or flower beds. The tomato's ability to mutate (change), crossbreed, and create new and beautiful different varieties helped contribute to its success and spread throughout Italy, even if no one was eating it.

Eww, it grows on a Vine!

Why was the tomato initially regarded with such horror? The tomato was associated with the eggplant, which was regarded with suspicion. It's a vine. Anything that grows along the ground was seen as something you only give to peasants because it touched the dirt (rich and powerful people didn't touch anything associated with dirt.) However, they were not adopted as a staple of the peasant population because they were not considered as filling as other foods already available.

At the time foods were classified by a few, specifically 4, different qualities — "cold," "wet," "hot," and "dry" and it was only considered safe to eat a food if those qualities were in balance. Tomatoes were viewed as cold and moist. The medical advice was to stay far away from these (cold, moist) things. A doctor at the time called tomatoes "strange and horrible things" in a discussion of possible edibles that also included the consumption of locusts, crickets, and worms.

Under this system practically all fruits and vegetables were considered harmful. For example, the tomato was thought to hinder digestion (cooling down the stomach) because it was cold and watery. Melons in particular were considered really dangerous. The only way to eat something cold and moist like melon was to wrap it in prosciutto or ham, which is hot and dry. It was a way of balancing the food. Later, when ideas about digestion changed, something like a tomato was not harmful anymore.

The Brave Spaniards

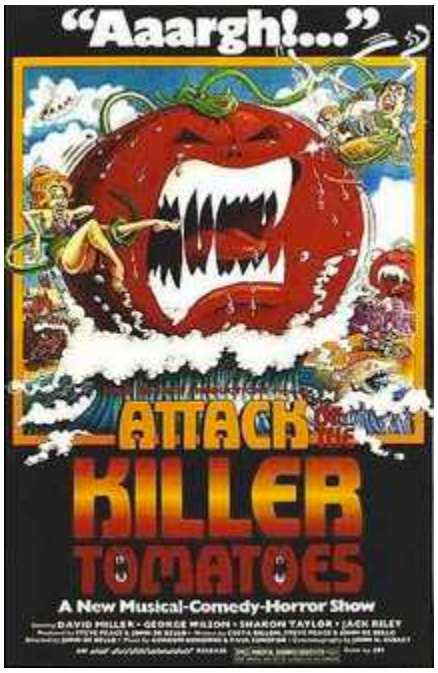
One can imagine the moment: a 16th-century botanist in Tuscany is puzzling over this new object, the *pomodoro*, brought to him by a sailor friend. What should he do with it? Try it out on the tennis court? Use it to cushion the insoles of wood-bottomed shoes? He tries to stick it in his ear. Nothing. At last, he tries something bold. He takes a bite of it. Eureka! And then he thinks, this would be good with a little garlic and oil, a sprig of basil, a slice of mozzarella.

So, that may or may not have happened, but we do know that Spaniards actually led the way in eating the tomato, teaching Italians to fry tomatoes up with aubergines (that scary eggplant, also known as brinjal, melongene, garden egg, or guinea squash), squash and onions, and use the dish (now famous as ratatouille) for a condiment. Italian peasants, especially those in the south and on Spanish-influenced islands, who often lacked other resources, came more and more to rely on a largely (lower-cost) vegetarian regime (now famous as the Mediterranean diet) in which tomatoes, raw or cooked, were teamed with oil, seasonings and other vegetables, and eaten as a main dish in a meal along with bread or some other cereal product.

They started eating them in the late 1700s, in the 1800s, with the south and especially Naples again leading the way, comes *pasta al pomodoro*, along with the pizza Margherita. Tomatoes took off in Italy because they became an industry, mostly for export. Italians were too poor to buy such things. Most of the country's processed tomatoes are exported. In Italy, up until the 1950s, there was a large part of the country, even where they produce tomatoes, where they still wouldn't eat the stuff.

The Wolf Peach! Attack of the Killer Tomatoes

Even today, it's a fairly commonly-held belief that tomatoes (*Solanum lycopersicum*, the scientific species name of the tomato plant) were once poisonous but that the poison was "bred out of them" so they could be eaten. A real success story for a plant of ill repute. The story's not true, though. Well, it's partially true. Tomatoes are *still* poisonous.



The tomato plant's species name means "wolf peach", and that was actually its common name for a very long time. It's a weird name but it makes sense when you know the story behind it. The peach part should be pretty obvious — the tomato fruit has a juicy, fleshy inside like a peach. The wolf part is because, due to the plant's place in the *Solanaceae* or nightshade family, it was believed to be poisonous, and it was supposed to be a cheap poison for wolves that got too close to your property. You could throw tomatoes at them and they would die from eating them. Thus, a peach only fit for a wolf.

If you're thinking to yourself "but I eat tomatoes all the time and I never get poisoned," well, you're not totally right. The tomato fruit contains low levels of a toxic alkaloid called tomatine (go figure). Levels of tomatine are higher in the leaves and stem of the tomato plant (so don't eat tomato vines, just the tomatoes), and also in unripe tomatoes. In very large amounts, it can cause gastrointestinal distress. Nothing major, you just won't feel too good for a bit. Cases of tomatine poisoning are so low as to be nearly nonexistent thanks to the incredibly high dosage of tomatine necessary to become toxic to the body.

Botanists commonly believed (and some still believe) that the tomato contains the slightly more dangerous alkaloid solanine, but the FDA says it has debunked that claim. There hasn't been a single case of solanine poisoning in the US from eating potatoes (or tomatoes) in the last 50 years. It is estimated that it would take 2–5mg per kilogram of body weight to produce toxic symptoms. A large potato weighs about 300g and has a solanine content of less than 0.2mg/gm That works out to around 0.03mg per kilogram for an adult, a hundredth of the toxic dose. You would have to eat something like 67 large potatoes in a single meal to be poisoned.

To its credit, the tomato is actually very healthy — it contains high doses of the powerful antioxidant lycopene (again, go figure—lyco means wolf in Greek). Modern medicine believes lycopene to be an important part of cancer prevention in the body.

Death by. . . Tomato?

So why did everyone think tomatoes were deadly poisonous? A string of unfortunate misunderstandings, basically. For one, as mentioned, the plant is part of the *Solanaceae* family, which is filled with highly toxic plants like the deadly nightshade and mandrake. Early botanists can probably be forgiven for assuming the same of the "deadly" wolf peach. What really propelled the tomato into infamy, though, was the wealthy of Europe. At that time, only the rich could afford metal plates, and the most common metal plates were made of pewter. Acidic foods, like, say, the wolf peach, would draw out the lead in pewter, which could (and often did) result in lead poisoning. The lead poisoning was, of course, mistaken for wolf peach poisoning, giving the plant a bad name for centuries.

Although tomatoes are originally from South America, they didn't make their way to North America for quite some time. It was actually via Europe that they did! It took some time, too, to shake the fear in the United States that the golden fruits were poisonous. Doctors warned they caused not only appendicitis but also stomach cancer from tomato skins adhering to the lining of the stomach.

Tales of the tomato's toxicity reached the New World and were believed by nearly everyone until the 19th century (1800s), when one Colonel Robert Johnson of Salem, New Jersey brought tomatoes home from overseas. He grew them at home and wanted to share his delicious harvest but found that no one would eat them for fear of falling ill. He had even tried offering a prize yearly for the largest fruit grown, but the general public considered the tomato an ornamental plant rather than one for food.

To combat ignorance about the fruit (which he knew from experience to be delicious rather than deadly), he announced to the town at large that he would eat an entire bushel (about 53lbs) of tomatoes on the steps of the Salem courthouse and suffer no ill effects. Johnson is quoted as saying the following:

Composers in the Kitchen: Pasta by Paganini

Speaking of classical compositions, did you know that one of the earliest recipes we have of a tomato sauce was penned by Paganini, the famous Italian composer and violinist? Paganini suggests ravioli pasta to pair with his sauce. Mind you, in Paganini's recipe there are likely some ingredients you'd rather leave out. Like maybe the calf's brain.

It's probably no surprise that Niccolo Paganini loved food, because as a youngster he was deprived of it.

When he was five, he began to play the mandolin; two years later he switched to violin, all under the stern oversight of his father, Antonio. Little Paganini was forced to practice from morning until night, and if his persistence waned, his father wouldn't let him eat.

Maybe that's why the famed fiddle virtuoso — perhaps reminiscing about those difficult times — loaded up his ravioli recipe with about as much veal, sausage and butter as it could possibly stand. Later in life, Paganini would have had difficulty chewing all that meat, after two jaw operations in fall 1828 required the removal of all his teeth.

But even that probably didn't stop Paganini from enjoying the variety of cuisine he found in the various European cities — Paris, London, Vienna, Prague, Berlin, Warsaw — where he was routinely hailed as the world's greatest virtuoso.

Find his recipe here, transcribed from his own hand
http://www.npr.org/blogs/deceptivecadence/2010/11/23/131539698/composers-in-the-kitchen-paganini-s-meat-lovers-ravioli

"The time will come when this luscious, scarlet apple will form the foundation of a great garden industry, and will be eaten, and enjoyed as an edible food…and to help speed that enlightened day, to prove that it will not strike you dead — I am going to eat one right now!"

Over 2000 people showed up to watch what they believed would basically be a slow public suicide. The local fireman's band even played sad music to add to the perceived morbid display of courage while he sat there dressed in black and ate tomato after tomato (he did eat the whole basket of tomatos.) Johnson's doctor was among the skeptics, he shouted, *"The foolish colonel will foam and froth at the mouth and double over with appendicitis, and with all that oxalic acid, in one dose, he will be dead. He might even be exposing himself to brain fever. Should he by some unlikely chance survive his skin will stick to his stomach and cause cancer."* Obviously, the colonel suffered no ill effects besides possibly being really really full.

Johnson's public stunt garnered a lot of attention, and North America's love affair with the tomato was off and running. Word spread, and the tomato started to gain a better reputation in America and beyond. By 1842, farm journals of the time were touting the tomato as the latest craze and those who eschewed it as "objects of pity."

So, the tomato was always poisonous, but it was never a threat — just the victim of a smear campaign by a bunch of botanists, nervous Europeans, and some dinnerware.

Popular Pomodoros & Trendy Tomatos

Today the tomato industry is worth $2.2 billion in Italy, with thousands of acres of land devoted to Roma, San Marzano, and other varieties.

However, much of what goes into cans in Italy is imported tomatoes. You can have tomatoes from, say, Turkey, imported in an unfinished state, half-processed. This is supposed to be done away with, with new labeling legislation, but it's still hard to know if it has been. So the great Italian tomato industry is in some sense really the great Italian canning industry.

The fact is that Italy exports more tomatoes than it produces. It's got to be coming from somewhere. The sums don't add up. China is also a

Did You Know?

Superstition once had it that placing ripe tomatoes on a mantel when first entering a new dwelling would guarantee future prosperity or will ward off evil spirits

Pincushions the color and shape of ripe tomatoes were used instead if ripe tomatoes were not available. To this day, pincushions are most often red.

Nurserymen use tomato seedlings the way miners use canary birds. The seedlings cannot survive the smallest amounts of natural gas, so they're placed in greenhouses to warn of leaking gas heaters.

According to the 1996 edition of the Guiness Book of Records the largest tomato ever grown weighed in at 7 pounds, 12 ounces.

Tomatoes are used in many food products, including of course, tomato sauce, ketchup, pasta and pizza. According to a Steel Packing Council survey of 1997, 68% of chefs use canned tomatoes for convenience, quality and flavoring.

There are many different recipes for tomato sauce and every Italian family has its favorite. No two tomato sauces are identical. This is reflected in the Sicilian expreseeion: "He is always different, like a sauce."

source of imports, or at least it was. Nowadays a can will specify "sourced from Italian tomatoes," and you have to trust it. Italians are very keen to buy Italian. They don't want to buy from Turkey or China, or anywhere else.

How far **does our** produce/food travel?

On the Hawaiian island of Maui is a sugar museum. It is next door to a sugar processing plant, and surrounded by acres of sugarcane growing. The museum tells the story of the history of sugarcane production on the island, and shows the power of one crop or food to shape the cultural make-up of a place.

The sugarcane growing on that acreage is processed in the plant across the street, but only to the 'raw sugar' stage. It is then shipped to the C & H Sugar Refinery in Contra Costa County, not far from San Francisco. C & H stands for "California and Hawaii." Here, it is refined into the white sugar that we use all the time. But that's not the end of its journey: the sugar is then shipped all the cross-country to New York, where it is packaged into little individual paper packages of sugar to go on tabletops, which are then distributed all across the country, including Hawaii.

So if you drive a mile away from that sugarcane field and sit in a café, the sugar packets on your table have traveled about 10, 000 miles: to California, to New York, and back again to Hawaii, instead of the one mile you have. This is not some sort of strange situation, but has actually become pretty normal for just about everything we eat.

Most of the food we now eat is no longer locally grown. Only 35-years ago, 50% of our food was produced fairly locally, now that figure is less than 20%. The rapid expansion of international trade in food, made possible by the availability of cheap oil has given us access to the global market and an almost endless choice of food items. The benefits to consumers are lower food prices and a great variety of foods to choose from, but it also adversely affects the quality of our food, our environment and our farming communities. As consumers in the "global market", we tend to look for the best (meaning cheapest) buys, with little thought of the true nutritional, environmental and social costs of what we purchase.

Vine Ripened vs. Tree Ripened?

These terms are applied to fruit that has been allowed to ripen on the vine or tree. In our industrial food system, fruit is often picked unripe in order to withstand shipping, and then sometimes treated with ethylene gas to "ripen" and soften them. Tree ripening and vine ripening allows the sugars in the fruit to fully develop, yielding better flavor.

Many of us take food for granted. Our supermarkets are full of food, and prices are largely affordable. The food we find at our grocery stores comes from all over the world. Lemons from Argentina, apples fromm New Zealand, lettuce from the western side of the United States – our food is more travelled than we are. It is estimated that the average American meal travels about 1500 miles to get from farm

to plate, spending days, even weeks between harvest and consumption, losing taste and nutritional value along the way. In fact, 30% of all trucks on the highways carry food products. There are some ecological and economic problems with this kind of food system. It relies on a network of production, processing and distribution that for the most part is energy intensive and environmentally harmful.

In order to transport food long distances, much of it is picked while still unripe and then gassed to "ripen" it after transport, or it is highly processed in factories using preservatives, irradiation, and other means to keep it stable for transport and sale. Scientists are experimenting with genetic modification to produce longer-lasting, less perishable produce. Ethylene is a gas used to speed-up the ripening process of fruits and vegetables shipped from far away because they are often picked before they are ripe to last the long journey, they need to be ripened quickly once they reach their destination. Ethylene is the plant hormone responsible for changing tomatoes from pale green to pink to red. Ethylene is produced naturally in ripening fruits, and its presence stimulates further ripening, then aging.

Consumers need to take more responsibility in the food choices they make. We can start by buying local foods – encouraging our favorite food stores to carry food produced locally.

Food produced and sold locally, such as that found in local farmer's markets, does not require long-distance shipping and is usually not extensively packaged. Some grocery stores also sell locally grown foods, both organic and conventionally-grown. Locally-grown food may also be purchased from pick-your-own operations, from food cooperatives, or from roadside markets.

Buying local food is not only more sustainable, but also tastier, fresher, and more nutritious. A recent nutrition study proved that long distance travel and treatment decreases the amounts of vitamins C, A, E, and riboflavin that is found in produce. Furthermore, imported produce is often treated with waxes, fungicides, and irradiation. Local foods are picked at their

Conventional Sources for some Common Fruits and Vegetables

Apples—WA, NY, MI, CA, VA, New Zealand

BANANAS—Costa Rica, Brazil, Bolivia

Cantaloupe—CA, AZ, TX, Mexico

Grapes—CA, AZ, Chile, Mexico

Oranges—CA, Fl, TX, AZ, Mexico

Peaches—CS, SC, GA, AR

Strawberries—Ca, Fl, OR, WA, Mexico

Broccoli—Ca, AZ

Carrots—Ca, TX, Mexico

Cucumbers—GA, FL, Mexico

Lettuce—FL, AZ, CA

Sweet Corn—FL

Spinach—CA, FL, GA

Squash—TX, AZ, Ca, Mexico

Bell Peppers—Ca, FL, Mexico

Potatoes—Ca, Id, Co, Nd, Or

Tomatoes—FL, Ca, Mexico

peak and can often be found at market the same day. Buying locally is a good way to ensure that we are getting the best quality produce available.

The Traveling Tomato Game

In this activity, your class will enact two short skits of a tomato's journey through the global food system. During the first enactment, students will follow the steps of a tomato grown in Mexico, and eventually sold to a consumer.
The goal of this activity is to energize and excite the students, while introducing the idea that our food travels great distances from the earth's floor to the retail store. Also to explore the problems associated with importing food from far away, and to give the students an understanding of how their personal choices have a global and environmental impact.

Materials
- Green tomato and two red tomatoes
- Role cards for grades 3-8

Game Directions: **Grades 3-8**
Part One
1. Keep the class seated at their desks. Pass-out the first three role cards of 'Part One' to three students at the front of the class (or what will be the beginning of the tomato journey). Give the last three role cards to three students at the back of the class (or what will be the end of the tomato journey. All students in the middle will be transporters.
2. The student with the 'Mexican Farmer' role card is the first person in the tomato journey. This person gets the green tomato cut-out, and follows the directions on the card, and reads their script.
3. The 'Mexican Farmer' will pass the tomato to the holder of card #2, the 'Company Owner'. After following the steps on the card, they will pass the tomato to the holder of card #3-The Truck Driver.
4. This 'Truck Driver' gets the tomato, and begins passing the green tomato to the student beside them. Each student should be passed the tomato once. Make it known that every time the tomato is passed from each 'Trucker' the student passing the tomato must say that the tomato has traveled 100 miles more, adding as they go. Tell the students that they must say the distance of the tomato when it reaches them (i.e.100miles, pass tomato, 200miles, pass tomato, 300miles etc).

Keep passing the green tomato up and down the rows until it reaches the 'Warehouse Owner'. This student takes the tomato, stands up, and puts the tomato on a desk at the front of the classroom and follows the directions on their card. This is when the teacher exchanges the green tomato with a red one.
'Warehouse Owner' passes red tomato to 'Grocery Store Owner.'

Part Two
Do the exercises again, however, there are only two roles to fill. The 'Local Organic Farmer' begins the exercise with a red tomato. Part two is short because the Farmer lives very close to the grocery store and sells directly to the grocery store owner. The farmer also only picks his tomatoes when they are ripe for harvest.
1. 'Local Organic Farmer' begins with the red tomato and reads their script.
2. The Farmer passes the tomato to the 'Consumer,' and they read their script.

Game Directions: **Grades K-2**
This activity is a very short, simple demonstration of how far food can travel before it reaches us in Tennessee.
Part One: First, the teacher can choose two students: one to be a farmer from Mexico, and one to be a consumer in Tennessee. The farmer will start with a green tomato, and begin passing it to a student beside them, who will continue passing the tomato until everyone has held it, and it reaches the consumer (at this point the teacher trades the green tomato for a red one). Each time the tomato is passed it represents 100km of travel.
Part Two: The exercise is then repeated with two new students who act as a TN farmer and a consumer. They are the only students who have to be involved in this round. The farmer begins with a red tomato and with an explanation from the teacher, they pass it to the local consumer.

Questions/Points of Discussion
- If the students are not familiar with how far away Mexico is, show them on a large map
- Ask the class which of the two production systems is healthier for the environment?
- Ask the class if they've been to a local farmer's market?
- Explain that if they were to buy local organic produce it would only travel around 100-200km, and the exchange would happen directly between the local farmer and the consumer.
- Explain why food costs are so low, and why grocery stores most often choose to import their produce.

Role Cards

Part One

#1 Mexican Farmer (Carlos)

"Look at all these green tomatoes I have to pick today. They're not ripe yet, but I have to pick them anyway. But first I need to spray them with pesticides to keep the bugs away."

PASS TO STUDENT WITH CARD #2

#2 Boss (Juan)

"Thank you for the tomatoes Carlos. Keep working hard, we have lots of deliveries to make. These tomatoes have to be in Tennessee by next week."

PASS TO STUDENT WITH CARD #3

#3 Truck Driver (Mark)

It's a long drive . These tomatoes have thousands of kilometres to travel."

PASS TO STUDENTS WITH NO CARDS (OTHER TRUCK DRIVERS)

#4 Warehouse Owner (Jim)

"These tomatoes are still green. Before I can deliver them I need to gas them for 24 hours to help them ripen."

PASS TO STUDENT WITH CARD #5

#5 Grocery Store Owner

"Wow, these tomatoes have traveled more than I have! It seems strange to buy a product from far away that we could have grown in our own country."

PASS TO STUDENT WITH CARD #6

#6 Consumer

"Here I am in the grocery store. I need to find some tomatoes to make spaghetti sauce. Here's one...it's kind of hard, and from far away...but it's the only tomato available."

END

Part Two

#1 Local Organic Farmer (Sylvia)

"I've been taking care of this tomato since I planted it in the spring. Now it's red and ripe to pick. Tomorrow I'll take it to the local market and sell it to someone from the community."

PASS TO STUDENT WITH CARD #2

#2 Consumer

"I love coming to the farmer's market...look at all this beautiful produce! I also get to see friends, and meet new people from the community. Hi Sylvia, your tomatoes look great, I think I'll buy some for lunch."

END

Cheesy Times: Mozzarella

Mozzarella has become a culinary darling of late, and it's about time! For too long, at least in the U.S., mozzarella was relegated to the role of second-class cheese citizen, as the good-quality stuff was available only to the lucky/knowledgeable few who lived in or near communities where the real deal was still being made. The rest of us, in our ignorance, settled for the mass-produced mimic and thought mozzarella was no big deal.

But times have changed. Fresh mozzarella is now more readily available (though you still have to be careful of this claim); it's even possible to get the legendary mozzarella di bufala, the mozzarella made from water buffalo milk.

A *bufala* is a female water buffalo. Hers is the milk – rare and expensive – from which mozzarella is traditionally made. These days, however, you're more likely to find a version made from cows' milk, which is more readily available and much less costly.

Legend has it that mozzarella was first made when cheese curds accidently fell into a pail of hot water in a cheese factory near Naples...and soon thereafter the first pizza was made! Actually, new cheeses are often formulated when mistakes happen, so there well may be truth in the tale!

Mozzarella's name derives from the Italian verb "mozzare," meaning "to cut off," from the action of cutting the curd into smaller, less unwieldy pieces. Mozzarella production began…well, nobody knows exactly when this happened, but this cheese has been around for centuries. A very similar cheese is "Scamorza" which probably derives from scamozzata which literally means "without a shirt", referred to the appearance of these cheeses "without" hard surface covering typical of many other dry cheeses.

Because it was not made from pasteurized milk (prior to the 1860s, mozzarella was a raw milk cheese by virtue of the fact that pasteurization had not yet been invented) and because there was little or no refrigeration the cheese had a very short shelf-life and seldom left the southern region of Italy near Naples where it was made. So the mozzarella market was contained within a small area of Italy. Only the very wealthy (who could afford to pay for the cost and transport of fragile delicacies), or people who lived in or near the communities where it was made, could enjoy mozzarella.

Possibly the only health and safety regulations and food regulations which were recognized by the producers, were the ones they developed themselves, to ensure they didn't poison their customers. The regulations were self-imposed because they relied on their reputation and repeat business to remain as a viable business. As cheese technology, refrigeration and transportation systems developed, the cheese spread to other regions of Italy.

The history of mozzarella is closely linked to that of the water buffalo (herded in very few countries such as Italy and Bulgaria.) Interestingly, water buffalo milk has an advantage over cows' milk when one is making cheese. The milk given by water buffalo is so high in fat and protein that it is too rich for many people to drink, but it is precisely this richness and quantity of protein that renders it ideal for cheese-making.

The constituents contained in the buffalo milk make it very rich and suitable for processing which takes four hours to complete the process from beginning to end. However, the production methods are still carried by hand make it very labor intensive, but because they get more cheese using the buffalo milk in place of cow's milk make it cost effective for the producers.

For example, 1 pound of Mozzarella cheese requires roughly 8 pounds of cow's milk, but only 5 pounds of buffalo milk is required for the same 1 pound of cheese. This benefit can also be achieved when producing butter ie. 1 pound of butter requires 14 pounds of cow's milk, but only 10 pounds of buffalo milk.

The demand for this product continues to grow. It is now a $430 million a year industry. The industry in the area is controlled by two major families shipping 33,000 tons of Mozzarella cheese product into the European Union countries and which is now expanding into Japan and Russia. The demand has raised so much that Mozzarella cheese is now produced in numerous countries throughout the world including the USA and the UK.

However, to this day it is widely considered that the best and most highly prized artisanal (The term "artisanal" implies that products are made by hand in small batches, but the term is unregulated and sometimes used by large manufacturers.) produced buffalo mozzarella is still found south of Naples near Battipaglia and Caserta where small factories continue centuries-old traditions making buffalo mozzarella fresh daily for their local customers, who line up at the factories to buy this delicacy. Most buffalo milk mozzarella sold in the USA is imported from Italy and South America.

Aside from the milk, mozzarella's other distinguishing feature is its stringy texture. After the whey is discarded, the curds are "strung" or "spun" to achieve the characteristic *pasta filata*. The cheese is then cut (in Italian, *mozzare* means to cut), immersed in water to firm it up, then covered in a light brine, in which it is kept until it is eaten.

There are three kinds of mozzarella:

Stretched (*pasta filata*):
Made with cow's milk, it has a creamy, soft texture ideal for pizzas and melted toppings; when heated, the cheese stretches and sticks to all the other ingredients.

Pressed:
This mozzarella is denser and contains less moisture. It is also not stringy. It's delicious eaten plain, and can also be used in cooking, although it will not have the same properties as *pasta filata*.

Fresh (*fior di latte*):
Generally sold in balls of different sizes, this mozzarella has a moisture content of 60%. It is soft, mild and tastes of fresh milk. Pearls of milky whey seep out when you slice into it.

Today two types of mozzarella are produced in the USA. Low moisture mozzarella that has a moisture content of less than 50% and High moisture mozzarella that contains more than 52% moisture. Low

Moisture Mozzarella was developed in the USA to fit our transportation and distribution systems, and it has been available in grocery stores for years. This is the dry shredded cheese that the huge factories produce for the pizza industry.

Thanks to the craze for genuine Italian food, high-moisture mozzarella is more readily available in the USA than ever. Though it is more perishable, fresh mozzarella can be packaged dry in vacuum-sealed plastic packages, cello-wrap or in a governing liquid sometimes called "latte". Vacuum sealing extends the shelf life dramatically because no air or bacteria can get at it.It is available salted and unsalted. It is most often made from cow's milk; however it can be made from a combination of other milks such as cow's milk and goat's milk mixed.

Taste, above all, is what distinguishes a great fresh mozzarella from the rest of the pack and the fresher the cheese, the more elastic and springy the curd. As the cheese ages it becomes more and more soft. The perishability of fresh mozzarella varies according to packaging.

There are many ways to enjoy mozzarella and mozzarella is most flavorful when served at room temperature.

Making Fresh Mozzarella Cheese

Production of mozzarella is swift in comparison to that of many other cheeses. Virtually all mozzarella is made from pasteurized milk these days (because the cheese is not an aged one, U.S. law requires all mozzarella sold here to be made from pasteurized milk—raw milk cheeses must be aged for 60 days prior to sale).Through a combination of acidification and/or heat and enzymes, the milk is curdled, then drained of whey. The curd is broken into smaller parts, then ground into crumbly bits. These bits are combined with hot water, and they are stirred until they become one mass of rubbery texture. Following this, a cheesemaker stretches the mass of curd with his hands, a key step requiring both knowledge and skill. Stretching (often called “kneading”) for too short or too long a time will adversely affect the quality

What you might not know: Not all cheese is vegetarian

It's true! In fact, most cheeses aren't vegetarian, especially European ones and those that are modeled after Old World recipes and techniques. But if you’re vegetarian don't start cheese fretting yet — there are tons of great vegetarian cheeses. First things first: Cheese becomes cheese through a process called acidification. It's a process that coagulates and isolates the solids in milk, which then allows the cheesemaker to manipulate those solids into various cheese styles.

Most cheeses are coagulated with an enzyme known as rennet, which is derived from the stomach lining of unweaned young animals; this enzyme helps them digest their mother's milk. In cheesemaking, that same enzyme breaks down the protein chains in liquid milk. Generally speaking, cow milk cheeses use calf rennet, goat cheeses use kid rennet, and sheep cheese uses lamb rennet. Rennet is also sometimes extracted from the lining of pigs' stomachs. Rennet usually comes in powder or liquid form, and an incredibly small amount is used to coagulate a very large amount of milk.

Vegetarian cheeses, on the other hand, are coagulated with either a synthetic, or microbial rennet, derived from mold or yeast, or with a vegetable- or plant-derived rennet, which would typically come from the cardoon thistle plant.

Rarely would you ever be able to taste a difference in taste between the two, and truly great cheeses can be made from both types of rennet.

of the finished cheese. When it is finished, the curd should be smooth and shiny. A "rope" of the curd is pulled from the rest of the mass, cut off (remember the definition of "mozzare"), and shaped, usually into a ball.
The ball is placed in cold water so it cools rapidly and holds its shape. This is followed by a quick soak in brine, where the mozzarella absorbs some salt. Remember that mozzarella does not require aging, so it's ready for consumption after the brine soak. The entire process usually takes about eight hours. Ideally, fresh mozzarella should be consumed within a day or, at most, two days.

A fresh mozzarella is soft and moist, mild and milky-tasting, almost oozing with watery butterfat. But what happens when highly perishable fresh cheese meets ever-increasing consumer demand and industrialization? Modern production techniques, including pasteurization and vacuum sealing, allow mozzarella made from both cow and water buffalo milk to be shipped long-distance and have a far longer shelf-life, but as with corn fresh-picked from the field hours earlier versus corn that reaches you the next day, a sharp palate can perceive a diminution.

But you'll be assured of good quality if what you buy is labeled as "fresh" mozzarella, won't you? Nope. A lot of today's "fresh" mozzarella is industrially produced; this is often the cheese you find vacuum-sealed. It's also possible to purchase ready-made mozzarella curds that one can place in hot water and stretch/knead to a "fresh" mozzarella state. This mode of "making" mozzarella is popular with some lunch counters or delis, and, in some cases, produces a cheese I find very good. There's even a business that will sell you a mozzarella-making kit, although I had very poor results with this. The number of companies producing mozzarella via more traditional methods remains limited, however, and I can find only two companies in the U.S. making mozzarella di bufala (and of those two, only one ships directly to consumers).

NOTE: A buffalo is, correctly, a water buffalo that produces milk; the species include the Asian water buffalo, used for cheese, and the African water buffalo. The animal that roamed the Great Plains of America is a bison. The most misidentified creature in the animal kingdom must be the poor bison. Unless some billionaire leaves funds for a reeducation campaign, it will forever be called the buffalo by most people—due in no small part to the song, "Home On The Range." The beast, an American native, was misnamed by the Europeans who first saw it and likened it to the buffalo of Asia and Africa. It's not even a close relative, but zoologists didn't have a chance to correct even the government, which minted the "buffalo" nickel...and doesn't want to be corrected. But, the term "buffalo" has become part of the vernacular.

So what's the difference between bison and buffalo? The answer is: a species, an ocean and two continents. Why it is called buffalo by many—even those who produce it—is a story that can be found here, http://www.thenibble.com/REVIEWS/main/meats/beef/bison-facts.asp The [incorrect] term has

become so colloquial, it is accepted. Our own government minted the buffalo nickel, after all. But, calling a turkey a peacock doesn't make it so.

Making Mozzarella

Knowing how to make your own mozzarella is a dangerous thing. Knowing that at any moment, should the desire present itself, you could whip up your very own ball of creamy mozzarella, still warm from the whey whence it came? Yes. Very *very* deliciously dangerous. Here's how to do it.

Compounding the dangerousness of homemade mozzarella is the fact that it comes together in about twenty minutes. You warm the milk with some citric acid (not as scary as it sounds), add the rennet (see side note) to separate the milk into curds and whey, heat it again, knead stretch knead, and then you have mozzarella. It's basically magic.

Don't be scared off by the citric acid and the rennet. Both things sound like something Batman might encounter on a bad day in Gotham, but they are actually normal, everyday ingredients.

Citric acid is just a powdered form of the same mouth-puckering acid found in lemons and limes. It's added here to help acidify and coagulate the milk. Rennet can be found in both tablet or liquid form, as well as in vegetarian or...er...non-vegetarian versions. Its job is to set the proteins in the milk and form solid, stretchy curds.

Both citric acid and rennet can usually be found at a good grocery store or food co-op. If you're having trouble tracking something down, however, there are TONS of places to buy the ingredients online.

When it comes to milk, almost anything goes: whole, 2%, skim, cow, goat, raw, organic, or pasteurized. The only rule is to avoid milk that has been ultra high temperature (UHT) pasteurized. This particular method of pasteurization denatures the proteins in the milk to the point that they lose their ability to fully solidify into curds. Be careful when buying organic milk as many brands are UHT pasteurized and the packaging doesn't always indicate this. If your mozzarella ends up looking like soupy cottage cheese, try switching to another brand of milk.

Ready to make some mozzarella? Let's do this.

How to Make Homemade Mozzarella

Makes about 1 pound of mozzarella

Adapted from New England Cheesemaking Supply Company

What You Need

Ingredients

1 1/4 cup water
1 1/2 teaspoon citric acid

1/4 rennet tablet or 1/4 teaspoon liquid rennet *(Not Junket rennet, see note below)*
1 gallon milk, whole or 2%, ***not*** ultra-pasteurized*
1 teaspoon kosher salt

Equipment

5 quart or larger non-reactive pot, such as stainless steel or enameled (Do not use aluminum, cast iron or other reactive pots)
Measuring cups and spoons
Thermometer
8" knife, off-set spatula, or similar slim instrument for cutting the curds
Slotted spoon
Microwavable bowls (glass is best)
Rubber Gloves

Instructions

1. Prepare the Citric Acid and Rennet: Measure out 1 cup of water. Stir in the citric acid until dissolved. Measure out 1/4 cup of water in a separate bowl. Stir in the rennet until dissolved.

2. Warm the Milk: Pour the milk into the pot. Stir in the citric acid solution. Set the pot over medium-high heat and warm to 90°F, stirring gently.

3. Add the Rennet: Remove the pot from heat and gently stir in the rennet solution. Count to 30. Stop stirring, cover the pot, and let it sit undisturbed for 5 minutes.

4. Cut the Curds: After five minutes, the milk should have set, and it should look and feel like soft silken tofu, or like custard and the whey will be clear. If too soft let set a few more minutes. If it is still liquidy, re-cover the pot and let it sit for another five minutes. Once the milk has set, cut it into uniform curds (1 inch squares) with a knife that reaches the bottom of the pot: make several parallel cuts vertically through the curds and then several parallel cuts horizontally, creating a grid-like pattern. Make sure your knife reaches all the way to the bottom of the pan.

5. Cook the Curds: Place the pot back on the stove over medium heat and warm the curds to 105°F. (If you will be stretching in water (not using a microwave) heat to 110F.) Stir slowly as the curds warm, but try not to break them up too much. The curds will eventually clump together and separate more completely from the yellow whey.

6. Remove the Curds from Heat and Stir: Remove the pan from the heat and continue stirring gently for another 5 minutes.

7. Separate the Curds from the Whey: Ladle the curds into a microwave-safe bowl with the slotted spoon.

8. Microwave the Curds: *(No microwave? See the Notes section below for directions on making mozzarella without a microwave.)* Microwave the curds for one minute. Drain off the whey. Put on your rubber gloves and fold the curds over on themselves a few times. At this point, the curds will still be very loose and cottage-cheese-like.

9. Microwave the Curds to 135°F: Microwave the curds for another 30 seconds and check their internal temperature. If the temperature has reached 135°F, continue with stretching the curds. If not, continue microwaving in 30-second bursts until they reach temperature. The curds need to reach this temperature in order to stretch properly.

10. Stretch and Shape the Mozzarella: Sprinkle the salt over the cheese and squish it with your fingers to incorporate, like you are kneading bread dough. Using both hands, stretch and fold the curds repeatedly. It will start to tighten, become firm, and take on a glossy sheen. When this happens, you are ready to shape the mozzarella. Make one large ball, two smaller balls, or several bite-sized bocconcini. Try not to over-work the mozzarella.

11. Using and Storing Your Mozzarella: The mozzarella can be used immediately or kept refrigerated for a week. To refrigerate, place the mozzarella in a small container. Mix a teaspoon of salt with a cup of cool whey and pour this over the mozzarella. Cover and refrigerate.

Additional Notes:

• **Making Mozzarella Without the Microwave:** Instead of microwaving the curds to make mozzarella, warm a large pot of water to just below boiling (about 190°F). Pour the curds into a strainer and nestle the strainer into the pot so the curds are submerged in the hot water. Let the curds sit for about five minutes. Wearing rubber gloves, fold the curds under the water and check their internal temperature. If it has not reached 135°F, let the curds sit for another few minutes until it does. Once the curds have reached 135°, lift them from the water and stretch as directed.

• **Milk for Mozzarella:** Almost any milk can be used for making mozzarella: whole, 2%, skim, cow, goat, raw, organic, or pasteurized. Pasteurized milk is fine to use, but make sure that it is not ultra high temperature (UHT) pasteurized. The proteins in UHT milk have lost their ability to set into curds.

• **Melting Homemade Mozzarella:** Homemade mozzarella doesn't always melt as completely as store-bought mozzarella, especially if I've overworked the cheese and it has become very stiff. If you're planning to make pizza or something else where melting is desired, use a whole-fat milk and make extra-sure not to overwork the cheese. It can also help to grate the cheese rather than slice it.

• **Using Junket Rennet:** Junket rennet is less concentrated than other kinds of rennet and isn't ideal for making cheese. If this is all you have access to, try using 1-2 whole tablets to achieve a curd.

• **Using Leftover Whey:** Making mozzarella leaves you with almost 3 1/2 quarts of whey! You can use this whey in place of water in bread recipes and other baked goods, mix it into smoothies, or add it to soups. Any baked good that requires a liquid (water or milk), you can replace with whey. You can also

pour the whey on your plants and it is a good addition to the compost pile. You can also feed it to chickens to boost their egg production.

Tips:
1. Use the plain ol' store brand whole milk if you can't get milk directly from a cow. The cheap stuff in a jug is pasteurized and homogenized, but usually not ultra-pasteurized.
2. Use liquid vegetable rennet and you can easily buy this from amazon or some other online retailer. Rennet is not something usually seen at the grocery store so order online if you must. You can also use 1 whole rennet tablet for 1 gallon of milk.
3. For the citric acid, you can use 2 TBs fresh lemon juice per 1 tsp of citric acid.

Options:
--A substitution of reconstituted dry milk powder and cream is a great option if you cannot find the right type of milk
--Lipase may be added to the milk to provide a typical italian cheese flavor
--If you want a softer texture, do not let the curd set as firm and work less when draining and kneading, this will make a moister cheese.

Variations and Additional Resources:

The Cheese Queen's Instructions: http://www.cheesemaking.com/howtomakemozzarellacheese.html

Instructables: http://www.instructables.com/id/Great-Mozzarella-Cheese/step1/Equipment-you-will-need/

Pizza Dough

1 teaspoon active dry yeast
1 cup warm water
3 cups bread flour or all-purpose flour
3 tablespoons extra-virgin olive oil
2 teaspoons kosher salt

Stir together yeast and water until dissolved.

Stir the ingredients together in a large bowl until combined, then transfer the dough to a flourless work surface. Knead the dough until it becomes elastic and pulls off the work surface.

Oil the bowl, then shape the dough into a ball and place it back in the bowl, turning to coat.

Cover the bowl with a towel and let rest at room temperature until it doubles in size, about 1 hour in a warm room.

Margherita Pizza

2 tablespoons extra-virgin olive oil, plus extra to grease pan
4 garlic cloves, thinly sliced
1 tablespoon fresh thyme leaves
1 28-ounce can whole peeled tomatoes, drained and hand-crushed
Kosher salt and freshly ground black pepper
1 8-ounce ball fresh buffalo (or home-made) mozzarella, drained
1/2 bunch fresh basil leaves
Cornmeal for dusting

Preheat pizza stone in oven to 450 degrees.

In a large sauté pan over medium heat, add 2 tablespoons olive oil, the minced garlic, thyme and oregano. Cook until just fragrant, then add the crushed tomatoes and season with salt and pepper to taste. Lower the heat and simmer for 7 to 8 minutes to reduce and concentrate the flavor. Shut off the heat and set aside.

Stretch pizza dough into a 15-inch round by tossing and stretching. Lay on cornmeal-dusted pizza peel. Smear with tomato sauce, then tear up the mozzarella and scatter it evenly over the top of the pie. Give it a final season with salt and pepper to taste, then bake in the hot oven until golden and bubbly, about 15 to 18 minutes.

Remove from oven, tear basil and sprinkle over pizza. Cut into slices and serve.

Wait, what about pepperoni?

Across the United States, artisanal (small batches made by hand) pizza joints are opening faster than you can say *Buongiorno!* But inside those fancy imported ovens, pepperoni — by far America's most popular pizza topping — is as rare as a black swan.

Pizzas are draped with hot soppressata and salami picante, potatos, leeks, even Brussels sprouts, and pancetta. But pepperoni pizza? Geddoutahere!

What, exactly, is pepperoni? It is an air-dried spicy sausage with a few distinctive characteristics: it is fine-grained, lightly smoky, bright red and relatively soft. But one thing it is most definitely not: Italian. (Pepperoni lovers would have to ask for a spicy salami in Italy to come close to the taste of American pepperoni.)

Did You Know?

In some States, such as Florida, Pepperoni is often used as an effective bait for catching moles on golf courses.

It's purely an Italian-American invention, and though it isn't truly Italian, the roots of the pepperoni date to ancient Roman times. The Roman civilization was notably the first society to regulate pork production, and they cured pork products into useful forms of salami and sausage because they couldn't refrigerate meat. "Peperoni" is the Italian word for large peppers, as in bell peppers, and there is no Italian salami called by that name, though some salamis from Calabria and Apulia are similarly spicy and

flushed red with dried chilies. The first reference to pepperoni in print is from 1919, the period when pizzerias and Italian butcher shops began to flourish here in the US.

The origins of pepperoni are in Italy, but the name “pepperoni” does not refer to the same food in Italian as it does in English. The term *pepperoni* is a corruption of *peperoni*, the plural of *peperone*, the Italian word for bell pepper. The first reference using pepperoni to refer to a sausage dates to 1919. Throughout continental Europe, with the exception of France, *peperone* is a common word for various types of capsicum, including bell peppers and a small, spicy and often pickled pepper known as *peperoncino* or sometimes *peperone piccante*, peperoncini or banana peppers in the U.S. Even if the in Italian the word is plural (like the Italian word "salami", for example), the English word pepperoni is used as a singular uncountable noun. In Italian, the word "peperoncino" mostly refers to hot and spicy peppers (or sometimes to small, sweet kinds), while "peperoni" refers only to sweet peppers, such as bell peppers.

Wait, pepperoni is raw meat?

Well, yes, in a way. Pepperoni is many things, but cooked is not one of them. Pepperoni is actually preserved through curing (preserve meats by various methods such as salting, drying, or smoking), fermentation (chemical breaking down of a substance using an enzyme), and drying (removing water). Curing pork is perfectly safe when proper safety standards are followed.

Pork and beef are first ground up and mixed together with spices and flavorings. Then, salt and sodium nitrite are added as curing agents to prevent the growth of unwanted microorganisms. The nitrite also gives pepperoni its characteristic pink color. Sodium nitrite is most often used to cure meat because it majorly slows down development of botulinal toxin (botulism), develops cured meat flavor and color, and delays development of rot and off-odors and off-flavors during storage. Table salt and other spices are also used in curing meat.

Next, the ground meat is inoculated with lactic acid bacteria, as in yogurt or cheese making. The ground meat can now be stuffed into casings, traditionally made of pig or sheep intestines, but now more commonly made of cellulose. Over the next two or three days the ground meat undergoes fermentation inside the casings. This is when the lactic acid bacteria produce lactic acid, causing the meat’s pH to drop, a key step in preservation because bacteria don’t like that kind of environment. Then, the sausages spend the next twelve to twenty days in a drying room to reduce the moisture level, also critical to preservation (bacteria like moisture). After drying, the pepperoni is sliced, packaged, and shipped to supermarkets and restaurants where it can make its way onto our pizzas and subs.

Hormel Pepperoni

Established in 1891 by George A. Hormel in Austin, Minnesota, Hormel Foods produces the nation’s top-selling pepperoni. Hormel produces a variety of pepperoni products for direct consumption and for inclusion in other products, such as calzones, pizzas, sandwiches and salads. According to Hormel, its pepperoni sausage is “medium-chopped and seasoned with red pepper and fine spices.”

Pepperoni certainly has conquered the United States. Hormel is the biggest-selling brand, and in the weeks running-up to the Super Bowl, the company sells enough pepperoni (40 million feet) to tunnel all the way through the planet Earth.

Making Our Own Pepperoni?

With the following recipes, while students may notice on one hand that we're not dealing with the fermenting, cases, and temperature controls normally involved with pepperoni - but on the other hand, the flavors involved are just right, and these methods are easily done for someone who is just starting out in *charcuterie* (sausage making) or someone who might not have access to all the specialized equipment or ingredients required to ferment and smoke meats.

Tammy's Spicy Pepperoni

A spicy dense cured pepperoni recipe. This recipe is very easy to make and has that authentic pepperoni taste.

Yield:

2 pounds of pepperoni

Ingredients:

2 pounds lean ground beef (85% lean or leaner)
2 teaspoons liquid smoke flavoring
2 teaspoons ground black pepper
2 teaspoons mustard seed
1 1/2 or 2 teaspoons crushed fennel seed* (It doesn't need to be very fine.)
1 or 2 teaspoons crushed red pepper** (Use more if you like hotter pepperoni; use less if you want a milder flavor)
1/2 teaspoon garlic powder
1 teaspoon paprika
1/2 teaspoon sugar
2 heaping teaspoons Morton's Tender Quick curing salt

Instructions:

1. Combine seasonings and meat and mix thoroughly, using hands. Cover and refrigerate for 48-72 hours.

2. Form meat into two long logs or rolls. Place a rack (or pan/sheet with drainage) on a cookie sheet and put the logs onto rack. Bake at 200 degrees for 8 hours, rotating logs every 2 hours.

3. Logs will be a bright pink when they are finished, and should be fairly dry and firm. Wipe off excess grease and allow meat to cool. Chill and then slice thinly. Refrigerate for up to 2 weeks or freeze for longer storage.

See step-by-step photos for this recipe here!!

Preparation Time:

10 minutes + 10 minutes, plus slicing

Cooking Time:

8 hours

The texture is also like the Hormel turkey pepperoni: lean and dense. Thinly sliced, this pepperoni will add lots of flavor to your pizza or sub without adding grease.

Note: The lactic acid in buttermilk will give the zingy taste of fermentation. When using liquid buttermilk, don't add water. Fermento is cultured whey protein and powder skim milk the same as powdered butter-milk.

Variation: Morton's Pepperoni Recipe

Ingredients

1 pound lean ground beef
1-1/2 level teaspoons Morton® Tender Quick® mix or Morton® Sugar Cure® (plain)
1 teaspoon liquid smoke
3/4 teaspoon freshly ground black pepper
1/2 teaspoon mustard seed
1/2 teaspoon fennel seed, slightly crushed
1/4 teaspoon crushed red pepper
1/4 teaspoon anise seed
1/4 teaspoon garlic powder

Directions

Preparations:
Combine all ingredients, mixing until thoroughly blended. Divide mixture in half. Shape each half into slender roll about 1-1/2 inch in diameter. Wrap in plastic or foil. Refrigerate overnight. Unwrap rolls and place on broiler pan.

Cooking:
Bake at 325°F until a meat thermometer inserted in the center of a roll reads 160°F, 50 to 60 minutes. Store wrapped in refrigerator. Use within 3 to 5 days or freeze for later use. If Morton Meat Curing

products are not available at your local grocery store, the products can be ordered online, ex. through the Morton Salt online store

Algebraic Pizza!

Math Concepts: Algebra

The teaching of mathematics has two primary purposes. One is to give students mathematical tools that can benefit them in their lives and careers, and the other is to help students learn to think logically.

When using our hard-won money we need to make sure that we make good decisions. But we might realize that we won't truly know whether a decision was good or bad until after we make it. That is about as good as gambling, you don't come up a winner all the time, and there must be a method we can use to help make sure our decisions are the best they can be. For example, have you ever wondered whether it's a good buy to order a mass-produced pizza just because it's cheap?

There is pizza, and then there is *pizza*. There is the real stuff, savored at a little corner restaurant in Italy, regional American pizzeria pizza, and then there is the pizza you scarf down on a Wednesday evening when you are too tired to cook and too frazzled to remember what that thing is that is buried at the bottom of your freezer--the It's-Wednesday-and-I-Refuse-To-Cook-Pizza—will probably come from your grocer's freezer or from a franchise. Every second, Americans eat 350 slices of pizza. That's 23 pounds per person, per year. At home, the type is split almost 50-50, with frozen pizzas having a slight edge over delivery. And that raises a question. Are all of these pizzas terrible, or just the ones you bring home from the store?

When it comes to pizza, convenience counts as much as anything. Assuming it's already in your freezer, frozen is a little quicker and perhaps much cheaper. It does require some effort on your part, you have to preheat the oven, open the freezer, tear open the box, cook it, and finally, cut the pizza which is roughly the same size as a medium from your local pizza franchise.

Delivery requires a phone call, figuring out what the deals are amongst all the options, a 15- to 45-minute wait, and a brief interaction with the delivery person who brings your pizza, not to mention figuring out how much you should tip the man for driving all the way to your house.

Here's an activity that uses a bit of algebra to help your students determine which pizza gives them the most bang for their buck, helps them make the best decision they can, and shows them how data can guide the decision making process. Before making a decision a person should try to gather as much relevant information as possible and analyze that information to try and figure out which decision would be the most likely to lead to success.

Materials:

- an appetite
- Pizza brands you'd like to compare

What You Do:

1. Talk about how a pizza price can be broken down into two parts: the cost of the ingredients, and the cost of running the company or parlor (workers, electricity, rent, etc.) The ingredients' cost varies with the size of the area of the pizza. It can be represented by a times d^2, where "d" is the diameter and "a" is the constant that represents the price of the ingredients.
2. The other costs can be represented as the constant "c." The formula is then: $p = ad^2 + c$ Where p is price, d is a pizza's diameter, A is the per-pizza cost of the ingredients, and c is the per-pizza cost of operations. Each parlor will have its own values for "a" and "c."
3. Go to the pizza parlor and determine the size and prices of your favorite frozen and franchise pizzas (or have menus from several pizza places). Now, write down these things: The diameter of a large pizza. The cost of your pizza in a large size. The diameter of a medium pizza The cost of your pizza in a medium size (which is almost the only size you can get in frozen.)
4. Make a table like this, and fill in the blanks:

Pizza size	**Price**	**Diameter**	**$p=ad^2+c$**
large			
medium			

5. For example, at a local pizza parlor, the table might look like this for pepperoni pizza:

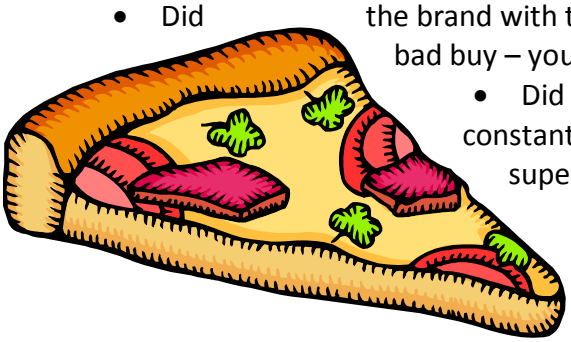
Pizza size	Price	Diameter	$p=ad^2+c$
large	$17	14	$17 = a*14^2 + c$
medium	$15	12	$15 = a*12^2 + c$

6. Use algebra to solve for the constants a and c. For example, by simplifying the "medium pizza" equation to solve for c, I get: $15 = a*12^2 + c$ $15 = 144a + c$ $15-144a = c$

I can now substitute for c in the "large pizza" equation: $17 = a*14^2 + c$ $17 = a*14^2 + 15-144a$ $17 = 196a + 15 – 144a$ $17 = 52a + 15$ $52a = 2$ $a = 2/52$, or approximately .038

By plugging "a" back into the formula for "c", we get $15 – 144 (.038) = c$ $9.528 = c$ Therefore, the final equation for my local pizza parlor is: $p = .038d2 + 9.528$ Now, do the same computations for yours.

7. Now, give the pizza you're testing a rating from one to ten, with one being "That stuff is garbage," and ten being "The most delicious pizza we've ever tasted."
8. Save your equation and your rating. Now, go to another pizza brand and find its equation and rating. Now, you're ready to compare. This can lead to some interesting discussions.



- Did the brand with the lower rating have higher constants? That means it's a bad buy – you're paying higher fixed costs for a poor product.
- Did the brand with the higher rating have a higher "a" constant? That means you're satisfied to pay more money for superior ingredients.
- Did the brand with the higher rating have a higher "c" constant? That means you're happy paying more for a nicer atmosphere or better location.

You can have all kinds of opinions about which pizza is the better buy, based on what your students' value about pizza. You can try another brand and compare it, too. Before long, they'll be the neighborhood pizza experts.

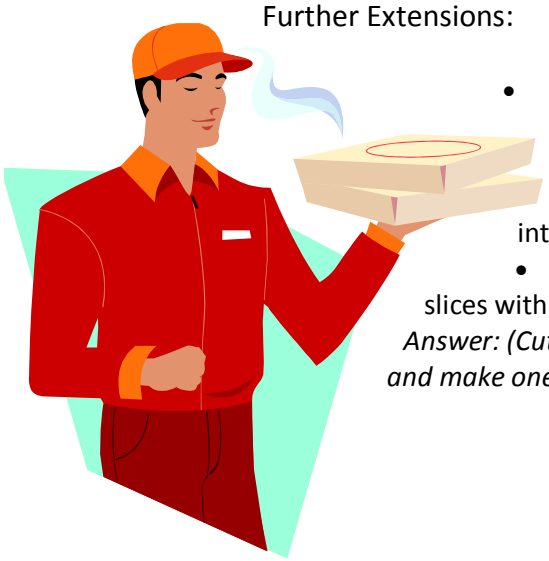
Extension Questions:

- Is frozen or franchise better? Create a chart and formula to compare the cost-effectiveness of buying frozen or franchise.

Pizza Brand		Price	Diameter	$p=ad^2+c$

- Is buying a bigger pizza really cost-effective? If you think of a large pizza as your base price, you can compare prices by knowing how the other sizes measure in comparison. If a large pizza is one unit, a medium pizza is about 3/4 of a large pizza (73%, to be exact) and an extra– large pizza is about 1 1/3 of a large pizza (131%). medium pizza = 3/4 large pizza extra large pizza = 1 1/3 large pizza. Which is really the best deal? Now, create a formula to compare the prices and see if the price is lower or higher than the percentages.

Further Extensions:



- Graphing Practice: plot each brands's points for its medium and large pizzas (price, diameter) on an x-y axis. Connect the points to make a line. Will the two brands ever sell the same pizza at the same price? Hint: look for a point of intersection.
- Brain Teaser: How can you cut a round pizza into eight equal slices with just 3 straight cuts? The answer is tricky, but it can be done. *Answer: (Cut the pizza in half, then in quarters. Now stack the quarters and make one last slice down the middle to get eight pieces.)*

Chill

happiness, one scoop at a time

ice cream

noun \ˌīs-ˈkrēm, ˈīs-ˌ\

: a sweet flavored frozen food often containing cream or butterfat and usually eggs.

We all scream for. . .

No other food boasts offers more legends of discovery than ice cream. Is it possible to separate fact from fiction? Sometimes. The stories are as delectable as the product itself. What are they really telling us about our collective gastronomic legacy? Let's trace a bit of the journey of how this once elite status symbol became today's universally available and wildly popular treat.

Who brought ice cream to America? Ice cream, not flavored ice or snow that was eaten by the Greeks or Romans (rather like our snow cones), but a mixture of milk and cream, eggs and sugar, real ice cream? Originally, it was from France and wasn't introduced to this country until the late 1700s. But now, Americans eat more ice cream than anyone else in the world! Our favorite flavor? Vanilla.

Few treats are as popular or American; immigrants arriving at Ellis Island were once served ice cream as part of their first meal. And it was immigrants which helped popularize this oh-so-American treat--Italian pushcart vendors in New York introduced "Penny Licks" at the turn of the century, and we've been screaming for ice cream ever since. Whether in a sundae, ice cream sandwich, banana split, parfait, or baked Alaska, ice cream is a dessert we can't desert. Americans eat 2-billion gallons a year, or 21.5 quarts on average per person!

Of Sugar and Snow

Even though ice cream wasn't introduced to this country until the 1700s, it existed in some form long before that. No specific person has officially been credited with inventing ice cream. Its origins date back as far as 200 B.C., when people in China created a dish of rice mixed with milk that was then frozen by being packed in snow. The Chinese King Tang of Shang is thought to have had over ninety "ice men" who mixed flour, camphor, and buffalo milk with ice. The Chinese are also credited with inventing the first "ice cream machine." They had pots they filled with a syrupy mixture, which they then packed into a mixture of snow and salt.

Good ol' Alexander the Great was known to enjoy snow and ice flavored with honey and nectar. Nero Claudius Caesar was known to send his footmen deep into the mountains for snow, which was then run back to his palace to be flavored with fruit and juice for Caesar's pleasure, kind of like a first century snow cone. These early "ice creams" were obviously a luxury indulged in by the rich, as not everyone had the ability to send servants up the mountains to collect snow for them. The actual recipe for true ice cream may have come through Italy, in the hands of Marco Polo the explorer, in the form of a sherbet, eventually becoming more ice cream-like in the 16th century.

In fact, in England, and across Europe changes were taking place the rich were be introduced to amazing new foods and flavors that they had never had (bitter chocolate, tomatoes, spicy peppers) that explorers brought home to impress their sponsors (who were paying lots of money for them to go far and wide), and cooking techniques from around the globe. King Charles the First had a French chef who introduced a modern and cutting edge dessert, a frozen treat called *sorbetti*. King Charles liked it so much that he actually paid his chef to keep it a secret, but the secret got out, luckily for us.

One of the first and foremost scientific and technological changes, critically important to the development of ice cream, was the discovery of freezing techniques. Long before anyone made ices and ice creams, much less served them to kings, ice and snow were highly valued. They were hard to get, difficult to store, and very very expensive. In other words, they were the perfect status symbols. Those who were able to acquire them flaunted them (showed them off), using them to add elegance to tables, cool the air on hot summer nights, and crown foods.

In ancient Greece in the island of Cimolos they made underground refrigerators in the summer where the people stored jars full of warm water and drew them out again as cold as snow. Alexander the Great is said to have had pits constructed in which he stored snow and ice. A fourth-century emperor of Japan, Nintoku, was so pleased by a gift of ice that he designated the first day of June as the Day of Ice. On that day each year he gave tiny chips of ice to palace guests in a ceremony called the Imperial Gift of Ice.

By the 15th century, the powerful elites of Spain and Italy would send their servants or slaves to nearby mountains, where they gathered snow, packed it down, wrapped it in straw, and carried it home, sometimes on mule's backs, sometimes on their own backs (though they didn't get to keep it themselves.) They stored the snow in pits dug for that exact purpose on their master's estates. Those who lived in areas where shallow ponds froze in winter harvested the ice and stored it in pits. Initially

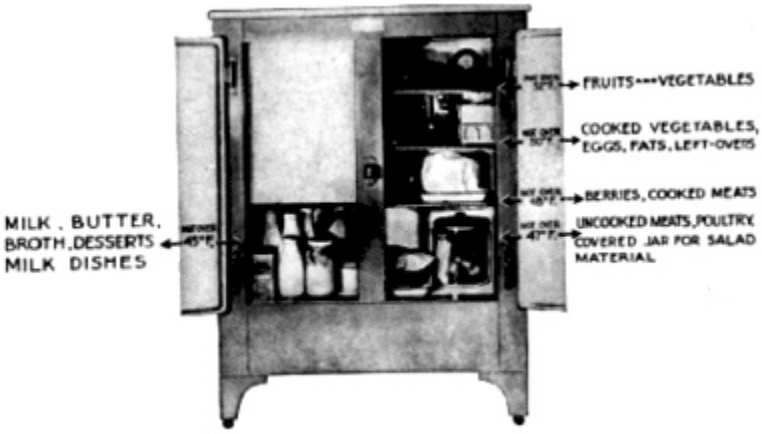
the storage pits were simply holes in the ground filled with alternating layers of snow and straw and covered with straw or wooden planks. Over time, Europeans built larger and more elaborate pits and lined them with bricks or wooden slates. The pits were located in dry, cool spots, often on a slope so they would drain well. Later, the rich would construct large, aboveground ice-houses, often made of brick. Some of these were so well constructed that water in them could be froze into ice, cream could be chilled, and any water that melted would be channeled to cool wine in a nearby cellar. In England during the 18th and 19th centuries these icehouses became part of the landscaping as 'whimsies,' they masqueraded as Greek temples or Chinese pagodas.

Keep-a-Cube Icebox Contest

(This idea from Zoom!)

Some antique ice boxes can look pretty fancy on the outside.

But essentially all it is, is an insulated wooden or metal cupboard with a space for a block of ice and shelves or space to store food. People managed for hundreds of years before electricity so there's no reason we can't design our own.



Of course, back then people grew their own and ate food in season – Californian grown strawberries weren't flown 2,500 miles to be eaten in New York, in December! As for design, we want the box to be as absurdly insulated as possible for a couple reasons. First, more insulation results in a longer melt time on a given mass of ice. That's simple enough. As long as there's solid ice, the block's temperature remains relatively constant. Second, the greater the difference between the thermal resistance (resistance to heat flow) of the box walls and that of the air inside, the less of a temperature gradient (slope or difference) exists between the ice block and the walls of the cooler. We want the walls to stay cool like the inside so the ice will stay cool rather than letting warmth from the outside in. It's just as important to keep the warmth out as it is to keep the cool in!

Materials:

- cardboard box (less than one cubic foot)
- waxed paper
- masking tape
- newspaper
- aluminum foil
- rubber bands
- ice cubes

Your Mission:

Design an ICEBOX - a box that can keep your ice cube from melting. You will be supplied with a variety of materials. You must decide which materials will keep the warmth out and the cold in, and keep your ice cube alive the longest.

Instructions:

1. Divide the class into teams. Each team will compete against the other teams. We will see which team can design the best icebox.
2. Using only the materials in the list above, make a container that will protect one ice cube and keep it as cold as possible.
3. As a team, try to decide: What works best to keep the heat away from your ice cube? Wrapping the box in aluminum foil? Hanging the ice cube from a string?
4. As a team, decide on your design. Have one team member sketch the design, or write a brief description of the design. All teams will have 5 to 10 minutes to decide on their team's design.
5. Once all teams have decided on a design, materials will be distributed, including the ice cube! Build your icebox.
6. One ice cube will be kept in a bowl on the teacher's desk. This ice cube is called the control ice cube. The control is used in an experiment to see what happens "naturally", without the measures we are taking to try to protect our ice cubes in our homemade iceboxes. The control is used so that we can compare our results with our homemade iceboxes against an ice cube that is out in the open, exposed to the elements.
7. Near the end of the session, we will break open our iceboxes and compare the size of the ice cubes in our boxes with the control ice cube. If at the end of 90 minutes, the control ice cube is the same size as the ice cube in your homemade icebox container, the container didn't do much to keep the ice cube from melting.

Extra, Extra! News Flash! More than Water Freezes

But an icehouse, no matter how fancy, allows only storage. The key to making ices was finding out how to make ice or snow freeze *other* substances. It seems obvious to us now, but that only happened in the mid sixteenth century (1500s), when Italian scientists learned that dunking a container of water in a bucket of snow that was mixed with potassium nitrate (saltpeter) would freeze the water. Soon this revolutionary theory spread throughout Europe and people first used the technique to chill their wine. Illustrations of the techniques of the time (vials or flasks being turned in their tubs) look uncannily like later illustrations of ice cream freezers being turned in their ice-filled tubs.

Eventually, scientists and then cooks learned that common salt would work as well as the harder to find (and much more expensive) saltpeter. For centuries, this combination of ice and salt was used for freezing. Even today, this technique is used by home cooks when making ice cream. Mixing salt with ice lowers the ice's freezing point, causing it to melt. As it does, heat is drawn away from the ice cream mixture and it freezes.

When Della Porta filled his vial with wine diluted with water and turned it in the salted snow, the result was the first slushie, a semi-frozen slushy wine that was a hit at banquets. A Spanish doctor who was practicing in Rome wrote that this was the new way to cool wine and water and that all the nobility and gentry (rich people) of Rome were doing it.

In addition to slushy wine, this scientific discovery made possible all kinds of fancy new ice-based techniques and ice artistry as cooks dipped fresh fruits in water, froze them till they sparkled, and displayed them. They created tall pyramids of ice with fruits and flowers frozen within, but best of all, the new freezing technique made it possible for cooks to begin experimenting with making ices and ice creams.

How many times have gone to the fridge for a drink, only to find that your favorite cans aren't in there? It's 90 degrees out and you're thirsty! Now, you've got to find the fastest way possible to chill your lukewarm drink. No worries. Science to the rescue!

Problem:

Which method is the fastest way to cool a can of soda?

Materials:

- 3 cans of soda or other drink
- Access to 1 freezer
- 1 wet paper towel
- 2 tablespoon salt
- 1 pot of ice
- Water
- Thermometer
- Plastic wrap
- 3 rubber bands

Procedure:

1. Set up your salted ice water bath by dissolving the 2 tablespoons of salt in water and adding it to a pot of ice.
2. After a minute, use your thermometer to record the temperature of your ice bath.
3. Using your thermometer, record the temperature of the freezer.
4. Open the cans of soda and record the starting temperatures for each can, then seal them again with plastic wrap and a rubber band.
5. Place your first can in the freezer.
6. Wrap the wet paper towel around your second can and place it in the freezer.

7. Place another can in the salted ice-water bath.
8. Check the cans' temperatures again after 5, 10, 15, and 20 minutes. Make sure to record the temperatures in your notebook each time.
9. Plot your temperatures and times on graph paper.

Results:

You should have found that the salted ice water bath cooled the can to a good drinking temperature of about 44 degrees after about 5 minutes, while the wet paper towel can chilled the drink to the same temperature after around 10 minutes. The can in the freezer sould have only reached about 60 degrees or so (it needs a good 20 minutes to get nice and cold).

According to Mythbusters: That would be about 20-25 minutes in a freezer. If you put [the can] in a bucket of ice, that would halve that time. If you put water in that ice, it'd be cold (+- 5c) enough to drink in about 4-6 minutes, if you put salt in that water, you'd reduce the chill time to just over 2 minutes. Agitating the can in the water, rolling it around, reduces the chill time even more.

Why?

The salt lowers the freezing point of the water, allowing the ice in the ice bath to melt while still retaining its temperature. This makes the chilly water in the ice bath even colder. The paper towel can was also chilled fairly quickly because the as the water evaporates from the paper towel, it takes some of the can's heat away with it, causing the can to rapidly get colder. The poor freezer, while pretty cold, just didn't make the grade because cold air just isn't enough to do the job quickly. Water is a much better heat conductor than air, so heat is able to leave the can more quickly in the ice bath and wet paper towel setups.

Digging Deeper:

There are countless ways to modify this experiment. You could add more cans of soda to get average temperatures for each freezing method. You can switch up methods by adding a fan and trying to cool the drink as it sits outside of the fridge. There are lots of new things to try when looking for an even better way to cool your drinks to a chilly 44 degrees. Just remember to use your creativity and everything you've learned about thermodynamics.

Did You Know?

In villages in eastern Turkey, it is still true today that, after a dowry is agreed on, the groom's family comes to the bride's house and out comes a long-spouted brass or copper ewer, called an *ibrik*, filled with *gül şerbeti*, or rose sherbet. The woman who has "drunk sherbet" has accepted the groom's suit. Far across Asia, in India and Afghanistan as well, once the groom's family has offered presents, the bride's family reciprocates by offering *gol sharbat*.

A Sip of Sherbet

Once scientists mastered freezing, and medicine had more or less given its approval (with a few reservations), creating recipes for ices and ice creams was relatively simple. After all, cooks had for many

years been making the drinks and creams that were the precursors of ices and ice creams.

In the Middle East, drinks known as sherbets—*sharab* or *sharbat* (Arabic), *sharbate* (Persian), *serbet* (Turkish)—have been made since medieval times. Sweet or tangy, cooling or nourishing, sherbet was the first soft drink of the Middle East, a way of preserving fresh, ripe fruit beyond its season. Sherbet has a long history and in ancient times was a non-alcoholic sweetened fruit drink sold in the Middle East by street vendors during the summer months. These sellers carried on their backs huge brass flasks with long spouts, filled with one of many flavors: tamarind or pomegranate, lemon or orange. Slung around his waist, the şerbetçi would carry a row of glasses tucked into his sash or into a brass cup-holder. For a customer, he would rinse a glass with water, bend forward and, from the spout that curved over his shoulder, pour delicious şerbet into the glass. There were also street-side stands that sold şerbet, which were "safer" in terms of cleanliness.

There are a great many recipes, but the basic ingredients are the same. Sherbet is made from fruit juices or extracts of flowers or herbs, combined with sugar and water (and sometimes vinegar) to form a syrup that is thinned at any later time with water, ice or even snow. As alcohol is forbidden in Islam, sherbet became one of the most important beverages in Muslim cultures—even part of everyday language. In Egyptian Arabic, for example, "*dammu sharbaat*" ("his blood is sherbet") is a compliment to a sweet disposition. Children are "*sharbaataat*"—"cuties" or "sweethearts." Coffee or tea can be served "*sharbaat*," which means "very sweet."

The drinks were made by blending fruit juices and other flavorings with sugar and water, or a sugar syrup, then chilling them with snow or ice. The Persians served these drinks over ice or snow in large porcelain or gold bowls and sipped them from long handled wooden spoons. We make lemonade the same way today, although ice has replaced the snow. To freeze the drinks into smooth ices requires added sugar, something cooks figured out after they had made a few very very icy ices. Eighteenth-century drink recipes often directed the reader to double the sugar when turning a regular drink into an ice.

Sour flavors were popular in the Middle Eastern sherbets, such as sour Cornelian cherries and pomegranate, citron, lemon, lime, and quince were also popular flavors in the Middle East. European drink flavors included lemon, strawberry, raspberry, cherry, apricot, peach, pistachio, and hazelnut.

Iced sherbet drinks were also made from powders. That may sound like a modern-day shortcut but the use of powders is centuries old. Some made what they called "essences" by combining grated rinds of a lemon or other fruit with sugar, pressing the mixture into a stone jar, covering it, and storing it for a month or more before using it as a base to make ices. The essences may have made something like the sherbet powder.

Middle Eastern sherbets are still drinks, but European and American sherbets are generally ices or ice milks.

Visne şerbeti Sour Cherry Sherbet

(From The Sultan's Kitchen: A Turkish Cookbook by Özcan Ozan)

2 cups sugar
1 ½ pounds fresh sour cherries (or equivalent of sour cherry juice concentrate)
5 cups water

Combine the sugar with water in a medium-size saucepan and stir the mixture over low heat until the sugar has dissolved. Add cherries and simmer for about 20 minutes. Using a slotted spoon, remove the cherries from the pan. Pass them through a strainer, pressing them to extract all the juice. Discard the cherries. Chill the juice for at least 30 minutes and serve over crushed ice.

Lemon Sherbet

(From Joy of Baking)

Aa light and refreshing frozen treat. It has a tangy sweet lemon flavor with a texture that is both creamy yet slightly grainy. The best way to describe it, is to say it's a cross between an ice cream and a sorbet.

This Lemon Sherbet is so easy to make. All you do is stir together equal amounts of lemon juice, heavy whipping cream, and milk. Then just sweeten the mixture with sugar. Because the tartness of the lemons can vary depending on the lemons you use, taste the mixture as you may have to add more sugar. While you can make the sherbet in an ice cream machine, it isn't absolutely necessary. I usually just "still freeze" the mixture. Which means you pour it into a metal dish (will freeze faster in metal) and then place in the freezer for about four hours or until frozen solid. As it freezes stir every 30-60 minutes to break up any ice crystals and to stir air into the mixture. Otherwise, if you don't stir the sherbet, its texture will be more like a popsicle.

Lemon Sherbet: In a measuring cup, stir together the lemon juice, lemon zest, cream, milk, and sugar. Taste and add more sugar if needed. There are two ways you can make this Sherbet.

Lemon Sherbet Recipe Ingredients:

- 1/2 cup (120 ml) freshly squeezed lemon juice (2 - 3 large lemons)
- Zest of 1 large lemon (outer yellow skin)

- 1/2 cup (120 ml) heavy whipping cream (cream with a 35-40% butterfat content)
- 1/2 cup (120 ml) milk (full or reduced fat)
- 1/3 cup (65 grams) granulated white sugar, or to taste

Method One: If you do not have an ice cream machine you can 'still freeze' the sherbet. Which means pour the mixture into a metal pan (so it freezes faster), cover with plastic wrap, and place in the freezer for about four hours or until firm (it will have a consistency somewhere between an ice cream and a sorbet). Stir the mixture ever 30 - 45 minutes to break up any large ice crystals that may have formed. For longer storage, transfer the sherbet to a container and store in the freezer.

Method Two: If using an ice cream machine, first cover and chill the mixture in the refrigerator for several hours until cold. Then place in your ice cream machine and process according to the manufacturer's instructions. Once made, transfer to a container and store in the freezer.

Makes about 4 servings. Preparation time 20 minutes.

Snow Wonders

Italy became the center of ice making, and to this day Italian ices and ice creams are prized. In the most famous cookbook of the time it was said that every Neapolitan was born knowing how to make them. Great quantities of ices were eaten in Naples and they had the consistency of sugar and snow. The balance of sugar and liquid is critical in making ices. Use too much sugar and you get a thick, sweet slush that never freezes completely. Use too little, and you get an ice so icy you can't get a spoon through it.

Cooks wishing to perfect their craft, in making ices, would travel to Italy to perfect their skills. Like those in the Middle East These ices were made from nonalcoholic drinks called waters flavored with orange flowers, lemon, strawberries, currants, raspberries, cherries, apricots, peaches, pears, almonds, pomegranates, unripe grapes, pine nuts, pistachios, hazlenuts, cinnamon, coriander, chervil, and fennel. To make them into ices they would double the sugar and increase the fruits, flowers, or seeds by half to make the taste stand up to the cold.

Freezing makes flavors come through less strongly, and experienced cooks know mixtures should taste just a little too strong when they're warm if they are to have enough flavor when frozen.

The trend for cool treats had spread, New World ingredients had made their debut, science had discovered the secrets of freezing, medical opinion had come around, and cooks were embracing the chance to innovate. This was just the beginning, as around the world were poised to create and enjoy all sorts of splendid ices and ice creams!

The following is a recipe of the time:

To Make Good Lemonade

Add the juice of three lemons to a pint of water, along with seven or eight zests, and if the lemons are fat and full of juice, you'll only need two, with a quarter pound of sugar, or at most five ounces. When the sugar has dissolved and is completely incorporated, strain it, chill it, and offer it to drink.

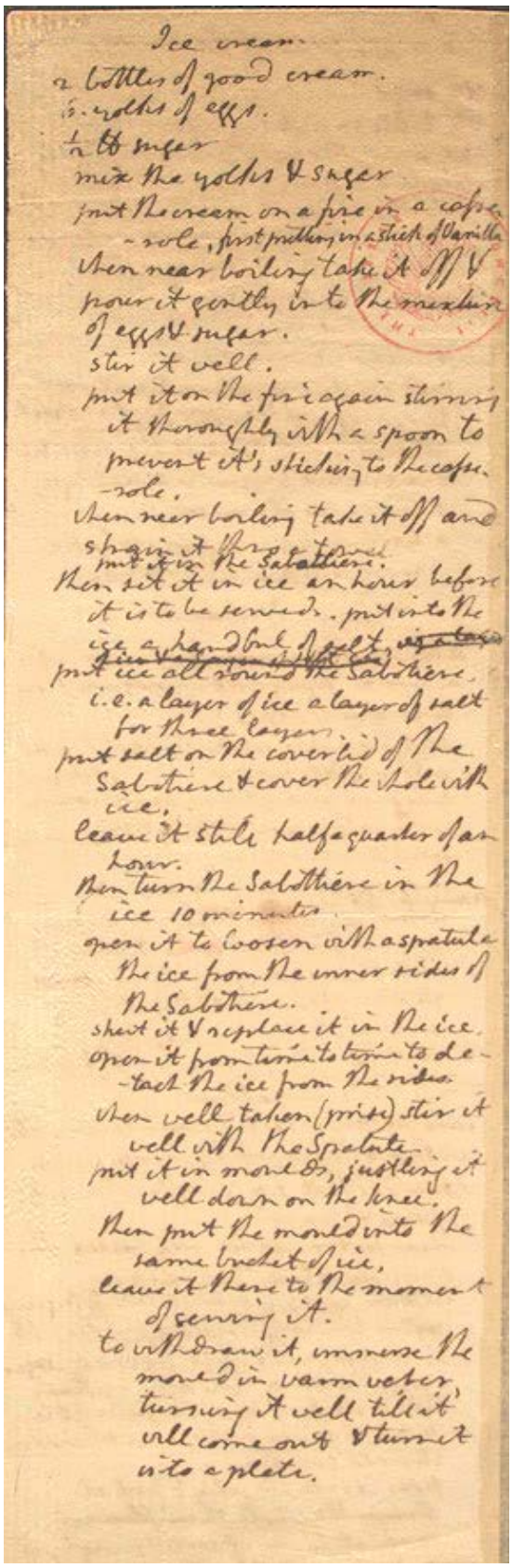
To turn it into a sorbet, they would have you double the sugar to about 10 ounces, about 1 1/3 cups of sugar. The recipe emphasized the importance of stirring the ices as they freeze so their texture is more like snow than ice and the taste is improved.

Ice Cream-An American Classic?

The first evidence of ice cream in our neck of the woods comes from a letter written in 1744 by a guest of Maryland Governor William Bladen. President Thomas Jefferson, known for his love of food, especially the new and exotic, was also a fan. While the claim that Thomas Jefferson introduced ice cream to the United States is false, he can be credited with the first known recipe recorded by an American, written in his own hand.

The included recipe was originally brought from France by Thomas Jefferson and Jefferson's French butler, the original source. Jefferson loved ice cream so much that he imported his own vanilla from South America. Though incredibly expensive to make at the time, ice cream frequently appears in visitors' accounts of meals with Thomas Jefferson and several times guests described it being served inside of a warm flaky crust or pastry.

Following his recipe, steeping vanilla in a cream and milk mixture, almost making a vanilla tea, then you make the custard. The interesting thing about Jefferson's recipe, is the addition of six to eight egg yolks. Those egg yolks are cooked first, even though it's going to be a frozen dessert. They add a lot of viscosity (richness/thickness) to the ice cream.



Ice cream.
2 bottles of good cream.
6. yolks of eggs.
½ lb sugar
mix the yolks & sugar
put the cream on a fire in a copper-role, first putting in a stick of Vanilla
when near boiling take it off & pour it gently in to the mixture of eggs & sugar.
stir it well.
put it on the fire again stirring it thoroughly with a spoon to prevent it's sticking to the copper-role.
when near boiling take it off and strain it through a towel
put it in the Sabothiere.
then set it in ice an hour before it is to be served. put into the ice a handful salt
put ice all round the Sabothiere.
i.e. a layer of ice a layer of salt for three layers.
put salt on the cover lid of the Sabothiere & cover the hole with ice.
leave it stile half a quarter of an hour.
then turn the Sabothiere in the ice 10 minutes.
open it to loosen with a spatule the ice from the inner sides of the Sabothiere.
shut it & replace it in the ice.
open it from time to time to detach the ice from the sides.
when well taken (prist) stir it well with the Spatule.
put it in moulds, justling it well down on the knee.
then put the moulds into the same bucket of ice,
leave it there to the moment of serving it.
to withdraw it, immerse the mould in warm water, turning it well till it will come out & turn it into a plate.

Stirring things Up

These days there are modern machines that will do all of the work for us. No need to add ice, or salt, or to stand there for 45 minutes cranking by hand. But, we can imagine, not just the manual labor that went into making ice cream, but the ingredients like the salt and the ice were very scarce when Jefferson brought his recipe over from France. Salt was expensive, and no one had a freezer, so ice was seasonal. It made it such a fancy treat, such a luxury, that ice cream was served by many of the earliest presidents at the White House. A New York City merchant's records show that President George Washington spent approximately $200 (approximately

$5,260.00 in today's money) for ice cream during the summer of 1790.

Jefferson was able to enjoy ice cream throughout the year because ice was "harvested" from the Rivanna River in winter and taken to the Monticello ice house, which held sixty-two wagon-loads and cost $70 in 1803 (approximately $22,500.00 (using the unskilled wage) or $45,700.00 for skilled laborers in today's money) for the hire of wagons and food and drink for the drivers. The ice house located in Monticello's north dependency wing was used throughout the year primarily to preserve meat and butter, but also to chill wine and to make ice cream. In 1815, Jefferson noted, the ice supply lasted until October 15.

Since Thomas Jefferson's time all of the ingredients have become a lot less expensive, including the ice and the salt. Which means everyone has lots of access to ice cream. Lucky us!

Thomas Jefferson's Vanilla Ice Cream
makes about 4 pints (2 quarts, 1/2 gallon)

6 yolks of eggs
1/2 lb sugar (1 1/4 cups)
2 bottles (quarts) of good cream (4 pints)
1 vanilla bean

Mix the yolks and sugar together. Put the cream on a fire in a casserole, first putting in a stick of vanilla. When near boiling, take it off and pour it gently into the mixture of eggs and sugar. Stir it well. Put it on the fire again, stirring it thoroughly with a spoon to prevent it's sticking to the casserole. When near boiling, take it off and strain it thro' a towel. Put it in the Sabottiere* then set it in ice an hour before it is to be served. Put into the ice a handful of salt. Put salt on the coverlid of the Sabotiere and cover the whole with ice. Leave it still half a quarter of an hour. Then turn the Sabottiere in the ice 10 minutes open it to loosen with a spatula the ice from the inner sides of the Sabotiere. Shut it & replace it in the ice open it from time to time to detach the ice from the sides when well taken (prise) stir it well with the spatula. Put it in moulds, justling it well down on the knee. Then put the mould into the same bucket of ice. Leave it there to the moment of serving it. To withdraw it, immerse the mould in warm water, turning it well till it will come out and turn it into a plate.

*The Sabottiere is the inner cannister of what we now know as an ice cream maker.

Modern translation:

Beat the yolks of 6 eggs until thick and lemon colored. Add, gradually, 1 cup of sugar and a pinch of salt. Bring to a boil 1 quart of cream and pour slowly on the egg mixture. Put in top of double boiler and when thickens, remove and strain through a fine sieve into a bowl. When cool add 2 teaspoonfuls of vanilla. Freeze, as usual, with one part of salt to three parts of ice. Place in a mold, pack with ice and salt for several hours. For electric refrigerators, follow usual direction, but stir frequently.

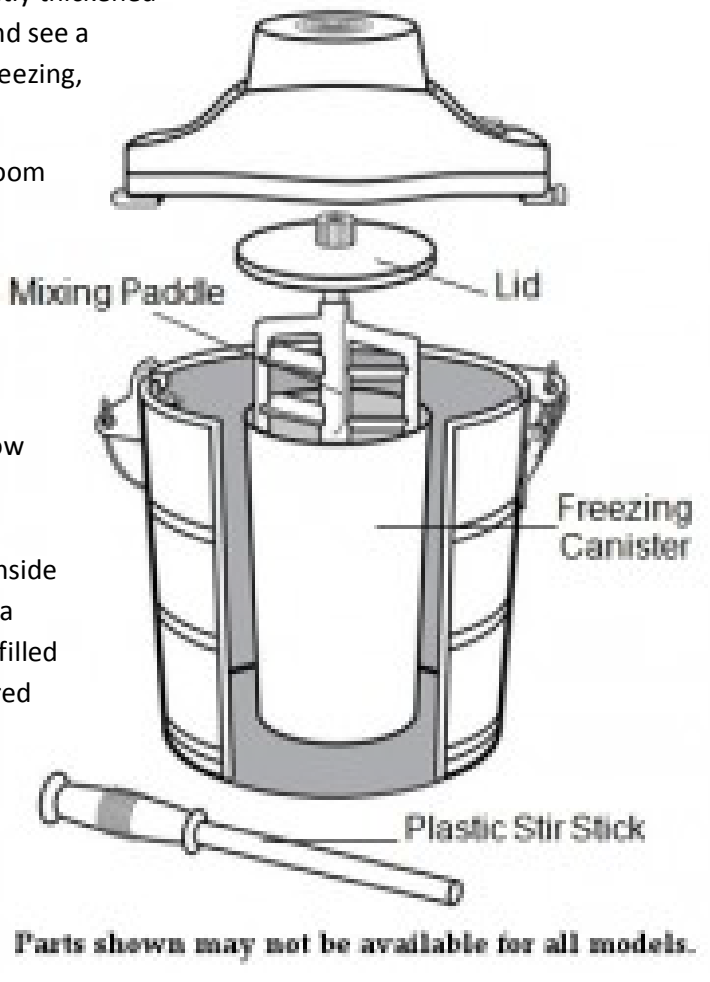
Modern French-Vanilla Ice Cream Recipe:

3 cups half-and-half
1 cup heavy cream
9 large egg yolks
1 1/2 cup sugar
2 teaspoons pure vanilla extract

Place the half-and-half and the heavy cream into a medium saucepan, over medium heat. Bring the mixture just to a simmer, stirring occasionally, and remove from the heat.

In a medium mixing bowl whisk the egg yolks until they lighten in color. Gradually add the sugar and whisk to combine. Temper the cream mixture into the eggs and sugar by gradually adding small amounts, until about a third of the cream mixture has been added. Pour in the remainder and return the entire mixture to the saucepan and place over low heat. Continue to cook, stirring frequently, until the mixture thickens slightly and coats the back of a spoon and reaches 170 to 175 degrees F.

Making a custard might seem like a little bit of work, it really isn't too hard, you just have to stand and stir for maybe 10-12 minutes. When the mix gets slightly thickened (you can run your finger over the back of the spoon and see a swipe), at that point it's ready to start churning and freezing, well, once it's cooled down.



Pour the mixture into a container and allow to sit at room temperature for 30 minutes. Stir in the vanilla extract. Place the mixture into the refrigerator and once it is cool enough not to form condensation on the lid, cover and store for 4 to 8 hours or until the temperature reaches 40 degrees F or below.

Once it's cooled down and we're ready to freeze it, now it's time to use something fun, an ice cream dream machine. Originally it was called a *Sabottiere*, which is French word for, you guessed it, ice cream machine. Inside most classic ice cream machines (which look a lot like a bucket) there is a canister. The outer compartment is filled with ice and salt, and the ice cream base liquid is poured right into the center canister. As the custard pours in you can see how thick and creamy it is, a very good sign, and the scent of vanilla rises. Then the canister is put back into the bucket, the top is put on and latched down.

Or, pour into a modernice cream maker and

process according to the manufacturer's directions. This should take approximately 25 to 35 minutes. Serve as is for soft serve or freeze for another 3 to 4 hours to allow the ice cream to harden and the flavor to strengthen or ripen.

The addition of the salt to the ice is a really interesting thing. It's sort of like sprinkling salt on your sidewalks in the winter to melt the ice. It melts the ice and it controls the temperature. Just like we use salt on icy roads in the winter, salt mixed with ice in this case also causes the ice to melt. When salt comes into contact with ice, the freezing point of the ice is lowered. The lowering of the freezing point depends on the amount of salt added. The more salt added, the lower the temperature will be before the salt-water solution freezes. For example, water will normally freeze at 32 degrees F. A 10% salt solution freezes at 20 degrees F, and a 20% solution freezes at 2 degrees F. When salt is added to the ice (or snow), some of the ice melts because the freezing point is lowered. Always remember that heat must be absorbed by the ice for it to melt. The heat that causes the melting comes from the surroundings (the warmer cream mixture). By lowering the temperature at which ice is frozen, you were able to create an environment in which the cream mixture could freeze at a temperature below 32 degrees F into ice cream.

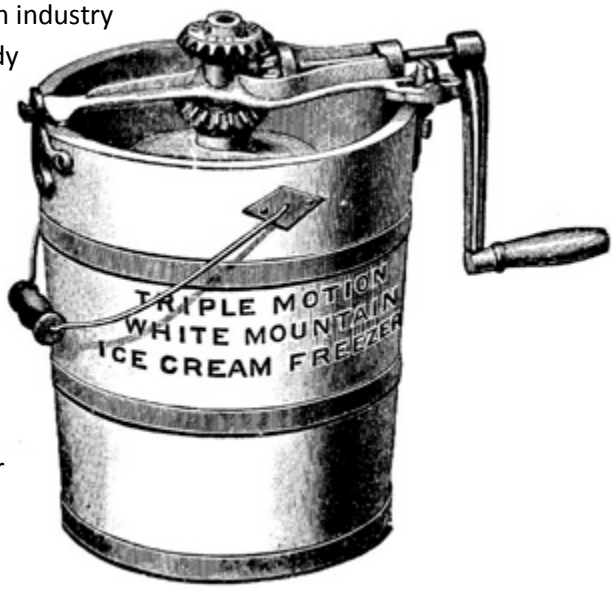
When the bucket is up to the brim (or the drain hole) with 1 part salt to 2 parts ice in classic ice cream machine or churn, water is added to make a slush that helps regulate the temperature. Then you'd get to stand there and crank by hand for about 45 minutes! These days, once it's the consistency of about soft serve ice cream, the canister is taken out and put into the freezer, but, of course, back in Jefferson's day, they didn't have freezers, so they would more ice and more salt and let it sit for a few more hours until it gets to the consistency of hard scoop ice cream.

Augustus Jackson

Several may have heard the story of the illusive Augustus Jackson, "Philadelphia inventor of ice cream." A survey of historic newspaper articles, ice cream texts, and reference sources confirms Mr. Jackson's existence and his ice cream connection. We can also confirm period prospering catering establishments owned and managed by Black Americans in Philadelphia. Given Mr. Jackson's period, we respectfully acknowledge the dearth of historic print information confirming his existence and accomplishments. The claim about him "inventing" ice cream is, however, easily debunked, though it was believed for many years and reported as fact even as late as 1995..

"The Origin of Ice Cream. The man who invented ice cream was a Negro by the name of Jackson, and in the early part of the present century kept a small confectionery store. Cold custards, which were cooled after being made by setting them on a cake of ice, were very fashionable, and Jackson conceived the idea of freezing them, which he did by placing the ingredients in a tin bucket and completely covered with ice. Each bucket contained a quart, and was sold for $1. It immediately became popular, and the inventor soon enlarged his store, and when he died left a considerable fortune A good many tried to follow his example, and ice cream was hawked about the streets, being wheeled along very much as the hokey-pokey carts are now, but none of them succeeded in obtaining the flavor that Jackson had in his product.--Baker's Helper." –New York Times, March 11, 1894

With the invention of insulated ice houses around 1800, an industry was able to form around ice cream manufacturing. A steady stream of other technological advances in the 19th century allowed the industry to grow, such as when, in 1846, a housewife from New England named Nancy Johnson invented the "hand cranked ice cream churn"., the basic design of which is still used today. Although she patented this invention, she did not have enough finances to produce and market this product herself. Because of that, she sold her patent for $200 to a kitchen wholesaler from Philadelphia. By 1847, this wholesaler made enough ice cream to satisfy the demands. Then later on, between the years 1847-1877, there were been patented more than seventy improvements to ice cream churns.



Ice cream Floats Along

An ice cream soda or float (United States, Canada, New Zealand, South Africa and East Asia), coke float (United Kingdom, Canada, New Zealand) or Snowball (United Kingdom, New Zealand), or spider (New Zealand and Australia), is a beverage that consists of ice cream in either a soft drink or in a mixture of flavored syrup and carbonated water.

In Mexico, El Salvador, Guatemala, Costa Rica and Colombia it's called Vaca Negra (Black Cow), while in Puerto Rico is referred to as a "blacao", the phonetic interpretation of "black cow".

In the United States, an "ice cream soda" typically refers to the drink containing soda water, syrup, and ice cream, whereas a "float" is generally ice cream in a soft drink (usually root beer).

The ice cream soda was invented by Robert McCay Green in Philadelphia, PA, in 1874 during the sesquicentennial celebration. The traditional story is that, on a particularly hot day, Mr. Green ran out of ice for the flavored sodas he was selling and used vanilla ice cream from a neighboring vendor, thus inventing a new drink.

His own account, published in Soda Fountain magazine in 1910, states that while operating a soda fountain at the Franklin Institute's semicentennial celebration in Philadelphia in 1874, he wanted to create a new treat to attract customers away from another vendor who had a fancier, bigger soda fountain. After some

experimenting, he decided to combine ice cream and soda water. During the celebration, he sold vanilla ice cream with soda water and a choice of 16 different flavored syrups. The new treat was a sensation and soon other soda fountains began selling ice cream sodas. Green's will instructed that "Originator of the Ice Cream Soda" was to be engraved on his tombstone.

Variations of the ice cream soda are as countless as the varieties of soda and the flavors of ice cream, but some have become more prominent than others. One of the most popular is described below:

Chocolate ice cream soda:

This ice cream soda starts with approximately 1 oz of chocolate syrup, then several scoops of vanilla ice cream in a tall glass. Unflavored carbonated water is added until the glass is filled and the resulting foam rises above the top of the glass. The final touch is a topping of whipped cream and usually, a maraschino cherry. This variation of ice cream soda was available at local soda fountains and nationally, at Dairy Queen stores for many years.

There are at least three other claimants for the invention of ice cream soda: Fred Sanders, Philip Mohr, and George Guy, one of Robert Green's own employees. Guy is said to have absent-mindedly mixed ice cream and soda in 1872, much to his customer's delight.

Regardless of its origins, the beverage quickly became very popular, to such a degree that it was almost mandatory among teens, although many adults did not like it. According to some accounts, it was banned, either entirely or on holy days, by some local governments, giving rise to a substitute treat, the soda-less ice cream sundae. As soda was marketed as a miracle cure or medication for health problems, it was often considered a substance that required oversight and control like alcohol, another controlled substance that could not be served or purchased on Sundays in many conservative areas.

Black Cow?

The origin of the name "black cow" has always been of interest to food and beverage experts and allegedly dates to August 1893 in Cripple Creek, Colorado. The only source of this story is the great-grand-nephew of Frank J. Wisner, who has popularized it through his soft drink product advertising. *Might this be an unreliable source?* Wisner, owner of the Cripple Creek Cow Mountain Gold Mining Company, had been producing a line of soda waters for the citizens of the then-booming Cripple Creek gold mining district. He had been trying to create a special drink for the children of Cripple Creek and came up with an idea while staring out at his properties on Cow Mountain on a moonlit night. The full moon's glow on the snow-capped Cow Mountain reminded him of a dollop of vanilla ice cream floating on top of his blackened Cow Mountain. As he told the story later, he was inspired by this view to hurry back to his bar and add a big scoop of vanilla ice cream to the one soda water he produced that the children of Cripple Creek seemed to like best — Myers Avenue Red root beer — and served it the very next day. The drink was an instant hit. Originally named "Black Cow Mountain", the local children shortened this to "black cow".

Many soda fountains had to figure out a way to turn a profit on Sundays when selling soda was considered illegal. The solution was to serve ice cream on these days, as it is merely a food product and not a controlled substance. Soda jerks of the late 1800s discovered that the combination of hot and cold was an irresistible temptation. To keep the treat special, they served them only on Sundays, usually

to the after-church crowd. Soda fountains then coined the term "Sundaes" for the ice cream concoctions that they served on "soda's day of rest".

The first sundae, claimed by no less than a dozen cities, was heated chocolate syrup over vanilla ice cream. As the syrup melted, it created a perfect milkshake in the bottom. Somehow, the common chocolate syrup soon assumed the even more tempting name of "fudge."

Sundaes were a way to boost sales beyond the usual nickel dish of ice cream. They first doubled the price to a dime. By 2010, the world's most-expensive sundae cost $1,000 at Serendipity Restaurant in New York City. It has 11 ingredients and is served in a baccarat Harcourt crystal goblet with an 18-carat gold spoon.

Why? Tell me why!

Brain Freezes! How they just might work explained in the following video!

http://science.howstuffworks.com/life/4536-ice-cream-headaches-explained-video.htm

Historians, and towns still argue over the originator of the ice cream sundae, but three historical probabilities are the most popular.

Who do students believe? Which story has the most "evidence"?

After 1900, hot sundaes grew to a family of flavors:

- Double fudge: Twice as big.
- Turtle: Hot fudge and hot caramel sauces with toasted pecans.
- Butterscotch: Replacing chocolate with butterscotch syrup.
- Peanut butter: Replacing chocolate with a peanut putter emulsification.
- Black and white: Vanilla and chocolate scoops with chocolate sauce and a marshmallow topping.

HOT SUNDAE TOPPINGS

- Sliced fresh fruit, including bananas and pineapple
- Sprinkles
- Chopped nuts
- Whipped cream
- Maraschino cherries

Things get even stickier when you start talking about the banana split! It also has a rich history topped a fair amount of controversy. The turmoil over who really invented the banana split has gone on for quite some time, but it may never be determined (or accepted, depending on one's point of view) who invented this delectable treat.

The strongest case for the title of "Home of the Banana Split" belongs to Latrobe, Westmoreland County. Not only has the original letter by Latrobe pharmacy owner and creator David Strickler been uncovered, but the *Greensburg Tribune-Review* documented the invention as well. In the article, Rachel Smith gives credit for the first banana split to David Stickler who "had sliced a **banana** in two, added

scoops of strawberry, vanilla and chocolate ice cream, three kinds of flavored toppings and whipped cream" in 1904. This ingenuity had allowed for the creation of the delicious dessert, but there was no proper way for it to be served. This prompted Strickler to elicit outside help from a glassmaker in Grapeville who created the first "banana boat" to house his masterpiece.

There are several variations in style according to their inventors:

1. A traditional Doc Strickler banana split is composed of a single banana split in half lengthwise with each half strategically placed on opposing sides of the dish. Scoops of chocolate, vanilla, and strawberry ice cream are placed between the banana slices. The ice cream is then covered with chocolate syrup, whipped cream, nuts, and a cherry on top. If the bananas are cut crosswise, the dish would then be a "banana royale."
2. The Boston version of the banana split has many modifications with its preparation when compared to Strickler's version. The Boston recipe is composed of only vanilla ice cream and only two scoops of ice cream (instead of three). Cherries were placed on top of both scoops of ice cream and peaches were used as dividers between the scoops. Pistachios and crushed walnuts were also used to top off this version of the sundae.
3. Wilmington had a version that differed slightly as well. Although the Wilmington version used three scoops of ice cream as Strickler did, the variations of ice cream flavors were not documented. This version also included crushed pineapple as a topping, which is not part of Strickler's original design. As time has passed, "traditional" banana splits have come to include chocolate, strawberry, and pineapple sauces. Wilmington splits, however, also can include caramel sauce.

When Doc Strickler premiered the split, it was only a whopping ten cents While 10 cents may sound like a bargain in today's economy, at the time it was actually quite expensive and was double the price of other sundaes ($16.80 in today's money!) Students from nearby Saint Vincent College were credited in spreading awareness of the banana split across the globe. The college even hosted a make your own banana split buffet on special occasions such as parents' weekend and the beginning of school. When the students traveled to their hometowns on vacation, they shared the new creation with family and friends, increasing its popularity nationally and making the banana split a new favorite everywhere. And a favorite it has remained for over a century.

Ice Cream - How much air are you buying?

Have you noticed that food packages always list the amount of food in the container? (Check the bottom of the front label). This information is required by law to help you compare products before you buy them. In general, the amount of food is listed by weight (e.g., cereal, bread, yogurt and soup). Consider that even when you open a bag of chips to find it only half full due to settling, you still had enough information to know how much you were buying, and a way to compare products and evaluate cost because of this net quantity requirement. For liquid foods, such as milk and juice, the amount of food must be listed by volume. But there are some exceptions. Ice cream is one of them. Where you

might expect to see ounces and grams (measurements of weight), instead you see gallons, quarts and pints (measurements of volume). Why is this interesting? Because ice cream is 40 - 50% air. You are, in fact, buying air.

So are you being deceived by the ice cream industry? Not really. Ice cream is a whipped product just like whipped cream or whipped margarine. The amount of air (called “overrun”) incorporated into the ice cream mix is carefully calculated to produce the texture you know and love. Without added air, ice cream would be very dense and much harder and colder than it should be.

If ice cream is measured by volume and we know the industry adds air, why not make ice cream with 60% or 70% air? Companies could save money by selling you more air and could even market the product as having fewer calories. The answer lies in the FDA’s standard of identity for ice cream. To call it ice cream, it must weigh "not less than 4.5 pounds to the gallon." By declaring a density minimum, the FDA has effectively capped the amount of air that can be added to your ice cream.

Ice, Cream... and Chemistry?

The Science of Ice Cream: http://www.acs.org/content/dam/acsorg/education/resources/highschool/chemmatters/archive/chemmatters-feb2014-ice-cream.pdf by Brian Rohrig.

Why bother with the science? - Because it will actually help us to make better ice cream!

If you think about it, an ice cream is actually quite a complex and multi-faceted composition – it should be solid, yet soft, and should preferably stay that way while melting slowly. If you would simply put a batch of cream in the freezer, you would not end up with ice cream, but with a block of hard-frozen, solid cream. The reasons for the delicious nature of ice cream is ultimately a matter of food chemistry!

Molecular gastronomy has become quite popular in recent years. Understanding at least something about the physical and chemical aspects which turn ingredients into delicious ice cream will not only add to our general knowledge about the world, but will also give us something to talk about over the next scoop of ice cream. Most importantly, however, it will help us to prepare own ice cream in a better, more mindful way, drastically increasing their success-rate in the kitchen!

Ice cream is not just for kids. **U.S. residents consume 1.5 billion gallons of ice cream each year; that’s roughly 5 gallons (19 liters) per person!** The ice cream we all enjoy is the result of years of experimentation involving—you guessed it—*chemistry!*

Air is important!

If you have ever made ice cream, you already know what goes into it, ingredients such as milk, cream, and sugar. But there is one main ingredient that you may not have thought about, probably because you can’t see it—*air.*

Why is air so important? If you have ever had a bowl of ice cream melt, and then refroze it and tried to eat it later, it probably did not taste very good. If you set a whole carton of ice cream on the table and let it melt, the volume of the ice cream would simply go down. **Air makes up anywhere from 30% to 50% of the total volume of ice cream.**

Electro Freeze/H.C. Duke & Son, LLC

To get an idea of the effect of air on ice cream, think of whipped cream. If you whip air into cream, you get whipped cream. Whipped cream has a different texture and taste than plain cream. Plain cream tastes sweeter than whipped cream. Just like ice cream without air, pure cream has a sickly, overly sweet taste. This is because the structure of a substance can have a big effect on how it tastes, and that the structure often controls the rate at which flavor molecules are released into the mouth. The larger the structure (ice cream, in this case), the longer it takes for the flavor molecules to be released. Flavor molecules that trigger receptors on the mouth and tongue.

The amount of air added to ice cream is known as overrun. If the volume of ice cream is doubled by adding air, then the overrun is 100%, which is the maximum allowable amount of air that can be added to commercial ice cream. The less expensive brands usually contain more air than the premium brands. One side effect of adding a lot of air to ice cream is that it tends to melt more quickly than ice cream with less air.

The amount of air also has a huge effect on the density of ice cream. A gallon (3.8 liters) of ice cream must weigh at least 4.5 pounds, making the minimum density 0.54 gram per milliliter. Better brands have higher densities—up to 0.9 grams per milliliter. The next time you visit a grocery store, compare cheaper and more expensive brands by holding a carton in each hand—you should be able to notice a difference. Then read the net weight on the label to confirm your observation. Due to the high fat content of ice cream, however, and because fat is less dense than water, any ice cream will always be less dense than any aqueous (watery) solution, otherwise you would not be able to make root beer floats!

Ice cream is an emulsion—a combination of two liquids that don't normally mix together. Instead, one of the liquids is dispersed throughout the other. In ice cream, liquid particles of fat—called fat globules—are spread throughout a mixture of water, sugar, and ice, along with air bubbles (Fig. 1). If you examine ice cream closely, you can see that the structure is porous. A typical air pocket in ice cream will be about one-tenth of a millimeter across. The presence of air means that ice cream is also a foam. Other examples of foams are whipped cream, marshmallows, and meringue (as in lemon meringue pie).

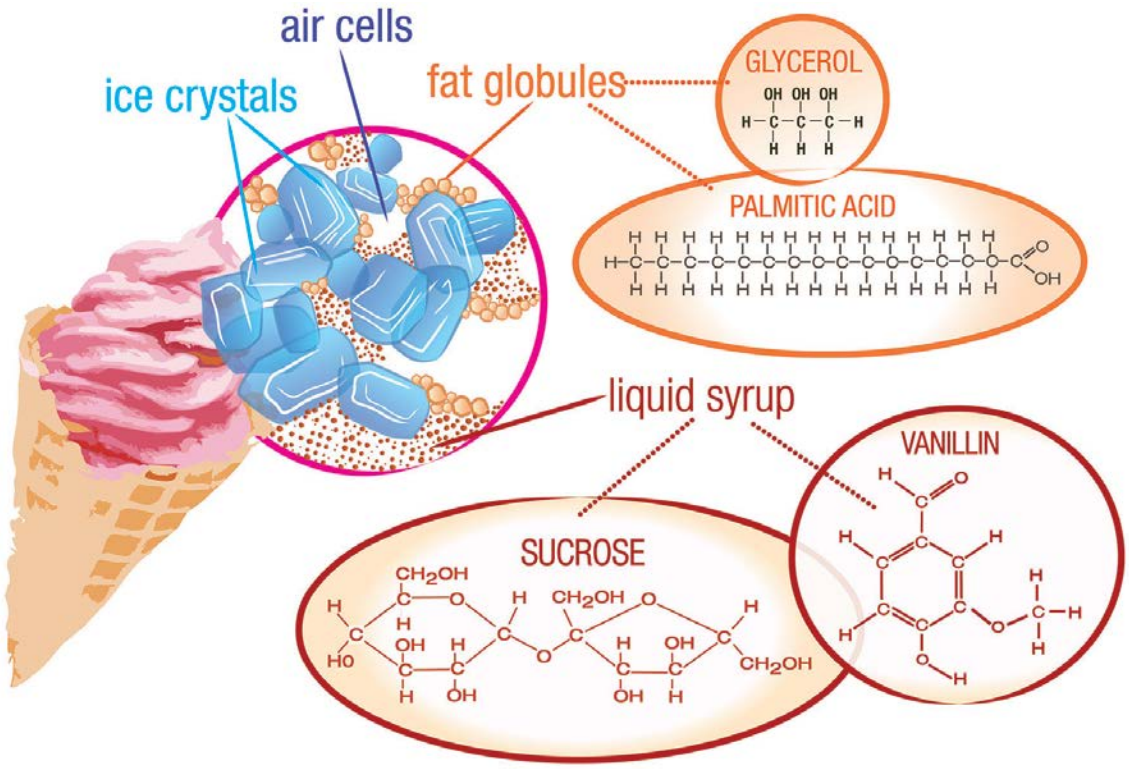


Figure 1. Some of the most common ingredients in ice cream include ice crystals, air, fat globules, sugar (sucrose), and flavoring agents (such as vanillin).
Ewa Henry

Sugar and fat

Milk naturally contains lactose, or milk sugar, which is not very sweet. Ice cream makers need to add a lot more sugar than you probably realize—usually sucrose or glucose. Cold tends to numb the taste buds, making them less sensitive. So more sugar needs to be added to produce the desired effect at the low temperatures in which ice cream is usually served. If you taste ice cream at room temperature it will taste overly sweet. You may have noticed this same effect with carbonated soft drinks. If consumed warm, they taste sickly sweet. In parts of the world where soft drinks are normally consumed warm, there is less added sugar. If these same soft drinks were served cold, they would not taste sweet enough.

A big reason why ice cream tastes so good is because of its high fat content. Unless it is labeled as light, low-fat or non-fat, ice cream must contain at least 10% fat, and this fat must come from milk. (You cannot use lard when making ice cream!) Before milk is homogenized, a thick layer of cream rises to the top. This cream has a high fat concentration—up to 50%—and supplies most of the fat in ice cream.

Premium ice creams may have up to 20% fat, which gives it a velvety, rich texture. Reduced fat ice cream does not taste as good as the real thing, and tends to lack the creamy texture. Although fat is frequently vilified, it has its purpose. Most foods that taste delicious probably contain fat. Fat fills you up, so you don't have to eat as much to feel full.

The problem with using fat as an ingredient in any food is that it doesn't mix well with a lot of other substances. Fat is nonpolar, meaning positive and negative charges within the fat molecule are equally dispersed. A polar substance, such as water, has separate regions of positive and negative charge—one end of a polar molecule has a partial positive charge, and the other end has a partial negative charge. Polar and nonpolar substances do not mix. Just like oil floats to the top of water, the fat content in ice cream has a tendency to separate out, as well.

Keeping it all together

Because ice cream is an emulsion, you would expect that the fat droplets that are present in the mixture would separate after some time, similar to a bottle of salad dressing in which the oil separates from the rest of the dressing. When you shake up a bottle of salad dressing, the two parts come together. But after a few minutes, they begin to separate. That's because the oil droplets interact with one another, a process called coalescence.

In the case of milk, each fat droplet is coated with a layer of milk proteins that prevents the fat droplets from interacting with one another. These milk proteins act as "emulsifiers"— substances that stabilize emulsions and allow the liquid droplets present in the emulsion to remain dispersed, instead of clumping together. Because these milk proteins have a nonpolar side, and because like dissolves like, the nonpolar sides of the proteins are attracted to the nonpolar fat globules. This is good in milk, but not so good in ice cream, in which the fat droplets should coalesce to trap air.

So another emulsifier is added to allow the fat droplets to coalesce. This emulsifier replaces milk proteins on the surface of the fat droplets, leading to a thinner membrane, which is more likely to coalesce during whipping. A common emulsifier is lecithin, found in egg yolks. Lecithin is a generic term that refers to a group of molecules that consist of long chains of fatty acids linked to a glycerol molecule, along with choline and a phosphate group (Fig. 2).

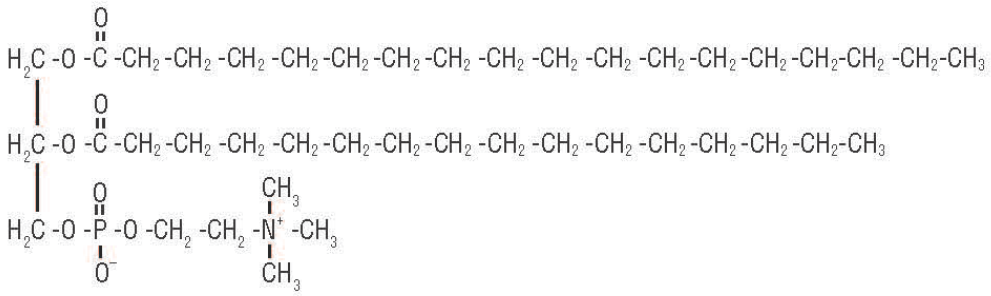


Figure 2. Chemical structure of a type of lecithin called phosphatidylcholine

Lecithin inserts itself between the fat globules, which helps the fat globules to clump together and, as a result, the air bubbles that are present in the mix are trapped by this partially coalesced fat. This adds firmness and texture to the ice cream, enabling it to retain its shape.

Closely related to emulsifiers are stabilizers, which make the texture creamy. Stabilizers have two roles: First, they prevent large crystal formation. In the presence of stabilizers, ice cream contains small ice crystals that are easier to disperse and, therefore, they melt more slowly than larger ice crystals would. Second, emulsifiers act like a sponge by absorbing and then locking into place, any liquid in the ice cream.

Common stabilizers are proteins such as gelatin and egg whites. Guar gum, locust bean gum, and xanthan gum can also be used. **Look for carrageenan and sodium alginate on the ingredient label of your ice cream container**. Both are derived from seaweed! Without these stabilizers, ice cream might look like a milkshake.

Once you get all of the ingredients together in a mixture, you need to freeze the mixture to form ice cream. The dissolved solutes (mostly sugar) in the liquid portion of the mixture lower its freezing point. A freezing point depression of 1.86 °C occurs for every mole of solute added to 1 kilogram (kg) of water. In other words, if you dissolve one mole of sugar in 1 kg of water, water will no longer freeze at 0 °C, but rather will freeze at –1.86 °C.

Freezing point depression is a colligative property, meaning that the effect is observed regardless of the specific identity of the solute—all that matters is how many moles are dissolved. A typical batch of ice cream will freeze at -3 °C (27 °F), due to the presence of all the dissolved solutes.

Types of ice cream

Soft-serve ice cream, frozen custard, and frozen yogurt. What is really the difference?

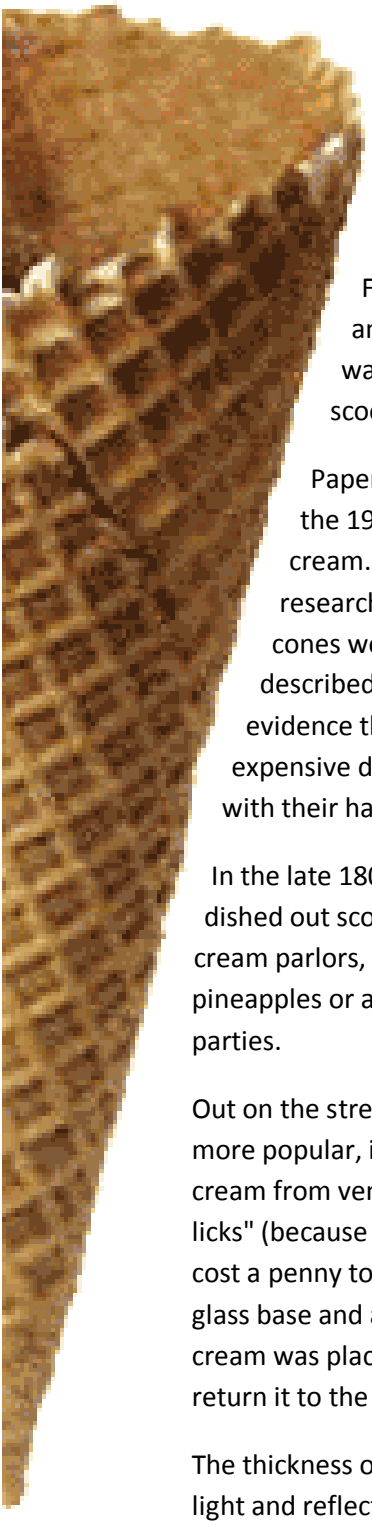
Regular ice cream is typically served at –12 °C, while **soft-serve ice cream** is served at –6 °C. This higher temperature is responsible for a softer product. Soft-serve ice cream, or soft serve, for short, contains less fat and more air than regular ice cream. Soft serve with insufficient air will have a yellowish color. The whiter the soft serve, the better the quality. As ice cream melts, you may have noticed this yellow color, which is simply the actual color of the ingredients used to make it. By adding air and fluffing it up, ice cream is better able to reflect white light, producing the white color. This is because the molecules in ice cream are large enough to reflect visible light (whereas, for example, water molecules are too small to reflect visible light, because the size of a water molecule is smaller than the wavelengths of visible light).

Frozen custard differs from ice cream in that it contains at least 1.4% egg yolks. The egg yolks are made of lecithin, an excellent emulsifier. The result is a product with a smoother, creamier texture. Another difference is that custard contains much less air than ice cream. No air is mixed during its manufacture; instead, air is introduced during mechanical agitation as the frozen custard is being made. It is churned more slowly during its manufacture to minimize the amount of introduced air. Less air leads to a thicker, denser product. Frozen custard is typically made fresh each day in the store. It is frozen quickly to prevent large crystals—of water, lactose, or any added sugar—from forming.

Frozen yogurt is making a huge comeback these days, with self-serve frozen yogurt shops offering a plethora of toppings popping up seemingly on every corner. Frozen yogurt is viewed as a healthier alternative to ice cream, unless you top it off with a generous helping of gummy bears! It does contain less fat, but that means you can eat more without feeling full. And to compensate for less fat, often a lot of sugar is added. The biggest difference is that instead of cream, yogurt is added as the primary dairy product. From there, the process is similar to making regular ice cream.

ten Ice Cream

A recent trend is ice cream made with liquid nitrogen. One shop in San Francisco, Calif., aptly named Smitten Ice Cream, has a viewing area where customers can watch ice cream being made with liquid nitrogen, accompanied by the impressive plume of fog that is released. Liquid nitrogen, which boils at –196 °C, will freeze ice cream almost instantly. Because the ice cream freezes so quickly, the size of the crystals is small, resulting in a creamy texture. And because it boils when it hits the mixture, the ice cream is aerated during the process. The popular Dippin' Dots are also made using liquid nitrogen. It is no exaggeration to say that ice cream made with liquid nitrogen is the coolest ice cream around!



Wait, what about waffle cones?

Where did they come from?

For over a century, Americans have been enjoying ice cream in an edible cone. Whether it's a waffle cone, a sugar cone, a wafer cone or a cake cup doesn't matter. Just add a double scoop of your favorite ice cream and lick to your hearts content.

Paper, glass and metal cones, cups, and dishes were used during the 19th century in France, Germany, and Britain for eating ice cream. Many cooking books, some as early as 1770, according to researchers mention pastry and creams in the same recipes. Edible cones were mentioned in French cooking books as early as 1825, when Julien Archambault described how one could roll a cone from "little waffles." But according to historians there is little evidence that they are describing the ice cream cone that we know today. Ice cream was an expensive desert that only the wealthiest could enjoy. They certainly would **not** be eating anything with their hands, that would be behavior of “common” people and to be avoided.

In the late 1800's and early 1900's while the confectioners dished out scoops to ladies and gentlemen in fashionable ice cream parlors, or molded ice creams into the shape of pineapples or asparagus spears to be served at elegant dinner parties.

Out on the street, as ice cream became less expensive and more popular, it began to be sold by street vendors. Most ice cream from vendors was sold in serving glasses called "penny licks" (because you'd lick the ice cream from the glass, and it cost a penny to do so). The glass was usually made with a thick glass base and a shallow depression on top in which the ice cream was placed. The customer would lick clean the glass and return it to the vendor, who would reuse it.

The thickness of the glass made the contents appear greater than they were, through the magic of the light and reflections, the glass would actually appear to be full of ice cream until hungry buyers discovered that it was only just a lick, often disappointing the customer, and the glasses commonly broke or were stolen. The penny lick was banned in London in 1899 due to concerns about the spread of disease, (especially tuberculosis), as the glass was not washed between customers. (The more “hygienic” sellers swirled them in a bucket of water between customers.) Thus, there was a major problem with sanitation (or the lack thereof), and another problem was that many people would accidentally break the glasses, or not so accidentally walk off with them.

Two enterprising ice cream salesmen independently invented and patented edible containers for ice cream. In 1896 Italo Marchiony was a successful ice cream salesman with over 40 push-cart vendors selling his edible containers filled with ice cream on the streets of New York City. He obtained a patent for a machine to make the containers in 1903. At about the same time an ice cream merchant in Manchester, England named Antonio Valvona obtained a U.S. Patent (1902) for a machine for producing edible cookie cups. Examination of the patent drawings show that both inventions were for edible ice cream cups with flat bottoms and tapered sides.

In 1904 St. Louis, Missouri was the place to be. That year three major events plus the invention of the ice cream cone took place. They hosted the 1904 World's Fair, the centennial of the Louisiana land purchase from the French (one year late) with a Louisiana Purchase Exposition and the 2004 Olympics.

According to most accounts there were more than 50 ice cream vendors (selling a total of 5000 gallons of ice cream per day) at the 1904 St. Louis World's Fair and more than a dozen waffle stands selling their wares at these events. With all these events running concurrently and the number of vendors involved selling ice cream and waffles, finding the real inventor of the ice cream cone had to end in controversy.

Ernest Hamwi was one of the vendors at the fair but he was not selling ice cream, he was selling a type of waffle (zalabia). The story goes that one day, a man (named Arnold Fornachou) at the next booth ran out of small paper dishes to serve his ice cream. Syrian immigrant Ernest Hamwi rolled up some of his “zalabia” (a waffle-like pastry) from his pastry cart into cornucopia and told Fornachou to put a scoop of his ice cream into the cornucopia's mouth. They were an instant hit with Fornachou's customers and they lined up to have their ice cream served this new way.

Word spread quickly though the Fair and many other vendors began selling ice cream in waffle cones. These edible ice cream cones became so popular that everyone wanted to take credit for their invention and many did.

After the fair, Hamwi joined with J. P. Heckle and helped him develop and open the Cornucopia Waffle Company. Ernest traveled throughout the United State introducing the World's Fair Cornucopia as a new way of eating ice cream. In 1910, Hamwi opened the Missouri Cone Company and called his container, the ice cream cone, to avoid a conflict with Cornucopia.

The earliest cones were rolled by hand, from hot and thin wafers, but in 1912, Frederick Bruckman, an inventor from Portland, Oregon, patented a machine for rolling ice cream cones. He sold his company to Nabisco in 1928, which is still producing ice cream cones as of 2012. Independent ice-cream providers such as Ben & Jerry's make their own cones.

In 1920 Ernest Hamwi was issued a patent for a pastry cone making machine. His Missouri Cone Company later became the Western Cone Company as the market for ice cream popularity spread and the company grew.

In its purest form an ice cream cone should be of conical shape. The first true edible conical shaped cone for serving ice cream was created at the St. Louis Worlds Fair by Ernest Hamwi in 1904. The cone obviously gained popularity across the United States because by 1924 Americans were consuming upwards of 245 million cones per year.

Today, the largest ice cream cone company in the world is the Joy Cone Company of Hermitage, Pennsylvania. The company is baking over 1.5 billion cones per year to satisfy the world's demand. Albert George, along with other family members, bought some second-hand cone-baking machines and started the George & Thomas Cone Company in 1918. Today, that company now called Joy Cone Company after its signature cone and is still owned/operated by the George family, together with their employees.

Iron-less recipe:
http://www.joyofbaking.com/IceCreamCones.html

Interesting Fact: Ice cream is not the only thing that can be or is served in waffle cones! Some food trucks serve what can only be called “meat cones” – waffle cones filled with meat or other sweet or savory items like chicken and dumplings, Jamaican jerk, pulled pork, Cobb Salad in a Crouton Cone, mac n’ cheese, chicken salad, the Tacone, or go vegan with mushrooms in marsala sauce in a handmade vegan waffle. There’s even Pizzacone - pizza in a waffle cone and The Bacone: Jalapeno scrambled eggs, cheese and pico de gallo and a slice of bacon in a bacon bit encrusted waffle cone. Then finish it off with a campfire cone (s’more cones anyone?) This photo is of a food vendor in Korea that serves pasta in waffle cones.

Can You Eat the Hokey-Pokey?

“Cones weren’t the first hand-held ice cream treat though. It may not be the question of the chicken or the egg, but in the contest between the waffle and the sandwich, the sandwich wins!

In the beginning, the sandwich seller was known as a "hokey-pokey vendor," or “hokey-pokey men” which refers to the no longer peddled treat of a small square (2 in. by 2 in. by ½ in thick) cut slab (the bricks were usually about 18 in. long, 12 in. wide, and 2.5 in. thick) of ice cream (built up of variously flavored layers, like today’s Neapolitan) kept in a circular metal pot surrounded by broken ice and wrapped in paper and called, “variously flavored…dreadfully sweet, dreadfully cold, and hard as a brick.”

They were usually made of three different flavors of ice cream and each slice would reveal all three. The men that peddled these once popular English treats through the streets of London, according to *The New York Times*, announced their presence by yelling, "Okey-pokey!" After it was cut the children would wonder how the colors “got in like that.” Children could buy a whole slice for 2 cents or half a slice for half the price. The peddlers were so busy they couldn’t eve take time to make change. It was pay with a penny or no ice cream sandwich. Who said exact change only became necessary for bus fares and parking meters?

Whole bricks were sold to ice cream shops to be sliced and served and also to house holders who had to rush home as fast as possible to serve them to their families before the ice cream melted.

Ice cream makers soon learned how to make less expensive versions for different markets and ice cream makers were encouraged to “decide what prices customers are likely to pay for the bricks, so that you will know whether to make a cream, milk, or sherbet one,” in order to maximize profit. One manufacturers brick could produce up to 320 slices. Priced at 5 cents each ($1.28 in today’s money) they could bring in between $8.00 and $9.60 ($205.00 to $245.00 in today’s money) depending on how much was charged to the seller. If you bought in bulk you got it a bit cheaper. It was recommended to manufacturers that profit should never be less than $5 a batch, which would be around $128.00 in today’s money.

Flags later became a popular motif for these bricks: flavors and colors were chosen to mimic the flags of different colors, and a tricolored slice of ice cream was served with a piece of wafer cake representing the flags staff. They might use chocolate, strawberry, and bright orange ice to stand for the black, red, and gold of a German flag. For Italy’s flag, they might use green made with pistachio, red made with red fruit or rose ice cream, and yellow, made with orange ice. It was an odd selection of colors since the Italian flag is red, green, and white, not yellow.

Gradually “hokey-pokey man” became less of an insult and became part of a popular children’s rhyme with many different variations:

Hokeypokey, penny a lump.
Freeze your belly and make you jump!

Hokeypokey, sweet and cold.
For a penny, new or old.

It also became a popular song and dance that people do to this day! “You put your right food in, you put your right foot out…”

A New Sandwich!

The street vendor’s hokeypokeys were covered with paper, which made them easy to store, convenient to carry, and sanitary! (Much more sanitary than the penny licks!) It was a practical arrangement. Then an anonymous vendor on the Bowery had a better idea and was inspired to replace the paper wrapping with cookies or crackers and thus created an enduring innovation—the ice cream sandwich. It was so good, it made the news.
It was revolutionary not only because they provided a hand-held option for ice cream but also because they conducted the heat of the eater's hands to the frozen treat, melting it a bit and allowing it to be more easily consumed.

The New York Tribune, ran a piece about the peddler in July 1900, saying, "The ice cream sandwich man, who sells quarter-inch layers of alleged ice cream between tiny slabs of water wafers, did a big business during the hot spell…He made the sandwiches quickly in a tin mold, and was kept so busy that he could not make change, but insisted on receiving the actual price for each ice cream sandwich — 1 cent."

Did You Know?

- Nationally, we eat, on average, 48 ice cream sandwiches per second
- If all the ice cream sandwiches made in a year were placed end to end, they would circle Earth 3 1/2 times
- 30-44 year olds buy the most ice cream sandwiches
- People on the eastern seaboard eat almost 50% of all ice cream sandwiches
- The ice cream sandwich is such an American institution that it is sold at the Smithsonian in Washington, D.C.
- A regular Good Humor vanilla ice cream sandwich (56g) has 140 calories, 3g fat, 26g carbs, 2g protein
- National Ice Cream Sandwich Day is August 2nd.

An article in American Kitchen magazine in 1901 described the making of the sandwich:

> A thin milk biscuit [cookie] is placed in a tin mold just large enough to receive it. Then the mold is filled with ice cream from a freezer and another wafer is placed on top. There is an arrangement for forcing the sandwich out of the mold when complete, and the whole process only takes a few seconds. The ice-cream sandwich man is the envy of all the other push-cart restauranteurs [sic]…, as he as all the patrons he can attend to, and the cart is always surrounded by curious customers.

In the beginning the sandwiches were longer, contained more cream, and sold at two or three cents, "but the boys of New York would have none of it…they desired a penny sandwich…" and the ice cream sandwich got smaller and came down to the blanket price of 1 cent (29 cents in today's money.)

Rich and poor people were united by the sweet street treat—at least at first. Ice cream sandwiches were so popular that news accounts describe crowds of customers, from the richest bankers to the poorest bootblacks or messenger boy, lining up to buy them and eating them in a democratic fashion side by side on the sidewalk.

But the elite indoor restaurants were quick to dress up the confection for their upscale clientele. They served the sandwiches on plates, with special ice cream forks, and even atop lettuce leaves. They stressed that they were "quite different from the article dear to a newsboy's heart, sold from the street vendor's carts." Rather, the restaurant's "dainty" sandwich was made with diamond shapes of "delicate sponge or cup cake, neatly cut and with all the brown edges removed."

Some hokey-pokey men used molds, others simply topped a wafer with ice cream and clapped another wafer on top. The wafers varied immensely (cookies, crackers, "nabisco wafers" and more were used) and one account reported that sandwiches were made from "two graham wafers and a slab of ice cream between."

These days it's the well-known song of the ice cream truck that brings kids out running for a cool snack, not the cry of "Okey-Pokey!" Of course ice cream sandwiches are also available in practically any grocery store or corner deli — although they will cost a bit more than one cent! But they're still best made by hand. So celebrate Ice Cream Sandwich Day (August 2nd) or any day by whipping up some of these hand-held chilly treats.

Did You Know?

Sylvester Graham, creator of the graham wafer or cracker, disapproved of meat, sugar, white flour, hot and spicy foods, coffee, tea, and alcohol. Although Graham, who had died in 1851, did not specifically condemn ice cream, it's highly doubtful that he would have approved of his healthy whole wheat crackers being used for anything as indulgent as an ice cream sandwich!

How's Your Humor?

In 1920, there came another invention in the ice cream field, and it was called "Good Humor Bar." It all started when Harry Burt created a chocolate coating compatible with ice cream. His daughter was the first to try it. Her verdict? It tasted great, but was way too messy to eat. Burt's son suggested freezing the sticks used for their Jolly Boy Suckers (Burt's earlier invention) into the ice cream to make a handle and things took off from there… In 1920 Burt outfitted a fleet of twelve street vending trucks with freezers and bells from which to sell his creation. The first set of bells came from his son's bobsled.

After waiting 3 years for a patent, Burt took a trip to Washington D.C. in 1923 with a five-gallon pail of Good Humor® Bars for the patent officials to sample. It worked – his patent was granted.

Good Humor® bars have been sold out of everything from tricycles to push carts to trucks. A Good Humor® plant opened in Chicago in 1929. The mob demanded $5,000 in protection money (a bribe so they wouldn't hurt their trucks), which was refused, so the mob destroyed part of the Chicago fleet of trucks.

During the Great Depression, Good Humor® introduced a bar for 5¢ – half the price of a normal bar. In the early days, Good Humor® men were required to tip their hats to ladies and salute gentlemen. Not much has changed since then.

The Good Humor® name came from the belief that a person's "humor", or temperament, was related to the humor of the palate (sense of taste). By 1960 there were over 85 Good Humor® ice cream products. "The Classics" – Candy Crunch, Chocolate Eclair, Strawberry Shortcake, Toasted Almond – were re-launched in 1992.

So, do you think we can create our own? For example, the packaged version of Strawberry Shortcake contains 46 ingredients, not counting "natural and artificial flavors". Will it take that many for us?

Good Humor-like Strawberry Shortcake Ice Cream Bars

Author: Robin Sue Joss, Big Red Kitchen LLC

Prep time: 2 hours

Total time: 2 hours

Serves: 12-15

Very much like the classic Strawberry Shortcake Ice Cream Bars, but even better!

Ingredients

- 3 ounce box strawberry flavored gelatin
- 3.8 ounce box vanilla non-instant pudding mix
- ½ cup chilled unsalted organic butter, divided
- 1 cup flour, divided
- 28 ounces of good vanilla ice cream, softened
- 14 ounces of good strawberry sorbet, softened

Instructions

1. Place the contents of strawberry gelatin packet, ¼ cup butter, and ½ cup oat flour in a bowl.
2. Using a fork or pastry blender, blend the contents until a small crumb is obtained. Spread crumbles on a waxed paper lined cookie sheet and freeze.
3. Repeat the same process with the vanilla pudding mix, ¼ cup butter, and ½ cup oat flour, and freeze crumbles on a tray as well.
4. Spread the softened vanilla ice cream onto a parchment paper lined 9×13 inch jelly-roll pan. The paper should extend over the edges- this will help students later to lift the dessert from the pan and slice it.
5. After spreading the vanilla ice cream to the edges of the pan, dollop spoonfuls of strawberry sorbet over the ice cream, and swirl using a butterknife or chopstick.
6. Remove both vanilla and strawberry crumbles from the freezer and top dessert, slightly pressing them into the ice cream.
7. Freeze 1-2 hours or until firm. Lift dessert from the pan using the parchment paper, slice, and serve.

Notes

When making the crumbles, you will notice they are all different sizes. If some were large, simply pinch off bits about the size of bb's and spread them on the cookie sheets. The vanilla tends to make bigger crumbs, but no big deal, break them up smaller, and, of course, let the kids help!

Bubbling Over!

A fountain of old-fashioned fun!

so·da

noun \'sō-də\

: a beverage consisting of soda water, flavoring, and a sweet syrup

Soda goes Pop?

When your grandpa took a young lady on a date, chances are they ended up at their local soda fountain. There, they flirted and sipped on delicious and refreshing fizzy beverages. When he went off to fight in the Big War, chances are the ship that took him over there had a soda fountain on board where your grandpa would grab a nice cold soda after baking in the hot sun on deck.

In the early days, many soda fountains were all-male hangouts where guys would well, hang out. And later on, fountains became the most popular place for a guy to take a date.

Why is it called a soft drink?

It turns out, soft drinks aren't just flavored carbonated beverages. "Soft Drink" refers to nearly all beverages that do not contain significant amounts of alcohol (hard drinks).

The term "soft drink" though is now typically used exclusively for flavored carbonated beverages. This is actually due to advertising. Flavored carbonated beverage makers were having a hard time creating national advertisements due to the fact that what you call their product varies from place to place. For instance, in parts of the United States and Canada, flavored carbonated beverages are referred to as "pop"; in other parts "soda"; in yet other parts "coke"; and there are a variety of other names commonly used as well. Then if we go international with the advertisements, in England these drinks are called "fizzy drinks"; in Ireland sometimes "minerals". To account for the fact that they can't refer to their product in the generic sense on national advertisements, because of these varied terms, these manufactures have chosen the term "soft drink" to be more or less a universal term for flavored carbonated beverages.

Tiny Bubbles Make Me Happy

Soft drinks can trace their history back to the mineral water found in natural springs. Bathing in natural springs has long been considered a healthy thing to do, mineral water was said to have curative powers. Scientists soon discovered that gas carbonium or carbon dioxide was behind the bubbles in natural mineral water.

America's earliest colonists were the first brewers of root beer, along with sarsaparilla, ginger beer, and birch beer. The brews were made from roots, berries, and bark, and were mildly alcoholic. Mildly alcoholic drinks like these were popular because they killed the bacteria and other organisms often lurking in the regular ground or well water.

The first marketed soft drinks (non-carbonated) appeared in the 17th century. They were made from water and lemon juice sweetened with honey. In 1676, the *Compagnie de Limonadiers* of Paris were granted a monopoly for the sale of lemonade soft

drinks. Vendors would carry tanks of lemonade on their backs and dispensed cups of the soft drink to thirsty Parisians.

In 1767, the first drinkable, man-made glass of carbonated water was created by Englishmen, Dr. Joseph Priestley. Three years later, the Swedish chemist, Torbern Bergman, invented a generating apparatus that made carbonated water from chalk by the use of sulfuric acid. Bergman's apparatus allowed imitation mineral water to be produced in large amounts.

In 1810, the first U.S. patent was issued for the "means of mass manufacture of imitation mineral waters" to Simons and Rundell, of Charleston, South Carolina. Carbonated beverages did not achieve great popularity in America until 1832, when John Mathews invented his apparatus for the making carbonated water. Mathews mass manufactured his apparatus for sale to others.

The first known reference of the term “Pop”, as referring to a beverage, was in 1812 in a letter written by English poet Robert Southey; in this letter he also explains the term’s origin: “Called on A. Harrison and found he was at Carlisle, but that we were expected to supper; excused ourselves on the necessity of eating at the inn; supped there upon trout and roast foul, drank some most admirable cyder, and a new manufactory of a nectar, between soda-water and ginger-beer, and called pop, because ‘pop goes the cork’ when it is drawn, and pop you would go off too, if you drank too much of it.”

The term “soda-pop” was a moniker (term or name)given to carbonated beverages due to the fact that people thought the bubbles were produced from soda (sodium bicarbonate), as with certain other products that were popular at that time. A more correct name would have been “carbonated-pop”.

The Rise of the Soda Fountain

For centuries people were intrigued by and believed in the healing powers of naturally effervescent waters. In the 18th century, scientists began to experiment with ways of artificially "impregnating" regular water with CO2. Selling this bubbly water as a cure for a variety of ills, "soda" fountains began appearing in pharmacies and apothecaries. Pharmacists mixed various "medicines" with soda water and flavoring to help them go down easier i.e. birch bark, dandelion, sarsaparilla and fruit extracts. The purpose of adding flavor wasn't just to make it taste better, but also to improve on the supposed natural curative properties of mineral water. Popular ingredients to add were birch bark, dandelions, ginger, lemon, coca, and kola (the latter two combined ended up producing Coca-Cola, which was originally formulated by Dr. John Styth Pemberton and first sold on May 8th, 1886).

While many Europeans had tinkered with the idea of soda water, the concept would truly take off in America. Carbonating beverages, introducing CO2 into the drink mix under pressure, makes the drink slightly more acidic (carbonic acid), which serves to sharpen the flavor and produces a slight burning sensation. It also helps preserve the drink longer without going bad.

From pharmacy novelties, soda fountains soon became a central part of American culture and transformed into community gathering places where people would meet and socialize over a delicious effervescent/bubbly beverage. The soda shops were often classy places, centered around a fancy soda fountain made of marble, gilded with metal piping and spigots, and ornamented with figurines, gas lights, and mirrors.

The soda shops often drew single primarily crowds of a specific gender, with ones located in the shopping district drawing all females, and those situated in the business district all males. At these all-male hang outs guys or gals would sip a bubbly beverage and talk around tall glasses.

People loved soda fountains but also wished to consume their new favorite beverage while on the go or lounging at home. Keeping aerated drinks in a bottle was a huge problem for a long time in the distribution of soft drinks. As such, until the advent of crown cork (crown cap), carbonated beverages were generally only available in pharmacies (hence why many of the most popular soft drink flavors that survived to this day were invented by pharmacists).

Over 1500 types of cork and other bottle stopper patents were filed to attempt to stop aerated drinks from losing their carbonation too quickly by preventing the carbon dioxide (bubbles) from escaping. Finally, in 1891, in the United States, William Painter, , a Baltimore machine shop operator, invented the "crown cork", which gave the first truly effective, mass producible, way to stop the carbonation from escaping from bottled carbonated drinks and keep the bubbles in the bottle. This allowed, for the first time, people to buy carbonated beverages they could store at home.

However, at the time of this invention, glass bottles had to be made by hand by glass blowers. (Glass bottles actually make significantly better containers for carbonated beverages due to the fact that air

can diffuse (move through) through plastic, allowing the CO2 to escape. Thus, carbonated beverages stored in plastic containers have a much shorter shelf life than their glass counterparts.) This changed in 1899 with the invention of an automatic glass blowing machine. Four years later, the new bottle blowing machine was in operation and, in a very short span, increased annual glass bottle production from about 1500 bottles a day to 57,000 bottles a day in the United States. This further drove down the price and helped popularize bottled carbonated drinks.

Sometime in the 1920's, the first "Hom-Paks" were invented. "Hom-Paks" are the familiar six-pack carrying cartons. Automatic vending machines also began to appear in the 1920's. The soft drink had become an American mainstay.

With technological advances in bottling, by the turn of the century hundreds of independent bottlers were selling their effervescent fare in a portable form. Soda was well on its way to becoming America's favorite drink.

Fun with Flavors

While soda water originally started out unflavored, people soon went crazy for the taste of that water mixed with flavored syrups. People loved to experiment with new and flavor combinations, and soda fountains began to offer a 100 or more. The menu at a large soda fountain might include:

almond, anise, apple, apricot, banana, birch beer, blackberry, blood orange, Catawba, celery, champagne cider, cherry, chocolate, cinnamon, cognac, Concord grape, coriander, crabapple, cranberry, cream soda, crushed violets, currant, egg chocolate, egg cream, egg phosphate, ginger, ginger ale, gooseberry, grape, green apple, grenadine, hoarhound, java, lemon, lime, maple, mead, mint julep, mocha, mulberry, nutmeg, orange, orris root, peach, peach oolong, peach cider, pear, pear cider, peppermint, pineapple, pistachio, plum, quince, raspberry, root beer, rose, sarsaparilla, strawberry, Valencia orange, vanilla, walnut cream, wild cherry, and wintergreen.

Soda fountains sold, egg creams, milk shakes, malteds, concretes, floats, frozen custards, sundaes, splits, Italian sodas and other quirky treats. Men particularly enjoyed the heartier raw egg drinks- concoctions which usually consisted of egg, soda water, phosphate, and flavored syrup. Comparing this list to what is currently found on our grocery shelves gives a clear indication on how far soda as evolved.

The flavor of many brand name sodas that we are familiar with today like Dr. Pepper and Coca-Cola were created by chemists and pharmacists who were looking for the next big flavor hit. These and other

sodas continued to claim health benefits especially as a tonic to restore vitality. Flavors like birch beer and root beer grew out of the penchant of America's earliest colonists for making brews out of all sorts of roots in order to avoid drinking the sometimes unsafe water.

Homemade Ginger Ale Float

In any form, ice cream floats are a delightfully lazy route to a happy summer. Here, with one extra step, we get a kicky homemade ginger syrup, lifted by seltzer and bear-hugged by slow-melting vanilla ice cream. It's a quick and easy, and nothing short of delicious ode to a proud soda pop tradition.

Serves 2

For the ginger syrup

- 1/2cup thinly sliced peeled, fresh ginger
- 1/2cup white granulated sugar
- 1/4cup packed light brown sugar
- 1 1/2cup water
- 1/4teaspoon vanilla extract

1. Combine all ingredients except the vanilla in a saucepan. bring to a boil and then simmer for about 15 minutes until reduced to one cup liquid.
2. Remove from the heat, stir in the vanilla and cool and strain.

Note: The cup of ginger syrup will make about 1 1/2 quarts of gingerale. If just wishing to make the soda, just under 3 tablespoons are needed per 8 ounces of soda.

For the float or shake

- 6 large scoops great quality vanilla ice cream
- ½ cup of the ginger syrup
- 3 cups sparkling seltzer water

1. For a shake: place the ice cream, syrup and seltzer in a blender and blend until smooth. Pour into 2 tall glasses and grab some straws.
2. For a float: place three scoops of the ice cream in each of the 2 tall glasses. Mix the syrup with the seltzer and then pour half over each ice cream filled glass. This time grab the straws and a long spoon!

Egg Cream?

The New York Egg Cream is almost exclusively a fountain drink. Although there have been several attempts to bottle it, none have been wholly successful, as its fresh taste and characteristic head requires mixing of the ingredients just before drinking. It has been described as a "poor man's ice cream soda," because it has a similar overall flavor, but is traditionally sold for only a slight premium over an ordinary fountain soda. While it has no eggs or cream, it **did** get its start in New York, and it's making a comeback all over!

1. Get a tall, chilled, straight-sided 8oz. glass.
2. Spoon 1 inch of chocolate syrup (the classic is U-bet Chocolate Flavor Syrup) into the glass.
3. Add 1 inch of whole milk over the syrup.
4. Pour in cold seltzer (aka soda water) making a nice foamy head to within 1 inch of the top of the glass. Use the spoon when pouring to prevent direct pouring into the syrup and milk.
5. Stir vigorously with a long spoon to mix the syrup and milk into the seltzer foam.
6. Enjoy the true experience by sipping it slowly with a long straw. Use the straw to stir in between sips.

What a Jerk!

The soda fountain soon became every community's social hub. Kids and adults, women and men, everyone enjoyed stopping in for a refreshing drink and some conversation. Men took their dates to the fountain, and though it has become a cliché, truly did order one glass with two straws. For many people, the soda fountain replaced the bar as their social center.

The soda fountain spigot itself typically was a sturdy, shiny fixture on the end of a metal pipe or other similar structure sticking out of the counter by several feet and curving towards where the glasses would be filled. The unflavored carbonated water was used to make all of the drinks. Consequently the tap handle was typically large, as a busy shop would have the soda jerker (The name soda jerk came from the

"jerking" action the server would use to swing the soda fountain handle back and forth when adding the soda water.) using it frequently. This made the mixing of drinks a center of activity at the soda counter. While the job of mixing sodas is fairly simple, there is some finesse involved in learning how to mix ice cream drinks, and many soda jerks undoubtedly invented all sorts of peculiar soda combinations while bored on the job. They had to be a showman, innovator was similar to a bartender, serving-up phosphates, rickeys, and fancy sundaes. The position was highly coveted, and awarded only after several months or even years of menial labor in the store.

This trend only accelerated when Prohibition became the law of the land in 1920. Sales of sodas skyrocketed as former booze drinkers looked to alternatives to quench their thirst. Soda fountains adapted to appeal to men who once frequented saloons. The sodas got manlier names, and when bartenders lost their jobs, due to the fact no one could legally sell alcohol, they went after the jobs of soda jerks! The soda shop décor became more masculine, and seats were reserved just for men during the lunch hour. Many fountains added a lunch counter to their offerings and served hearty meals to men who once dined on the free lunches offered by saloons.

The End of a Soda Era

Even after Prohibition ended, soda fountains continued to enjoy a central place in American culture. During World War II, soda, along with tobacco and toiletries, was considered an item essential to soldiers' morale. Thus soda fountains were often found in Army post exchanges, service clubs, USO clubs, Red Cross posts, and naval training stations. As was the case in WWI, soda fountains were even installed on navy ships. While there are certainly exceptions to the rule, American troops in general were praised during the war for their humane and honorable behavior. Some believed this was due to American GI's love for the soda fountains and preference for non-alcoholic drinks.

After the war, several factors began to spell the demise of the soda fountain. Americans fell in love with cars and began their obsession with automobiles, and used them to drive away from the cities and into new homes in the suburbs. People began to favor even quicker lunches than the soda fountain's lunch counter offered, and took their businesses to newly established drive-in restaurants and road stands (they wouldn't have to

leave those cars). Drugstores moved towards being entirely self-service, and paying a soda jerk (to dispense drinks became cost prohibitive.

The popularity of bottled soda was also on the rise. During the 1950's major brands like Pepsi and Dr Pepper decided to focus their advertising on selling the bottled versions of their drinks. Soft drink vending machines also began to appear, making soda consumption all the easier. Soda fountains began to die a slow death and disappear from American culture.

Soda manufacturers began to replace bottled sodas with cheaper cans. A few large corporations came to dominate the soda market and squeezed the little guys out. Stripped of its traditions and sense of craft, soda became thoroughly homogenized. But some smaller bottlers have hung on and still offer their delicious beverages to those who diligently seek them out.

How to Make a Self-Freezing Coca-Cola Slushy (Or Any Kind of Instant Soda Slurpee)

This project was inspired by the viral YouTube video "How to Chill a Coke in Just a Second!" by The Super Effect, and the process of nucleation was inspired by "Self-Freezing Coke" by Crazy from Kong.

How to Make Instant Soda Slurpies

You may know that water can be turned into instant ice and bended at will, but you may be amazed to see that soda can be supercooled as well!

Warning: *Leaving soda in the freezer too long can result in failure of the container, and a big mess. Glass bottles are* ***not*** *recommended, as the ice expands when freezing and can shatter the glass explosively. Use of video content is at own risk.*

The anomaly of "self freezing soda" has been observed by many people, usually by accident. Some people put a soda in the freezer to chill it, but then forget about it. When they've remembered and gone to get it, it's liquid until they open it, leaving them puzzled. Some have noticed the effect by leaving the soda outside in cold temperatures.

There is a vending machine in Hong Kong that sells super-cooled Coke bottles, and the instructions to trigger nucleation is the same as in this video. However, they recommend taking a sip when the cap is on. It is believed that this is to increase the chances of impurities being introduced into the liquid, making nucleation more likely. From what has been seen, the results in the following experiment form an even thicker slush than the vending machine in Hong Kong.

To get this effect, shake up and put 4 bottles of 500mL (16.9 oz) soda in a freezer set at -24ºC (-11ºF) between 3¼ to 4 hours. The longer they're in, the more dramatic and solid the slushy freeze will be. However, anytime longer than 3 hours and 15 minutes, there's a chance of them freezing before you take them out.

Shaking the up increases the pressure in the bottle, and actually lowers the freezing point a little.

Every freezer will be a little different temperature, and the location of your bottles in the freezer makes a dramatic difference on freeze times. For best results, choose one consistent location in your freezer, and play around with freeze times to see what works best for you. For example, in this test freezer, the middle of the center rack settles at -24ºC (-11ºF) and takes 3:15 to super chill 4 bottles.

Remember that the longer the freezer door is open, the more cold air will escape, and it will make your freeze times take much longer because your freezer has to cool down again. I've also noticed that the more frozen items you have in your freezer, the faster your soda will chill. In contrast, the less items in your freezer, the longer your soda will take to cool. Bottom line is, use a consistent environment for your experiments, and you'll get consistent results!

The trick to getting the 3 second slush, is quickly releasing the pressure in the bottle and re-securing the cap, flipping the bottle upside down, and back upright again. This is because the forming ice crystals will be moved around the length of the bottle, and trigger nucleation for the rest of the soda.

If you were to just take the cap off, ice will form, and it will slowly spread downward, but might take upwards of 2 minutes for the bottle to completely freeze.

Once you've iced your soda, try pouring it into a glass to see how slushy it really is. It has a consistency similar to that of a Slurpee.

It's actually the water that is forming the ice crystals, and you'll notice the ice will begin to float to the top, trapping some of the soda syrup, and making for a delicious carbonated ice slush.

If you were to remove the ice, the rest of the syrup would be more concentrated due to all the water that was taken out from it.

If you open the cap just enough to hear the bottle hissing, and held it there until it stopped, you can remove the cap completely and the soda should stay a liquid.

If you put a metal bowl in the freezer for about 30 minutes when it comes out it well get frosty from the moisture in the air. If you pour your supercooled soda into a frosty bowl, it's enough of a nucleation point to trip the ice crystallization, and you'll be able to pour yourself and "instant slushy".

Some people have asked what would happen if you were to drink a supercooled soda. Simple answer is that it's cool and refreshing!

As the soda ices, latent heat is released in the crystallization process, and it actually warms up to just below freezing. That's similar to just having a drink with ice cubes floating in it, so go ahead and enjoy it!

If you try pouring your supercooled soda into a regular clean bowl, or glass, it will just look like regular soda.

Now drop a flake of ice, or ice cube into the liquid.

As if by magic, the soda will crystalize until the whole bowl becomes slush.

There's one tasty treat ready for serving!

This also works with cans of soda as well, but it is tougher. The freeze time is about the same, and the key to making it work is releasing the pressure from the can very very slowly. This is much harder to do that opening a tab, but it is possible, and the soda has the same properties as the stuff from the bottles.

If you experiment with 2 liter bottles, the best results were often seen after freezing them between 4-5 hours. The whole bottle slushifies in an instant if you shake it upside down for a second.

If you experiment with Gatorade, Fresca, Mexican Sprite, Rootbeer, Orange sodas, Coke, Diet Coke, in bottle form, as well as in cans you can have super cooled success with them all!

Removing the pressure very slowly from the bottle, can keep the beverage liquified, and give you the choice opportunity to play with supercooled beverage outside of the bottle.

Well, there you have it! That's how to freeze soda almost instantly. If you're not a soda drinker, you can do this same trick with water and other beverages!

Why Become a Soda Connoisseur?

In recent years, it has become fashionable to have a discerning palate (or be picky about what you consume) when it comes to coffee, tea, chocolate, and beer. While these products had become universal, easy to find, and mainstream, people became aware of the differences in these categories between quality, independently made products and those watered down for mass consumption by big corporations.

People may be surprised to learn the same is true of soda. While soda has an interesting history, a refreshing taste, and intriguing flavors, it has been reduced to the cheapest and blandest of commodities. Any variations in flavor and form have been pushed off grocery shelves and replaced with a small selection of focus-group tested choices. In the war between Coke and Pepsi, it has been the unique, independently bottled sodas that have been the real causalities.

Demonized by nutritionists as “liquid candy” and cheapened by big corporations, soda has seemingly been stripped of any good qualities. After all, almost all of the food energy in soda-pop is from refined cane sugar or corn syrup. Each single serving of a typical carbonated soft drink contains more than the recommended daily allotment of sugars. But is there a world of difference between a watered down Big Gulp from 7-11 and a well-crafted, cane sugar sweetened, wonderfully fizzy, long neck bottle of real soda? It’s time to get back in touch with the soda our grandpas enjoyed.

Soda was intended to be a delicious treat made with real sugars and crafted in glass bottles. It was never intended to be gulped from a 64 ounce plastic cup. It was not intended to wash food down your gullet. Nor was it intended as such a cheap beverage that free refills were a possibility. It was meant to be tasted, savored, and enjoyed. When used, and crafted, that way, soda can be enjoyed regularly.

So, let’s get crafting!

Tips:

- ### Keep the Water Cold
  In order for homemade syrup to mix properly with sparkling water, use cold carbonated water, with an emphasis on "not cold from the tap, but cold from the refrigerator. CO2 doesn't grab onto the water properly if it's above 38°F... When you start getting above 40°F it starts to taste a little flat. And the warmer it gets, the flatter it's going to be." Keep a glass jar of filtered water in the refrigerator, and my wife constantly uses that to fill her SodaStream bottles and carbonate."
- ### Know the Shelf Life
  Certain herb-flavored syrups, like lemon verbena, don't last that long. "Lemon verbena is one of my favorite sodas ever," shares Nocito, "but the problem is after about three or four days, the syrup really changes in flavor. It doesn't taste the way it did when you first made it. The green herbs really change shortly afterwards. Other than that, flavors like lemon will generally last a week or two."
- ### Experiment
  Don't let conventional flavors hold you back from tinkering with and creating flavors that you and your students like. You may surprised every time something works out, like using dried fruits. They can be a really fun thing because you have an intense flavor from the drying process.
- ### Try Acids
  Creating your own drinks requires a balancing act between sweet and sour flavors. While lemon and lime juice, as well as vinegar, are traditional ingredients used to finesse and brighten flavors, you can also make use of citric acid to achieve the same. Try using them in different recipes to impart a fresh taste that's not overtly lemony or limey. experiment to see what flavors you like best.
- ### Pour and Mix Gently
  You may want to add the syrup *after* the carbonated water is poured into the glass. Of course, the ratio you choose of syrup to seltzer water will determine how intensely flavored your soda will be.

All you knead is

Bread!

bread

noun \'bred\
: a usually baked and often leavened food made of a mixture whose basic ingredient is flour or meal

It's Alive?

You probably eat some kind of bread every day, but have you ever thought about bread as a technology?

Why do we have bread? That's a great place to start. We could just as easily munch on dry wheat-kernels instead. Or we could grind the wheat into flour, mix the flour with water and eat it as a wet mush. Or we could pour the mush out on a table and dry the mush into thin brittle sheets. But we don't do that, mainly because bread tastes a lot better, and it also works a lot better for sandwiches. Bread is moist (not wet like mush or dry like dried mush), soft (unlike wheat kernels), spongy and delicious. Bread is a bio-chemical technology for turning wheat flour into something tasty!

Bread, in all its various forms, is the most widely consumed food in the world. How often have we heard the simplest meal possible described as bread and water? Not only is it an important source of carbohydrates, it's also portable and compact, which helps to explain why it has been an integral part of our diet for thousands of years. In fact, recent scholarship suggests humans started baking bread at least 30,000 years ago.

The importance of bread in the formation of early human societies cannot be overstated. In fact, it's been asked, without bread to make our sandwich technology possible, would human civilization have ever made it out of the Stone Age? From the western half of Asia, where wheat was domesticated, cultivation spread north and west, to Europe and North Africa, and enabled humans to become farmers rather than hunters and foragers. This in turn led to the formation of towns, as opposed to the nomadic lifestyle, and gave rise to more and more sophisticated forms of societal organization. Similar developments occurred in eastern Asia, centered on rice, and in the Americas with maize.

Prehistoric man had already been making gruel from water and grains, so it was a small jump to starting cooking this mixture into a solid by frying it on stones. A 2010 study by the National Academy of Sciences discovered traces of starch (likely from the roots of cattails and ferns) in prehistoric mortar and pestle-like rocks. The roots would have been peeled and dried before they were ground into flour and mixed with water. Finally, the paste would be cooked on heated rocks.

But how did humanity get from this prehistoric flatbread to a fluffy, grocery store loaf (of which Americans consume on average 53 pounds a year)?

It took a simple grass we call wheat.

On Bread Alone

Plants are crucial for the welfare of human society. They help our ecosystem function. They provide us with oxygen to breathe, medicine, clothing fiber and, importantly, food. Out of the 7,000 species of plants currently used for agriculture around the planet, only 30 crops make up the world's diet. Wheat, corn and rice alone account for more than half of the world's food consumption [source: Diverseeds].

Humans have cultivated wheat for roughly 10,000 years, and archeologists have discovered evidence of milling operations in Asia that date back 75,000 years [source: Encyclopaedia Britannica]. But the origins of humanity's relationship with wheat go back even farther than that, all the way into the murky depths of prehistory. Long before the agricultural revolution, hunter-gatherers picked through the rich vegetation that surrounded them. Among the fruits and vegetables, they came across wheat stalks and quickly discovered the grains were edible.

Watch a fascinating short video as a modern day factory makes an ancient product at the link below: http://science.howstuffworks.com/innovation/5125-how-its-made-bread-video.htm. What do students pick up as the key ingredients or steps in making bread from watching the video? Ex. How many loaves does the roller handle per hour? What kinds of bread are they making? What temp does the bread rise/proof at? How long are they baked? Are they ever touched by humans? How long does it take for bread to from flour to packaging?

Today, humans devote more farmland to wheat than any other food crop. The plant dominates an estimated 500 million acres worldwide [source: Perdue University]. Combined, these fields yield a global harvest of approximately 661 million tons (600 million metric tons) each year [source: Encyclopædia Britannica]. Roughly 10 percent goes right back into the ground to ensure future harvests, but most of the rest goes on to feed humans and livestock around the world. Humans turn fields of grass into everything from the simplest porridge to the ritziest wedding cake.

Growing Wheat, the Organism

If you've ever flown on a commercial airliner and grabbed a window seat, there's a good chance you've witnessed the sheer magnitude of our dependence on wheat. Fields of the crop stretch for miles, dividing the landscape into a patchwork of green and gold farmland. It's easy to get lost in the big picture when gazing at such sights, but at the heart of it all, wheat is just a durable grass, and each plant produces a handful of nutritious grains.

Wheat grows in a variety of climates and soils, but thrives best in temperate zones. It's an annual grass, which means it produces a harvest once a year. The tall plant typically boasts hollow stems, long leaves

and heads of compacted flowers. Sometimes there are as few as 20 flowers, but some species sprout up to 100.

Believe it or not, the wheat plant's mission in life has nothing to do with Big Mac buns and Twinkies. The plant needs to grow to its full height and develop flowers, where reproduction will take place to ensure the plant's genetic future in the form of seeds. This yearlong lifecycle takes place in four stages. First, the plant goes through **tillering**, in which the subsurface **crown** produces leafs and lateral branches called **tillers**. Then, during the **stem extension** stage, the plant shoots up to its full height through a series of stem segments, joined to each other by **nodes**. Then, at the top, the stem terminates in a head or spike during the **heading** stage.

WHAT'S GLUTEN?

You might have heard about people going on gluten-free diets or being allergic to gluten, thanks to celiac disease. The substance is a mixture of the two proteins gliadian and glutenin, and it's found in a lot (but not all) bread products. It gives bread an elastic, chewy quality.

At this point, each head fertilizes its own flowers due to the movement of pollen from the male **stamen** to the female **stigma**. Once this happens, grain develops in the **ripening** stage, and the plant begins to wither and die. Each grain or kernel of wheat consists of a wheat plant embryo called a germ (as in germinate), protected by a thick outer coating called the bran which works to keep the more delicate germ safe and fueled by the protein-rich endosperm. These resources protect and nurture the wheat germ, allowing it to grow out of the soil into a new wheat plant.

The Earth is home to thousands of different wheat grasses. Given its importance as a global food crop, this kind of variety is really good news! Should a new plant disease wipe out one of these forms of wheat, there are still others that might be resistant. Scientists recognize the value of this biological diversity and have taken measures to store the world's wheat away in **seed banks**. Still, despite the risk that threat organisms such as the black stem rust fungus pose, wheat growers concentrate most of their efforts on three key varieties of wheat.

1. ***Triticum aestivum***: Also known as "common wheat," we use this variety for flour and bread making. Experts suspect this particular grass originated in the Middle East's Fertile Crescent. Today, farmers cultivate nearly 100 of the 200 known varieties of common wheat.

1. ***T. durum***: Durum wheat primarily winds up as **semolina**, the grains used to make macaroni, spaghetti and other noodles. There are eight known varieties.

1. ***T. compactum***: A subspecies of *T. aestivum*, club wheat produces a softer flour and is mostly used in cakes, cookies and crackers.

But how do we harvest the wheat grains and turn them into delicious foods?

Processing and Eating Wheat

Farmers grow wheat as either a winter or spring crop, depending on how severe winters are in the region. In milder climates, planting takes place in the fall with harvest following between June and August, depending on the duration of winter. Where winters are a little more intense, farmers plant as soon as the soil has thawed and harvest in early fall.

Modern farmers typically use a **combine harvester** to collect their wheat, but the scythe, sickle and flail still see significant use in developing countries. No matter what tool is used, the first task is pretty simple: cut the heads from the top of the wheat plants and then **thresh** them to remove the grains from the rest of the head, called **chaff**. The grains are divided from additional plant fragments, cleaned and taken to a mill, where any separation of bran, endosperm and germ takes place.

Wheat is the most widely grown crop in the world. But we can't eat it as it is. We have to mill it - open the seed up and scrape and grind and sift the flour that sits inside it.

Once upon a time, the typical American pantry had a single canister of flour. Today, supermarkets stock myriad milled options — beyond traditional wheat flour — reflecting increased consumer demand for diversity in the baking aisle. Flour is the finely-ground, sifted meal of grains, nuts, seeds, legumes or certain vegetables — and each kind of flour has a different nutrition profile and cooking or baking qualities.

Seeds for the Future

Did you ever stop to think about what might happen if wheat or other crops disappeared? Right now, for example, our wheat supply is dwindling. The world's stockpiles are at their lowest numbers in thirty years. Consumption is exceeding production, and farmers are having a tough time keeping up. Experts predict this trend is temporary [source: Streitfeld].

But what if it's not? Or, what if a natural disaster wipes out the majority of wheat and other important crops? Scientists think they have hit upon a solution -- seed banks.

Think of a **seed bank** as a savings account. Seeds are "deposited" into secure storage with the intention of "withdrawing" them in the future when they are needed. Just as you might keep money saved for an unforeseen emergency, scientists are saving up seeds to use for replanting in case certain crops die out or are destroyed. When stored correctly, seeds can remain viable for decades or even centuries [source:Minister of Agriculture and Food].

There are currently about 1,400 seed banks around the world, many of which emphasize different crops/plants, but the most famous is the Svalbard Global Seed Vault, which opened on Feb. 26, 2008. Also known as the Doomsday Vault, it functions as a global repository and backup for all other seed banks [source: Mellgren].

Seed banking is not a new phenomenon. Scientists believe agriculture began as far back as 8000 B.C., in the mountains of Mesopotamia, now present day Iraq. Even then, farmers realized their seeds needed protection in order to ensure the next year's harvest. As a result, seed harvesting was one of the most important rituals in ancient farming communities. In Iraq, scientists have discovered evidence of seed banks from as far back as 6750 B.C. [source: Seabrook].

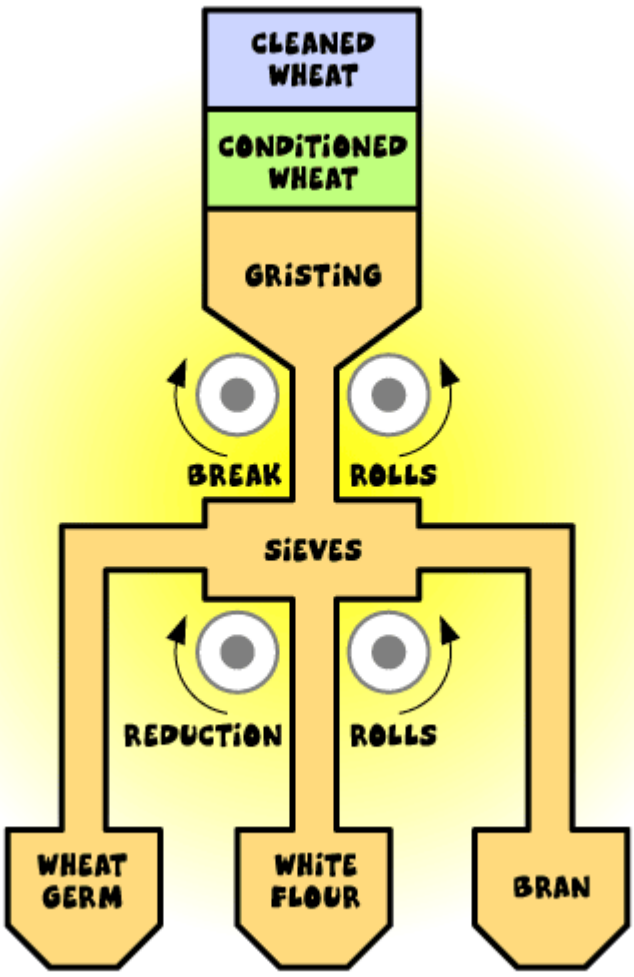
Back then, seed banks protected seeds from animals and extreme weather. Today, we store seeds for different reasons such as crop diversity (with diverse crops famine may be avoided if one type fails or gets diseased), natural disasters, disease, man-made disasters, and research. Seed banking is a complicated concept, but is often considered an investment in the future of the human race.

To separate the three elements of wheat, farmers either crush the wheat with grinding stones or pass them through automated steel cylinders, then wheat grains go through the following process.

Cleaning and conditioning

Powerful magnets, metal detectors and other machines extract metal objects, stones and other grains such as barley, oats and small seeds from the wheat grain. Throughout the cleaning process, air currents lift off dust and chaff.

Conditioning with water softens the outer pericarp (bran) layer of the wheat and makes it easier to remove the floury endosperm during milling.



Gristing

The cleaned and conditioned wheat is blended with other types of wheat in a process called **gristing** to make different kinds of flour. Occasionally, wheat gluten is added to increase the protein content of milled flours.

Milling

The miller's art lies in finely tuning a sequence of breaking, sifting and rolling to achieve the desired colour and consistency of flour.

Mill operators usually add a small amount of water to the grains, as this toughens the outer bran and softens the inner endosperm, making it easier to split the two.

- **Stage 1:** The grist is passed through a series of fluted 'break' rolls rotating at different speeds. Rollers typically flatten the wheat germ, allowing it to be sifted out from the rest of the flour. These rolls are set so that they do not crush the wheat but shear it open, separating the white, inner portion from the outer skins.

- **Stage 2:** The fragments of wheat grain are separated by a complex arrangement of sieves. White endosperm particles are channelled to a series of smooth 'reduction' rolls for final milling into white flour.

Coarser pieces of bran with endosperm still attached go to a second break roll, and stages 1 and 2 are repeated until the flour, bran and wheatgerm are completely separated. The result is a number of flour streams containing white flour, bran and wheatgerm. In modern mills, the type of flour produced depends on what stage operators remove it from the milling cycle.

The whitest flours are produced from the early reduction rolls, with the flour getting less white on later rolls as the proportion of bran particles increases. Brown flour is a mixture of white flour and a portion of the other streams. To produce wholemeal flour, all the streams must be blended back together.

Packing

The different flours are packaged and sent to the bakeries. The flour is used for bread as well as biscuits, pies, cakes and confectionery. Wheatgerm and bran may be used for certain breads and cereals or sold as health foods. The remainder is blended into wheat feed for animal food. As all components of the wheat grain are used, waste is kept to an absolute minimum.

Wheat grain contains several key nutrients. The outer bran covering contains three major B vitamins, trace minerals and dietary fiber. The endosperm, however, takes up most of the room and contains protein, carbohydrates, iron, riboflavin and thiamine. Not to be outdone, the germ (or wheat plant embryo) contains a small portion of B vitamins and trace minerals as well.

While early humans consumed these grains raw, they eventually began using tools to pound the grain and then adding water to the crushed kernels to form a wholesome gruel. The uses and properties of wheat foods vary depending on what combination of bran, endosperm and germ harvesters use. Take white bread and bleached white flour, for instance. In these products, both the bran and the endosperm have been removed to ensure smoother texture and longevity. The germ contains fat, which can turn rancid in flour if not properly stored. But wheat germ still contains a number of key nutrients, including protein, and is used separately in many products.

Whole wheat products contain all three parts of the wheat grain, offering the largest array of nutrients. When separated from the rest of the grain, bran also goes it alone for use in animal feed and foods such as bran muffins and breakfast cereals.

Back to Bread

So now that we know a bit more about wheat itself, let's get back to the "stuff of life"...bread! Some 1,300 years ago, in the time of King Tut Egyptians were already baking over 40 kinds of leavened bread. The Greek's contribution to this history was the oven and over 70 varieties of flavored breads! Bread so good that the conquering Romans took the Greek bakers back to Rome as slaves, and their ovens to Gaul. This is how, by the Middle Ages, bread had spread and become the primary food of Western Europe.

If you pick up a slice of bread and examine it closely, you can see that it is full of air holes. This makes it spongy and soft. You will also see that bread is moist. If you let a slice of bread sit out on the counter for a day, you will realize just how moist fresh bread is!

Bakers, modern and historical, use two simple facts of life to create soft, spongy, moist bread and some innovative techniques to create "modern" bread.

1. Leavening

Leavening is what makes bread rise into a light and fluffy loaf. Bread without leavening is a known as flatbread (no rising so it stays flat), and is the most closely related to mankind's first breads. Examples include Middle Eastern pita, Indian naan and Central American tortillas.

> *Did You Know?*
>
> Pumpernickle means "devil's fart" in the Westphalia dialect of German, the province where the bread originated.

The most common leavening for bread is yeast. Yeast floats around in the air, looking for a nice place to make a home—like a starchy bowl of flour and water. Bakers use the fact that yeast (a single-cell fungi) will eat sugar, and from the sugar create alcohol and carbon dioxide gas as waste products. The carbon dioxide gas created by yeast is what gives bread its airy texture, and the alcohol, which burns off during baking, leaves behind an important component of bread's flavor.

In the mixture of flour and yeast, there are enzymes (Enzymes are biological molecules that catalyze (i.e., increase the rates of) chemical reactions.) that turn the starch in the flour into maltose, a kind of sugar. The yeast uses this sugar in the same way it uses the glucose in white sugar. It takes time for the enzymes to change starch to maltose/sugar. In a loaf of bread, it is this flour-to-maltose reaction that actually drives the expansion of the bread for the most part -- the small amount of sugar you mix into the bread dough is used up by the yeast fairly quickly.

The first leavened bread was likely the result of some passing yeast making a home in a bowl of gruel. The yeast began eating the sugars present in grain, and excreting CO_2, producing bubbles that resulted in lighter, airier bread.

2. Stretching Power

Second, wheat flour, if mixed with water and kneaded, becomes very elastic or stretchy. The flour-and-water mixture in bread becomes stretchy like a balloon because of a protein in wheat known as gluten. Gluten forms thread-like chains and gives bread dough the ability to capture the carbon dioxide produced by yeast in tiny flour balloons.

By stirring (or more commonly, kneading) the dough, the gluten develops into long, interlaced chains. Kneading is better for developing these chains because kneading is gentle -- it does not cut the chains up. When you knead bread dough, you are creating gluten chains. If you were to skip the kneading part, your bread would not rise very well -- all the carbon dioxide in the yeast would bubble up to the top and escape, rather than being captured inside the elastic dough.

3. Refined Flour

The earliest bread grains would have been ground by hand with rocks. This would have resulted in coarse, whole grain bread—the descendants of which are dark, rustic breads from Europe, like pumpernickel. The Mesopotamians refined this process around 800 B.C., using two flat, circular stones, stacked on top one another to grind the grain. These stones were continuously rotated by draft animals or slaves. This "milling"—which was the genesis for how we create flour today–created smooth, finely ground flour that quickly became prized as a status symbol. The desire for the whitest, most refined bread continued through the modern era, and later advancements included the sifting of flour to remove the bran and the germ and the bleaching of the flour itself to make it as white as possible..

4. Mechanized Slicing.

For hundreds of years, the finest white breads were sold in whole loaves to be cut at home—like a French baguette or Italian ciabatta. The New York Public Library's "Lunch" exhibit notes: "Nineteenth and early 20th-century cookbooks and magazines gave highly specific advice about lunchtime sandwich making. For ladies and children, the bread was supposed to be sliced very thinly and the crusts removed. For workers, thick slices with crusts were deemed more appropriate."

But in 1917, traveling jeweler Otto Rohwedder created the first mechanized bread slicer. Initially, many companies were convinced that housewives wouldn't be interested, and his bread-slicing machine wasn't installed in a factory until 1928. However, within two years, 90% of store-bought bread was factory sliced.

Progress led us to what was supposed to be the ideal loaf of bread: white, ultra-fluffy and pre-cut into even slices. This perfect bread was dubbed "American." By this standard, Wonderbread should have been the last loaf of bread we ever needed. But modern science has uncovered the nutritional benefit of whole grains, and more and more consumers prefer the toothsome texture and nutty taste of a rustic loaf.

If you feel inspired to replicate a prehistoric recipe be warned you that Bob's Red Mill does not make a "Cattail/Fern Blend Flour"—yet. Settle for a "10 Grain Breakfast Cereal" full of ancient grains, like millet, coarsely ground.

Then, they would poke around until they found a nice piece of slat , or, if they lived somewhere they are easily accessible, simply walk outside and pick up a flat rock. You can grab a griddle!

Now, they would need to build a big fire, while you can just heat up your griddle. They would let the flames die down until they had a bed of glowing, hot coals (we just need a nicely heated griddle.) They would set the slate tiles on top of the coals, and wait about 10 minutes. Combine three cups of grain with about a cup of water and mix into a thick, workable paste. Form the dough into one-inch thick patties, and place them on the stones. After five minutes, flip them (you can use a spatula, they'd do it with a piece of bark)—and you'll be amazed to see the grain is browning on the heated rock. They may stick, so it's recommended to grease your cooking rocks/griddle before hand.

In about 10 minutes, you'll have a pile of hot, crispy cakes. The outside is crunchy and tastes like popcorn, the inside is moist and dense.

You Only Know What You Know

By now, students understand a whole lot more about the technology of bread!

They know that the bubbles in the dough come from yeast, and that enzymes convert flour's starch into maltose, which the yeast eats to produce the carbon dioxide.

They know that the gluten in the flour helps the dough capture the carbon dioxide and hold it in mini gluten-balloons.

They also know that the yeast produces alcohol. The combination of the maltose and alcohol explains why bread tastes a lot better than flour mush!

How Bread Works

The science behind bread making centers around a complicated chemical process that occurs when flower is mixed with yeast. Learn more about bread making, the science behind it, the importance of strong flour, and see the bread-making process illustrated and explained with these informative, short, and fascinating videos from Discovery Channel's "How StuffWorks" show, Episode 7.
http://science.howstuffworks.com/innovation/edible-innovations/bread.htm

- 30,000 worldwide varieties of wheat, what they're good for, & how wheat is made up:
- The art and science of White vs. Wheat (http://videos.howstuffworks.com/discovery/35512-howstuffworks-show-episode-7-white-vs-wheat-video.htm)
- From flour to wheat: The modern grinding stones
- Bread Making: How does yeast work? Which wheat bakes into the best kind of bread? How do factories test their wheat for strength?

(http://videos.howstuffworks.com/discovery/35508-howstuffworks-show-episode-7-bread-making-video.htm)

- Wheatex: Move over soy! Find out how wheat is being used to create low cholesterol, meatless food products
- Semolina Pasta: If students like pasta, check out how the pros create fresh pasta from semolina wheat flour in this clip.
- Bioplastic Wheat: Did studetns know that wheat could be used to make plastic for credit cards, cutlery and more? Find out how in this clip.

Baking Bread

So, let's bake some bread and try it out this amazing technology for ourselves! To make one loaf of basic bread, they'll need:

- 3-1/4 cups (.78 L) flour, separated into two 1-1/2 cup (.36 L) and one 1/4 cup (.06 L) batches
- 1 cup (.24 L) lukewarm milk (warm it in a microwave)
- 1/8 cup (.02 L) water
- 1 tablespoon (15 mL) sugar
- 1 envelope active dry yeast
- 1 teaspoon (5 mL) salt
- 1 tablespoon vegetable oil
- 1 loaf pan (or cookie sheet)
- An oven

Here we go...

1. Dissolve the yeast in the water and let it sit for 10 minutes or so to "come back to life" (you will likely notice it foaming slightly -- that is a good sign -- it tells you your yeast is okay).
2. In a big bowl, combine the water/yeast, milk, sugar, salt and oil.
3. Add 1-1/2 cups of your flour and start stirring until well blended.
4. Stir in the other 1-1/2 cups of flour. At this point, the dough will be pretty stiff but still sticky.

Now, you need to very gently knead the dough for about 10 minutes. Start by washing your hands.

1. Since the dough is sticky, dust the top of it with about 2 teaspoons of the flour you saved.
2. The best way to knead dough is with your hands, though you do get a bit sticky. Get your hands into the bowl with the ball of dough and hand knead; lifting it from the board, gently slapping it back down, and folding it over itself before scooping it back up and doing it again. Don't dig in while kneading or punch the dough, since pounding it releases all the natural gases you've worked hard to develop -- that's where much of the gradations in flavor lie. Instead, "turn" the dough to strengthen the gluten. The surface tension that builds as the dough anchors itself to the work surface is a further sign of the dough's maturing strength.

This is **kneading**, and it's hard work, by the way, but you have to do it to develop the gluten. Stick with it for 10 minutes (set a timer if you need to). By using this method two things happen, glutens are activated and air is trapped inside the dough. It only takes a couple minutes (and it's not a bad way to work up a little sweat!) You never want to over knead dough and doing it by hand allows students to feel how the dough changes, which is pretty remarkable.

3. When the dough gets sticky again, dust it with some more flour. You may have to use more than the original 3-1/4 cups flour, and that's okay. Your hands may get covered with sticky dough. "Wash them" with dry flour. That is, when your hands get sticky, dust them and the top of the dough ball with flour.
4. Over time, an amazing thing will happen -- the dough ball will stop being sticky, and will become satiny smooth and elastic.
5. Now, you need to let the dough rise in a warm place for between 60 and 90 minutes. The easiest way to create a warmish place is to turn your oven on to its lowest setting possible (around 150 F/ 65.5 C), let it heat up to that temperature, then **turn the oven off** and open the door of the oven wide for about 30 seconds to dissipate some of the heat. Rub the 1 tablespoon of vegetable oil onto the top of the ball of dough to prevent drying, and then stick your bowl of dough inside the oven and close the door. Traditionally, you cover the bowl with a towel, also to keep the dough from drying out. Look in periodically.
6. After about 60 to 75 minutes, your dough ball will have nearly doubled in size. The gluten and the carbon dioxide that the yeast produced worked!

Letting the dough rise in the oven

1. Take the bowl out of the oven. The dough will be sticky again, so wash your hands and this time rub a little oil on them.
2. Take the dough out of the bowl (the air will come out of the dough). If you have a loaf pan, grease the pan, shape the dough into a small loafish shape and put it in the pan. If you are using a cookie sheet, either shape the dough into a ball or a loafish shape, and place it on the sheet.
3. Put the dough back in the warm oven and let it rise again for another 60 to 90 minutes -- it will double in size again.

Letting the dough rise a second time in the pan

When your dough has again doubled in size, turn the oven on to 350 degrees F (176 C), and cook the bread for about 45 minutes. You will know it is done when **the loaf has a nice golden-brown color** and **when you tap on the top crust, the tap sounds hollow**.

Take your loaf of bread out of the oven -- don't forget to turn off the oven! Let the bread cool for a minute so you can get it out of the pan. Then cut off a slice and enjoy the miracle of fresh-baked deliciousness! They are tasting the great biological and chemical masterpiece of technology called **bread**!

Bread Q&A

Here's a set of questions students may still have and the answers to go along with them!

Q: Why does bread need to rise twice? A: You let bread rise over several hours to develop its flavor. The longer the yeast cells have to work (up to a point), the more maltose and alcohol they can produce.

Q: Why does bread need to rise in a warm place? A: Yeast cells are like most single-cell organisms -- they are more active when it is warm. The whole idea behind a refrigerator is to make food cold so that the bacteria, which all foods contain, have a low level of activity and therefore reproduce less. Warm yeast cells do their work faster up to a point -- beyond that point, the temperature gets too high and the yeast cells die.

Q: Does the yeast reproduce in the bread? A: Yeast reproduces by cell division. Over the course of two hours, yeast does not really have time to reproduce. The yeast cells in the envelope of yeast are the cells that do the work in your loaf of bread. That is why, if you use old yeast, your bread will not rise. Most of the yeast cells in an old envelope of yeast have died, so there are not enough cells to power the expansion.

Ingredient Overload: Store-Bought vs. Homemade

Supermarket versions of our favorite foods often have an outrageous number of additives!

Today our food is a bit different than in Kidder's bakery and we're often about convenience. Sure, it's easier to throw a box in your cart than to cook something from scratch, but do you have any idea how many additional additives and ingredients are found in processed products? The number one way to know what's really in your food – and how highly processed it is – is to read the ingredient label. Let's try it! And keep our eyes out for a few things.

Ingredients we know are bad, or at least pretty unhealthy: (include what these are)

- High Fructose Corn Syrup
- Hydrogenated Oils
- Artificial Flavors
- Mechanically Separated Chicken
- Monosodium Glutamate (MSG)
- Sodium Nitrites

Ingredients we usually don't find in our kitchen cabinets or spice racks:

- Sodium Diacetate
- Potassium Chloride
- Potassium Sorbate (Preservative)
- Monocalcium Phosphate
- Thiamine Mononitrate
- Monocalcium Phosphate
- Calcium Propionate
- Whey Protein Concentrate
- BHA and BHT

Ingredients that are mysteriously evasive…probably for a reason:

- Flavor
- Natural Flavors

If we take some everyday household foods—simple stuff, like cookies, oatmeal, and salad dressing—then compared the ingredient list of the homemade version to boxed and bottled brands we may be surprised how many extra ingredients are tagging along with every bite, even from "healthy" brands.

For example, Quaker (you know the "heart healthy" breakfast) has a lovely description on their website about their Strawberries and Cream Oatmeal, "Imagine a warm summer morning and a fresh

bowl of juicy, sun-ripened strawberries topped with rich, dairy cream. Now imagine all of that warmth and rich flavor in a bowl of Quaker Oats." Sounds pretty tasty right? Yet, when you actually read the ingredients you'll find that the pictured red fruit chunks aren't even strawberries! They are dehydrated apple pieces treated with artificial strawberry flavor and red dye. They can take apples and make them taste like strawberries! Not to mention this product also contains partially hydrogenated oils and a few other strange things you would never make oatmeal with at home.

Your lemonade mix might not even contain a single drop of lemon or lemonade! With the power of flavorings companies can take one thing and make it taste like something completely different!

Let's look at a few more.

Peanut Butter and Honey Sandwich

Homemade: **3 INGREDIENTS** (whole-wheat bread, natural peanut butter, honey).

Smuckers Uncrustables Peanut Butter and Honey

Store-bought: **20 INGREDIENTS** (pictured below; not counting the bread ingredients)

Nutrition Facts

Serving Size 1 Sandwich (58g)

Amount per Serving

Calories 210

Calories from Fat 80

Ingredients:

WHEAT BREAD: UNBLEACHED WHOLE **WHEAT** FLOUR, WATER, **WHEAT** GLUTEN, HIGH FRUCTOSE CORN SYRUP, PARTIALLY HYDROGENATED SOYBEAN OIL, CONTAINS 2% OR LESS OF: SALT, DOUGH CONDITIONERS (DISTILLED MONOGLYCERIDES, SODIUM STEAROYL LACTYLATE, DATEM, ENZYMES [WITH AMYLASE, LIPASE, ASCORBIC ACID, CALCIUM PEROXIDE, AZODICARBONAMIDE, **WHEAT** STARCH]), YEAST. **PEANUT** BUTTER: **PEANUTS**, DEXTROSE, SUGAR, MONO AND DIGLYCERIDES (PALM AND/OR SOYBEAN OIL), CONTAINS 2% OR LESS OF: FULLY HYDROGENATED VEGETABLE OILS (SOYBEAN AND/OR COTTONSEED AND/OR RAPESEED), SALT, MOLASSES. HONEY SPREAD: CORN SYRUP, HIGH FRUCTOSE CORN SYRUP, WATER, HONEY, CONTAINS 2% OR LESS OF: PECTIN, NATURAL FLAVOR, CITRIC ACID, POTASSIUM SORBATE (PRESERVATIVE), CARAMEL COLOR, CALCIUM CHLORIDE.

Chocolate Chip Cookies

Homemade: **10 INGREDIENTS** (butter, sugar, brown sugar, eggs, vanilla, flour, baking soda, baking powder, salt, chocolate chips).

Grandma's Chocolate Chip Cookies

Store-bought: **21 INGREDIENTS** (pictured below)

Nutrition Facts
Serving Size 1 cookie (35g)

Amount Per Serving		
Calories	1 cookie (35g)	Entire Package
	170	340
Calories from Fat	80	150

INGREDIENTS: Enriched Flour (Bleached and Unbleached Wheat Flour, Niacin, Reduced Iron, Thiamin Mononitrate, Riboflavin, Folic Acid), Semi-Sweet Chocolate Chips (Sugar, Chocolate Liquor, Cocoa Butter, Corn Sugar, Milk Fat, Soy Lecithin, Natural Flavor, Vanillin), Vegetable Shortening (Palm Oil, Canola Oil with TBHQ and Citric Acid to preserve freshness), Sugar, High Fructose Corn Syrup, Molasses, Whey, And Less than 2% Of the Following: Polydextrose, Corn Sugar, Corn Starch, Eggs, Leavening (Baking Soda, Ammonium Bicarbonate), Propylene Glycol Monoesters of fats and fatty acids, Mono- and Diglycerides, Soy Lecithin, BHT (to protect flavor), Citric Acid, Salt, Caramel Color, Natural and Artificial Flavor, and Wheat Flour.

CONTAINS WHEAT, MILK, EGG, AND SOY INGREDIENTS.

Allergy information: *This product is made on equipment that processes peanuts and tree nuts.*

Vanilla Ice Cream

Homemade: **4 INGREDIENTS** (cream, sugar, vanilla, salt).

Blue Bunny Premium Vanilla

Store-bought: **11 INGREDIENTS** (pictured below).

Nutrition Facts
Serving Size 1/2 Cup (68g)
Servings Per Container 14

Amount Per Serving	
Calories 140	Calories from Fat 70

INGREDIENTS: Milk, Cream, Sugar, Corn Syrup, Carob Bean Gum, Guar Gum, Mono & Diglycerides, Carrageenan, Vanilla Extract, Vanillin, Annatto (for color).

ALLERGEN INFORMATION: Contains milk.

Vinaigrette

Homemade: **4 INGREDIENTS** (olive oil, red-wine vinegar, Dijon mustard, salt).

Wish-Bone Red Wine Vinaigrette

Store-bought: **18 INGREDIENTS** (pictured below)

Nutrition Facts

Serving Size	2 tbsp (30mL)
Servings Per Container	16
Amount Per Serving	
Calories	70
Calories from Fat	45

*Percent Daily Values (DV) are based on a 2,000 calorie diet.
INGREDIENTS: WATER, RED WINE VINEGAR, SOYBEAN OIL AND EXTRA VIRGIN OLIVE OIL, SUGAR, CORN SYRUP, CABERNET SAUVIGNON WINE, MALTODEXTRIN (CORN), SALT, GARLIC*, ONION*, XANTHAN GUM, SORBIC ACID AND CALCIUM DISODIUM EDTA (USED TO PROTECT QUALITY), GRAPE JUICE CONCENTRATE, REB A (NATURAL STEVIA LEAF SWEETENER), NATURAL FLAVOR, ANNATTO EXTRACT (COLOR). *DEHYDRATED

Vanilla Pudding

Homemade: **7 INGREDIENTS** (sugar, cornstarch, salt, milk, eggs, butter, vanilla).

Jell-O Vanilla Pudding

Store-bought: **18 INGREDIENTS** (pictured below).

Nutrition Facts

Serving Size 113g
Servings per Container about 6

Amount Per Serving

Calories 110 Calories from Fat 10

Ingredients: SKIM MILK, WATER, SUGAR, MODIFIED FOOD STARCH, CONTAINS LESS THAN 1.5% OF HYDROGENATED VEGETABLE OIL (COCONUT AND PALM KERNEL OILS), CORNSTARCH, SALT, SODIUM STEAROYL LACTYLATE (FOR SMOOTH TEXTURE), SODIUM ALGINATE, CALCIUM PHOSPHATE, NATURAL AND ARTIFICIAL FLAVOR, ARTIFICIAL COLOR, YELLOW 5, YELLOW 6, VITAMIN A PALMITATE, VITAMIN D. CONTAINS: MILK.

Biscuits

Homemade: **6 INGREDIENTS** (flour, baking soda, baking powder, salt, butter, buttermilk).

Pillsbury Grands

Store-bought: **19 INGREDIENTS** (pictured below)

Nutrition Facts
Serving Size 1 biscuit (58g)
Servings Per Container 8

Amount Per Serving

Calories	170
Calories from Fat	60

Ingredients:
Enriched
Flour Bleached
(wheat flour,
niacin, ferrous
sulfate, thiamin
mononitrate, riboflavin,
folic acid), **Water,**
Soybean and Palm Oil,
Sugar, Hydrogenated Palm
Oil*, Baking Powder (sodium
acid pyrophosphate, baking
soda, sodium aluminum
phosphate). **Contains 2% or less**
of: Partially Hydrogenated Soybean
Oil*, Salt, Vital Wheat Gluten, Dextrose,
Whey, Mono and Diglycerides, Xanthan
Gum, Propylene Glycol Alginate, TBHQ
(preservative), Natural and Artificial Flavor,
Yellow 5, Red 40, Color Added.
*Adds A Trivial Amount Of Trans Fat
CONTAINS WHEAT AND MILK
INGREDIENTS.

Oatmeal with Brown Sugar and Maple Syrup

Homemade: **4 INGREDIENTS** (oats, salt, brown sugar, maple syrup).

Quaker Instant Oatmeal Maple & Brown Sugar

Store-bought: **10 INGREDIENTS** (pictured below).

Serving size 1 Packet (43 g)

Amount per serving

Calories 160 Calories from Fat 25

INGREDIENTS:

WHOLE GRAIN ROLLED OATS, SUGAR, NATURAL FLAVOR, SALT, CALCIUM CARBONATE, GUAR GUM, OAT FLOUR, CARAMEL COLOR, REDUCED IRON, VITAMIN A PALMITATE.

Macaroni and Cheese

Homemade: **6 INGREDIENTS** (cheddar cheese, milk, butter, flour, salt, elbow macaroni).

Velveeta Shells & Cheese

Store-bought: **17 INGREDIENTS** (pictured below).

Nutrition Facts

Serving Size: 0.333 box
Servings Per Container: 3

Calories	360
Calories from Fat	110

Ingredients

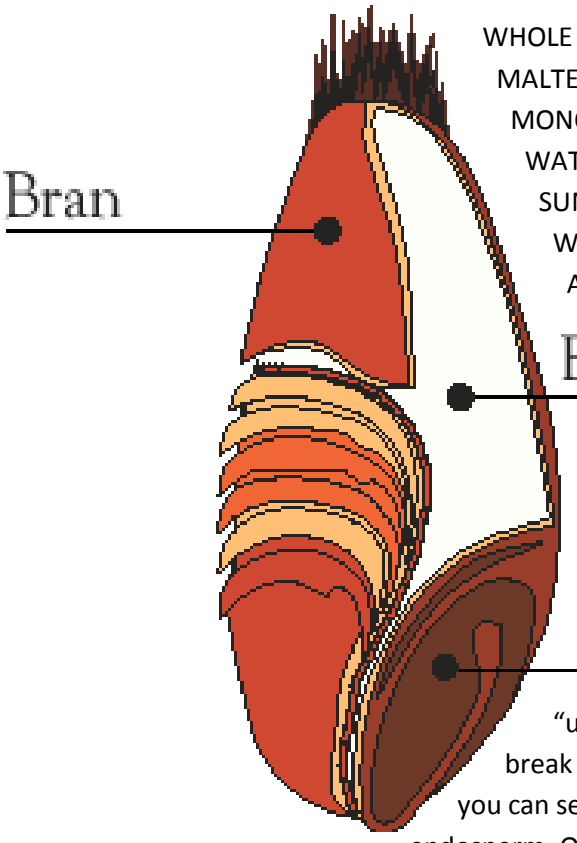
Enriched Macaroni Product (Wheat Flour, Niacin, Ferrous Sulfate [Iron], Thiamin Mononitrate [Vitamin B1], Riboflavin [Vitamin B2], Folic Acid); Cheese Sauce (Milk, Whey, Water, Whey Protein Concentrate, Canola Oil, Milk Protein Concentrate, Sodium Phosphate, Salt, Contains Less than 2% of Lactic Acid, Sodium Alginate, Sorbic Acid as a Preservative, Oleoresin Paprika [Color], Annatto [Color], Natural Flavor, Cheese Culture, Enzymes.

Bread: What Are those Ingredients on the Labels?

When it's time to make a sandwich or toast, Americans have never had so many choices. Supermarket shelves are packed with tasty breads of seemingly endless variation. At least it seems this way! Many adults don't remember sunflower seeds, hazelnuts, and poppy seeds making an appearance in their daily childhood bread, let alone healthful offerings like double-fiber and heart-healthy.

While enjoying some tasty Honey, Oat & Flax toast, you may have been puzzled at the long ingredient declaration on the label. If bread, as we've just found out, is essentially just flour, yeast, salt and water, what's this other stuff doing in there? Some bread recipes might also include some extras like honey (which does help preserve the bread), nuts, raisins, etc., so maybe we are up to 10 ingredients. So why does it take "Arnold" 31 to 40 ingredients including white flour (a.k.a. unbleached enriched wheat flour) to make their whole grain "Health Nut" bread?

As many people know the ingredients are listed in a certain order. According to the FDA's website "Listing ingredients in descending order of predominance by weight means that the ingredient that weighs the most is listed first." In our supposedly healthy "whole grain" bread that also contains "unbleached enriched wheat flour" which may sound okay at first glance:



WHOLE WHEAT FLOUR, UNBLEACHED ENRICHED WHEAT FLOUR [FLOUR, MALTED BARLEY FLOUR, REDUCED IRON, NIACIN, THIAMIN MONONITRATE (VITAMIN B1), RIBOFLAVIN (VITAMIN B2), FOLIC ACID], WATER, SUGAR, CRACKED WHEAT, RYE, WHEAT GLUTEN, YEAST, SUNFLOWER SEEDS, GROUND CORN, NUTS (ALMONDS AND/OR WALNUTS), MOLASSES, SOYBEAN OIL, SALT, CULTURED DEXTROSE AND MALTODEXTRIN, WHOLE WHEAT, WHOLE WHITE WHEAT, BROWN RICE, OATS, SOYBEANS, TRITICALE, MONO- AND DIGLYCERIDES, BARLEY, FLAXSEED, MILLET, CALCIUM SULFATE, DATEM, CITRIC ACID, GRAIN VINEGAR, SOY LECITHIN, HAZELNUTS, WHEY, NONFAT MILK.

Now most of us have heard that white flour is "bad" for us. But, why is it so bad and is there anything wrong with "unbleached enriched wheat flour" as listed above? Well, we must break out the anatomy of a wheat kernel to properly explain this one. As you can see the wheat kernel has a few key parts: bran, germ and endosperm. Over a hundred years ago wheat was ground between big stone

wheels, which removed the bran, but could not remove the germ (a.k.a. the embryo) of the wheat kernel.

The germ contributes “some of the most valuable nutrients to the flour, including much of its protein, folic acid, and other B vitamins”, although once the germ is crushed during the milling process it releases a nutrient rich oil that gives the flour a very short shelf life. So in the late 1800s rollers were developed for grinding grain, which “made it possible to remove the germ and then grind the remaining endosperm” which is basically a “big packet of starch and protein.” We were then left with a gorgeous white powder that could travel long distances without spoiling and was almost nutritionally worthless – “the first fast food.” Since then food scientists figured out what happened and began fortifying the refined grain with vitamins to try to add back what they thought was missing. This is why white flour – which is still technically made from the wheat plant – is often listed as “enriched” on food labels. It also explains why if we compare the labels of two breads, ex. Arnold “whole grain” to Nature’s Own “White wheat” bread it may appear – as if it was an illusion – that the White wheat has more vitamins and nutrients.

But, studies have proven that there are “additional health benefits to eating whole grains that none of the nutrients (they added back in) could explain.” So we are nutritionally better off eating real whole grain flour rather than white flour that tries to imitate what may or may not be important in the real thing. This summary also explains why whole grain flour should be kept in the fridge or freezer – to keep those nutrients alive as long as possible.

Now that we know it should only have whole-wheat flour and no enriched white flour what about all the other stuff they put in the grocery store bread that we can’t even pronounce? Let’s consider the following a primer for decoding the rest of the bread label. The intention here is not to judge whether or not these ingredients are good or not, or healthful or not. But since they often have unfriendly names—long chemical names a ten-year old would stumble over—we can at least offer some insight as to why they are used from a bakery perspective.

Let’s start with a big category, the emulsifiers (also called dough conditioners), which covers at least three major ingredients: **Mono & Di-glycerides, Sodium Stearoyl Lactylate (SSL), and Diacetyl Esters of Tartaric Acid (DATEM)**. Usually when we think of emulsifiers, we think of emulsions, like mayonnaise, where the egg yolk acts as an emulsifier, keeping the oil and water in mayonnaise suspended. these are unnecessary in traditional bread making and only make the process faster and cheaper for the food industry to make bread in big machinery. Emulsifiers have the ability to help keep foams, batters, and doughs uniform and strong, preventing the collapse of air bubbles. As we’ll see, their role in breads is more specific.

Mono & Di-glycerides interact with starch molecules. This is important because staling in baked goods is largely due to what is called retrogradation of the starch molecules, or in layman’s terms, the firming of the starch over time. Mono & di-glycerides complex with the starch, postponing the staling process. Because of this, they are considered softeners.

SSL and **DATEM** interact with the protein complex in doughs, and as such they are considered dough strengtheners. Let's say you've made a whole wheat bread dough, and you want to add more bran, nuts, and raisins to it. SSL or DATEM would prevent the collapse of this dense dough, bolstering the protein network to ensure good oven-spring and a resilient crumb. We may not need this help at home, but remember that the automated systems in large-scale bakeries are more stressful—fully risen doughs are conveyed along belts between the proof-box and oven, and the vibration and movement could cause collapse.

Ascorbic acid, also known as vitamin C, is a popular dough conditioner added to provide good volume and fine grain, but because it tightens dough, bakers are limited as to how much can be added. Consequently, **Azodicarbonamide** (ADA) comes into play. It achieves similar results without making the dough seem dry or bulky. In fact, ADA slightly relaxes dough—a bonus in large bakeries where doughs are divided under pressure, which damages the essential protein (gluten) network in the dough that's so essential to the finished bread's character.

Calcium propionate is by far the most common preservative used in breads. It's a calcium salt that breaks down into propionic acid, which inhibits the growth of molds and microorganisms. You may think of bread as being dry and stable, but it actually possesses a high moisture content that makes it an attractive substrate for colonization. Other forms of propionic acid used are **Cultured wheat starch** and **Cultured whey**.

Two other minor ingredients worth mentioning are **Ammonium sulfate** and **Monocalcium phosphate**. Ammonium sulfate is added to make the yeast happy. As a yeast food, it provides a necessary source of nitrogen. Monocalcium phosphate (or sometimes calcium carbonate) is a calcium salt added to compensate for the low calcium ions of soft water. Very hard water and very soft water are considered problematic—soft water yields soft, sticky doughs while very hard water makes doughs so tight that fermentation (rising) can take longer.

So, all those extra additives aren't there to make the bread taste better, but instead to give it a longer shelf life (and ensure it travels well before even hitting those shelves).Students may not find all these ingredients on the back of their bread label. They may also notice that more and more baking companies are offering options for consumers that do want a simpler label. It's not quite safe to use the word "natural", because the FDA does not have a definition for that term and you can see it slapped on everything, but nevertheless, 'all-natural' has been one of the most popular descriptives added to labels in the past five years.

Keep in mind that some of these ingredients serve the essential function of bringing affordable, fairly nutritious bread to most of the nation's families—and giving them a few days to enjoy it before it stales or becomes moldy. 'Artisan' bread may be simple, tasty, and local, but it is not a practical choice for most Americans. We no longer shop every day as a culture, and the bread we buy has adapted to our changing shopping and eating preferences. If not wasting food is more sustainable, then perhaps some additives make sense. **What do students think?**

This primer is meant to be a starting place for students to draw their own conclusions, and simplify some of the terms that muddle our labels. Do they believe that simpler is better? Some people fear the ingredients, others say there's no problem, and others believe that fewer emulsifiers and preservatives means fewer ingredients to compete with the wonderful flavor and aroma of fresh bread. How important is bread in students' daily life?

Wait, Eating Crust is **Good** for Me?

It's not uncommon for picky eaters to trim the bread crust from a PB&J before eating it. But what these folks may not realize is that when they remove the crusts from sandwiches, they're also removing a powerhouse of antioxidants.

A study published in the American Chemical Society's Journal of Agricultural and Food Chemistry explains the various health benefits of eating bread crust. Bread crust not only contains powerful antioxidants that can combat cancer, it is also rich in dietary fiber, which can prevent colon cancer. Researchers at the German Research Center of Food Chemistry in Garching, Germany, experimented with an everyday sourdough bread mixture. Through analyzing the bread crust, bread crumbs from the paler inside of the bread and flour, researchers discovered that pronyl-lysine, an antixodant, was eight times more plentiful in the bread crust than in the other components of the bread. Pronyl-lysine was not at all present in the flour [source: Science Daily].

But what exactly does pronyl-lysine do? Researchers at the Institute of Human Nutrition and Food Science in Kiel, Germany, used human intestinal cells to study pronyl-lysine and found that it is effective at raising the levels of phase II enzymes -- enzymes that, according to previous studies, prevent cancer.

When you perform the seemingly simple act of popping some bread dough in the oven, you're actually beginning a complex set of chemical reactions that create powerful cancer-fighting molecules. What chemical reactions create the antioxidants that make bread crust so good for you?

Bread Crust = Curly Hair?

Could you forego an expensive perm and opt for a diet of bread crust, instead? An old wives' tale claims that eating bread crust will make your hair curly. Unfortunately, there's no truth to this myth. Historically, curly hair was associated with prosperity, and wealthy people were able to afford to eat more bread. These two characteristics became associated with each over time, and the bread crust and curly hair adage was born [source: Health and Well being].

The Science of Bread Baking

When you pop a slice of bread into the toaster, you're setting off a complicated set of chemical reactions. When you bake bread, the addition of heat causes carbon found in the carbohydrates of the bread to combine with the amino acids of the proteins, resulting in a browning of the surface of the bread. This process, known as the Maillard reaction, discovered by Louis-Camille Maillard in the early 1900s, was long credited by scientists for producing different flavor components

and the brown color on the surface of baked breads. However, in recent years, researchers have credited the Maillard reaction with producing antioxidants that are beneficial to those who consume bread crust.

These good antioxidants are more prevalent when bread is broken down into smaller pieces; that is, smaller loaves make for a bigger percentage of crust per slice and while they are produced by both yeast-based and yeast-free bread, darker breads like wheat and pumpernickel contain higher levels of antioxidants than lighter breads like white.

But be careful of too much browning. Burning or overly browning bread can actually lower the level of antioxidants. In fact, burning bread flips from cancer-preventing to cancer-creating -- burning your bread can produce carcinogens, or things believed to cause cancer.

Baking Conversions

Here's most professional bakers' philosophy on measurements in baking in two sentences: Use a scale. It'll make your life so much easier. (And it's a great way for students to practice measurements and conversions in real life!)

In the US, most cooking measurements are still done in volume: measuring cups and spoons for dry ingredients, liquid measures for liquids. However, for baking, where precision is key to the success of many a recipe, once they practice measuring in weight, they'll realize the imprecision of using volume.

We can use measuring flour as the best example. Have students use a measuring cup to scoop out a cup of flour from a bag and weigh it on a kitchen scale. Now have them scoop out a second cup and weigh it. What's the difference in weight? Whether you packed in the flour tightly, levelled off the top of the measuring cup, shook the cup as you were filling it – all these variables will affect how much flour actually goes in your recipe – and it can vary every time. On the other hand, if they weigh out 5 ounces or 140 grams of flour on a scale, they'll get the same amount every time.

That's why many bakers consider a kitchen scale to be one of the most indispensable tools in a kitchen. By using it, we eliminate one of the biggest factors that can influence the outcome of baked goods: imprecise measurement.

Note: Please use caution when applying conversions from charts such as the one below to your own recipes – a little tweaking may be required as the translation between volume and weight is always a tricky thing.

<u>Flours/Other Dry Ingredients</u>

All Purpose Flour (unsifted): 1 cup = 4 1/3 ounces = 125 grams

Cake Flour (unsifted): 1 cup = 4 ounces = 110 grams

Cornstarch: 1 cup = 4 ounces = 110 grams

Cocoa Powder: 1 cup = 3 1/4 ounces = 91 grams

Sugars

Granulated White Sugar: 1 cup = 7 ounces = 200 grams

Brown Sugar (Light or Dark): 1 cup = 7 ounces = 200 grams

Confectioners' (Powdered/Icing) Sugar: 1 cup = 4 ounces = 110 grams

Dairy

Milk (All Kinds), Cream: 1 cup (liquid measure) = 8.2 ounces = 230 grams

Butter: 1 cup (2 sticks) = 8 ounces = 220 grams

Other Liquids

Water: 1 cup (liquid measure) = 8.2 ounces = 230 grams

Corn Syrup: 1 cup (liquid measure) = 10.9 ounces = 310 grams

Molasses: 1 cup (liquid measure) = 9 ounces = 260 grams

Honey: 1 cup (liquid measure) = 10.9 ounces = 310 grams

Vegetable Oil: 1 cup (liquid measure) = 7 ounces = 200 grams

Common Units of Dry Measurements

3 teaspoons = 1 Tablespoon = 1/2 ounce = 14 grams

4 tablespoons = 2 ounces = 1/4 cup = 56 grams

32 tablespoons = 2 cups = 16 ounces = 1 pounds

Other Common Conversions

1 ounce = 28 grams

1 fluid ounce = 30 milliliters

1 gallon = 4 quarts = 8 pints = 128 ounces = 3.8 liters (liquid)

Many conversion calculators also exist online. Here is one that is quite complete and should let students convert most of their ingredients: http://www.onlineconversion.com/weight_volume_cooking.htm

Quick Breads

"Quick bread" most probably originated in the United States of America at the end of the eighteenth century. Before the creation of quick bread, baked goods were leavened with either yeast or by mixing dough with eggs.

During the American Civil War (1861-1865), the demand for food was high. Thus, bread was rapidly made and leavened with baking soda, instead of yeast. Hence the name "quick bread". The "discovery", or "rediscovery", of chemical leavening agents and their widespread military, commercial and home utilization in the United States dates back to 1846 with the introduction of commercial baking soda (one component), in New York, and to 1856 with the introduction of commercial baking powder (two components), in Indiana.

The unavailability of these chemical leaveners in the American South, during the Civil War, contributed to a food crisis therein. Indeed, even an essential food flavoring and food preservation agent, salt, was in short supply.

Leavening process

During the chemical leavening process, agents (one or more food-grade chemicals—usually a weak acid and a weak base) are added into the dough during mixing. These agents undergo a chemical reaction to produce carbon dioxide, hence increasing the baked good's volume and producing shape and texture. Yeast breads often take hours to rise. The baked good's outcome texture can vary greatly based on external factors such as temperature. However, breads made with chemical leavening agents are relatively uniform, reliable, and quick. Usually, the resulting baked good is softer and lighter.

Examples of such agents include a weak base, such as baking soda (sodium bicarbonate) plus a weak acid, such as cream of tartar, lemon juice or cultured buttermilk, to elicit an acid—base reaction that releases carbon dioxide. (Quick Bread leavened specifically with sodium bicarbonate is often called soda bread).

Baking powder can also be used as it contains an acid and a base (2 components) and simply needs a liquid medium in which to react. Other leavening agents are egg whites beaten to form stiff peaks as in the case of many waffle recipes, and steam, in the case of cream puffs. Nevertheless, in a commercial process, designated chemical leavening acids and bases are used to make gas production consistent and controlled. Examples of acid—base combinations include:

Leavening acids	Leavening bases

Citric acid Tartaric acid Glucono delta-lactone (GDL)	Potassium bicarbonate Ammonium bicarbonate Sodium bicarbonate

Almost all quick breads have the same basic ingredients: flour, leavening, eggs, fat (butter, margarine, shortening, or oil), and liquid such as milk. Ingredients beyond these basic ingredients are included for variation in flavor and texture.[5] The type of bread produced is variable based predominantly on the method of mixing, the major flavoring, and the ratio of liquid in the batter. Some batters are thin enough to pour, and others thick enough to mold into lumps.

Mixing methods

There are three basic methods for quick breads: the stirring method, the creaming method, and the shortening method. These three methods combine the rise of the chemical leavener with advantageous lift from other ingredients. For example:

- Pancake batter is made using the stirring method.
- Layer cakes and shortbread cookies are made using the creaming method.
- Pie crust is made using the shortening method.

The stirring method, also known as the quick-bread method, blending method and muffin method. This method is for pancakes, muffins, corn bread, dumplings, and fritters. It calls for measurement of dry and wet ingredients separately, then quickly mixing the two. Often wet ingredients include beaten eggs, which have trapped air that makes the product rise. In these recipes, the fats are liquid, such as cooking oil. Usually mixing is done using a tool with a wide head such as a spoon or spatula to prevent the dough from becoming over beaten and deflating the egg's lift.

The creaming method is frequently used for cake batters. The butter and sugar are creamed, or beaten together, until smooth and fluffy. Eggs and liquid flavoring are mixed in, and finally dry and liquid ingredients are added in. The creaming method combines rise gained from air pockets in the creamed butter with the rise from the chemical leaveners. Gentle folding of the final ingredients prevents destroying these pockets.

The shortening method, also known as the biscuit method, is used for biscuits and scones. This method cuts solid fat (whether lard, butter, or vegetable shortening) into flour and other dry ingredients using a food processor, pastry blender, or two forks. The layering from this process gives rise and adds flakiness as the folds of fat melt during baking. Confusingly, while this technique produces "shortened" cakes and breads (regardless of whether the chosen fat is vegetable shortening), unleavened shortbread cookies are made with the creaming method, and strawberry shortcake recipes may use any of these three methods.

Dough consistency

Quick breads also vary widely in the consistency of their dough or batter.[10] There are four main types of quick bread batter: pour batter, drop batter, soft dough and stiff dough.

- Pour batters, such as pancake batter, have a liquid to dry ratio of about 1:1 and so pours in a steady stream. Also called a "low-ratio" baked good.
- Drop batters, such as cornbread and muffin batters, have a liquid to dry ratio of about 1:2.
- Soft doughs, such as many chocolate chip cookie doughs, have a liquid to dry ratio of about 1:3. Soft doughs stick significantly to work surfaces.
- Stiff doughs, such as pie crust and sugar cookie doughs, have a liquid to dry ratio of about 1:8. Stiff doughs are easy to work in that they only minimally stick to work surfaces, including tools and hands. Also called "high-ratio" baked good.

Corn Bread

We all have the Native Americans to thank for corn bread. Its humble beginnings can be traced back to the Indians that the European settlers came in contact with when they first arrived in America. However, it stands to reason that the Native Americans have been making corn bread long before that.

The Indians used corn ground into meal and flour for years in their cooking. Corn was a major food source so they were very creative in its usage. Because the white settlers were dependent on the natural resources, they too, adopted the practice of making corn bread. A surge in popularity around Civil War time was inevitable as corn was plentiful and cheap. Corn bread and other meals made from corn were easy to make.

Because there were special varieties of corn grown throughout North America, the corn bread differed by region. In the southwest areas, blue corn was popular. The northern regions favored the yellow corn and the south had white corn. In addition, the preparations in making corn bread differed too./p>

In the beginning, when a lot of supplies were scarce, the Indians made corn bread from a simple mixture of water, salt and cornmeal. The recipe graduated to using variety of sweetener products like sugar, honey or molasses for northern corn bread. The south tended to steer clear of the sweetened corn bread and favored using fat from bacon or lard.

Because of some of the natural components in the corn, there is no need to use yeast to get the corn bread to rise. This property makes it one of America’s favorite quick breads.

Starting from Scratch

Classic sweets & tasty treats!

can·dy

noun **\'kan-dē**

: a sweet food made with sugar or chocolate, often with flavoring and filling

Candy Bars

Perhaps we could say that the fascination with candy, and with chocolate in particular, first occurred with the Conquistadores. The Conquistadors were 15th century Spanish explorers and conquerors who sailed across the uncharted oceans. The desire to explore new worlds ... to gain political power ... to win fame and fortune .... all these factors motivated their actions which caused such great impact on the New World. Licensed by the Spanish Crown, they endured extreme challenges in order to search for "The Indies" and its coveted spices. The price of conquest was high – shipwreck, disease, starvation, warfare, and death.

In 1502 when Christopher Columbus returned home from his fourth voyage of the "Americas." Although he didn't like the bittersweet treat, his benefactors in Spain found it fascinating, but the King and Queen never realized how important cocoa beans was to be. It was left to the great Spanish explorer, Hernando Cortez, to realize the commercial possibilities of this 'Food for the Gods'.

For a while, the Maya and the Aztecs were the only ones enjoying the fruit of the cacao tree, something they had done for thousands of years. In the 16th Century, Spanish explorer Hernan Cortez (he was only 7 when Columbus sailed) paid a visit to the Aztecs and when he met their leader, Montezuma, he got a taste of the spicy, un-sweetened chocolate drink that was a local treasure as Emperor Montezuma, who personally drank 50 or more portions daily (talk about a chocaholic!), served chocolatl to his Spanish guests in golden goblets, treating it like a food for the gods.. Cortez noticed that the Aztec Indians used cocoa beans in the preparation of the royal drink of the realm, "chocolatl", meaning warm liquid.

Cortez returned to Spain with the recipe (we like to imagine it scribbled on a Post-it note) and a stash of cacao beans and the chocolate drink quickly became a favorite delicacy in the aristocratic circle. Regardless of its regal association, Montezuma's chocolatl was very bitter, and at first the Spanish did not appreciate its taste. To make the drink more to the liking of the Europeans, Cortez and his countrymen sweetened the Aztec Chocolate with cane sugar.

Ancient Mayan Hot Chocolate

Indigenous Maya people still drink the following ancient hot chocolate recipe. In ancient times, Maya never mixed the cacao bean paste with milk, instead they used hot water; it was the Spaniards in Colonial times that began to add milk, cream, and sugar to the cacao paste to create a soft creamy taste similar to current hot cocoa.

Spanish Style Mayan Cocoa Recipe

Cocoa was used by the Aztec and Mayan as a sacred drink. It was brewed with various spices and drank unsweetened as part of ceremonies. The following recipe uses pure cocoa and several spices, including chili peppers. The flavor is very rich and aromatic. Experiment with the sweetness to your liking.

- 4 cups milk
- 1/2 cup cocoa powder
- 1 teaspoon flour
- 1/4 cup brown sugar
- 1/4 teaspoon nutmeg
- 3 whole cloves, crushed
- 1/4 teaspoon chili pepper, crushed
- 1 cinnamon stick, broken up
- 2 teaspoons powdered sugar
- 1 1/2 teaspoons vanilla
- 1 teaspoon cornstarch (dissolved in 1 tablespoon of water) (optional)

Directions:

1. Sift the cocoa powder and flour.
2. Measure out 4 cups of milk. From the 4 cups of milk, slowly whisk about 1/4 cup of it, a little more if necessary, into the cocoa/flour mix until it becomes a paste. If you add milk too fast, you get clumpy cocoa. If that happens, use a hand blender to smooth it out.
3. When all the cocoa and flour are a paste (no more dry flour,) add the remaining spices (sugar, nutmeg, cloves, peppers, and cinnamon).
4. Heat the rest of the 4 cups of milk in a double-boiler or a saucepan over medium.
5. Add the cocoa/flour/spices mix to the hot milk in the double-boiler. Stir constantly to keep it from burning.
6. If you prefer a slightly thicker drink, you can add the optional cornstarch/water mixture now. Continue stirring on the heat until it's to your desired thickness. Not too long; you don't want to be forced to use a knife and fork!
7. When the cocoa is ready (it takes about 10-15 minutes until the flavor and heat level are *just right*), strain the cocoa in a fine sieve to remove the cloves and cinnamon pieces. (Careful, it could splatter.) Then add the powdered sugar and vanilla and stir.
8. If you like, you can put whipped cream on top, add small marshmallows, or add a stick of cinnamon for stirring.

For a while, the rich Europeans had all the fun, but over the next couple of centuries, cacao and sugar became widely traded in Europe and North America, filling the growing demand for the chocolate drink among all the classes from rich to poor. In 1847, Englishman Joseph Fry figured out a way to put melted cacao butter back into defatted, or "Dutched," cocoa powder (along with sugar) to create a paste that could be pressed into a mold. The resulting bar was such a hit that people soon began to think of eating chocolate as much as drinking it. Nice going, Mr. Fry.

John Cadbury added a similar product to his range in 1849, and by today's standards these original chocolate bars would not be considered very palatable. The early eating bars of chocolate were made of bittersweet chocolate, like eating one of todays “baking bars.”

In 1875, Henry Nestle a maker of evaporated milk and Daniel Peter, a chocolate maker, got together and invented milk chocolate. They realized that adding milk to the chocolate mixture makes it less bitter, another major milestone in the world of chocolate, soon followed by an even bigger one. In 1879, Rodolphe Lindt thought to add cocoa butter back to the chocolate. Adding the additional cocoa butter helped the chocolate set up into a bar that "snaps" when broken as well as melting on the tongue.

In 1893, a caramel maker named Milton Snavely Hershey attended the World’s Fair in Chicago. The 1893 Chicago World’s Fair featured chocolate making machines that caught Milton Hershey’s eye (he was already rich from making caramel, but saw even more opportunity in chocolate, smart man). One year later, the world got the first chocolate bar from Hershey, marking the beginning of the mass-produced American candy bar. In 1900, Hershey sold the caramel company and began to concentrate solely on chocolate. He introduced the Hershey Milk Chocolate Bar that same year. The Hershey Company went on to invent Hershey Kisses, the Mr. Goodbar, the Krackel Bar, and many other popular kinds of chocolate.

Other Americans began mixing in other ingredients to make up new candy bars throughout the end of the 1890's and the early 1900's.The candy bar genealogy from that point goes something like this: Clark Bar (1916), Oh Henry! (1920), Reese’s Peanut Butter Cups (1922), Baby Ruth and Milky Way (1923), Mr. Goodbar (1925), Snickers (1930), 3 Musketeers (1932), Kit Kat (1933), and Nestle’s Crunch (1938) and more.

Another milestone in the history of the chocolate bar came with the invention of the Milky Way bar. In 1920, a man named Frank Mars started the Mar-O-Bar Company in Minneapolis, Minnesota. In 1923, the company began selling the Milky Way Bar, which was made to taste like malted milk. The Milky Way became the best selling chocolate bar in the United States. The Mars Company success continued with the Snickers bar, named after one of the Mars family’s beloved horses, which was introduced in 1930. This was followed by the release of the Three Musketeers bar in 1932.

Forrest Mars, Frank’s son and a ruthless entrepreneur, was unhappy with what he perceived as his father’s lack of initiative to expand the business. After spending time making chocolate bars in Europe, Forrest returned to the United States, and in 1941, he went into business with Bruce Murrie, the son of the president of the Hershey Company. That year, they began the manufacture of the wildly popular M&M’s (Mars & Murrie) in response to depressed chocolate sales during the summer months (these candies will melt in your mouth, not in your hands, or the heat of summer). Later 1964, after his father’s death, Forrest merged Mars and M&M, and it wasn’t long before his company was the most successful chocolate company in the world.

But it was World War I that really first brought attention to the candy bar. The U.S. Army Quartermaster Corps commissioned various American chocolate manufacturers to provide 20 to 40 pound blocks of

chocolate to be shipped to quartermaster bases. The blocks were chopped up into smaller pieces and distributed to soldiers in Europe.

Eventually the task of making smaller pieces was turned back to the manufacturers. By the end of the war the returning soldiers had grown fond of chocolate candy and now as civilians wanted more of the same.

With mechanized candy bar production that began in the 40's, the market became flooded with new and inventive candy bar creations, to the tune of 40,000 over the years. We don't have quite that many candy bar recipes, but we do have a lot, and surely there are some you haven't tried or flavors you wish were in there. Call it a history lesson and dive into making Candy Bars and fill in those gaps.

Hold a tasting of commercial candy bars vs. handmade versions

Where in the World is Our Food Coming From?

In this activity, the class will examine the labels on a selection of grocery items from for information on the food's origin. They will map out their findings on a large world map and calculate the total food miles of their grocery selection. (This activity will be continued throughout the week, in each strand, and the map can be added to and updated with different food items.)

The goal of this activity is to explore where our food comes from, map out the distance it travels to reach us, and to gain a sense that food can be grown close to home, rather than imported from a great distance.

Materials

- Photocopies of a world map - one for each group
- Food cut outs with labels- one set for each group
- Food miles calculator chart-one per group
- Pencil and paper to record findings

Game Directions

1. Divide your class into groups of four-five.
2. Give each group a world map, a list of foods, food miles calculator and food distance chart.
3. Identify different food items with the class, and have students volunteer to read where each one came from.
4. Locate on the map the province or country the food comes from – sticking a paper or pin onto the map for visual reference.
5. Repeat, until all items in the bag have been addressed.
6. CALCULATION SECTION (For 6-8, or led by teacher). Have the students refer to their map or use the website www.foodmiles.com to calculate the total food miles it took to deliver the produce to TN.
7. As a class, consult the table, and compare the emissions from food from abroad to some food items that could have been purchased locally.
8. Review the Questions/ Points of Discussion.

Food Miles Calculator

Transporting food long distances guzzles fossil fuels and emits greenhouse gases that contribute to climate change and other problems. We challenge you to do the math and figure out exactly how approximately how many greenhouse gas emissions are produced as your food travels to make it to your plate.

Here are four simple steps to calculate the environmental impact of your food miles.

Step 1: Check the label- where did your product come from?

Step 2: Look it up on the chart- how many kilometers or miles did your food travel from its origin to your house (use the distance chart on a map, and or use the great website http://www.foodmiles.com/

Step 3: Which method of transportation did your food use to get here? The effects of food miles can be measured in the pollution that is caused. Think about the distance travelled, then think about how that distance was covered. Was it by plane, boat, train, or truck?

Step 4: Now you are ready to do the calculations:

Km travelled multiplied by ghg (green house gas) emissions (see table below)

Grams of GHG emissions per km traveled for each kg of food

PLANE	1.1010
BOAT	0.1303
TRAIN	0.0212
TRUCK	0.2699

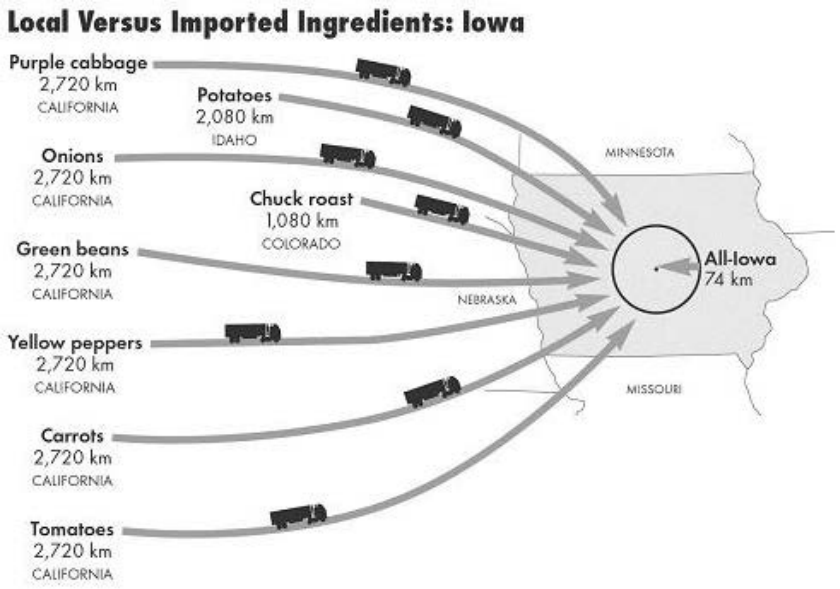
(Environment Canada 2002)

For example:

If a kilogram (2.2 lbs) of tomatoes from Mexico travels 4200 km, or 2609 miles to reach New Brunswick, Canada. Since it travels by truck we multiply the distance traveled by 0.2699.

1 kg x 4200 km x 0.2699 = 1129.8 grams of GHG emissions

That means that for every 2.2lbs of tomatoes 1.1298 kg or 2.5lbs of GHGs are emitted to the atmosphere, the same amount as going for a 3.6 km or 2.2 mile drive in an average car.



Questions/ Points of Discussion

• On average, the food we eat travels 2400 km before it reaches our plate.
• Which foods that we looked at during this activity could have been bought locally?
• What could we do during the winter months to still use local produce?
• Do we need to eat all these imported products?
• It is important to understand that we have the CHOICE to buy food that is grown locally or internationally. As consumers, we can make educated decisions about what we buy, and where we buy it.

Average Distances from Farm to Market

Weighted average source distance* (WASD) estimations for produce arriving by truck at the Chicago Terminal Market - 1998

Fresh produce type	Distance by truck Continental U.S. only* (miles)	Number of states supplying	% Total originating from Mexico
Apples	1,555	8	0
Asparagus	1,671	5	37
Beans	766	11	10
Blueberries	675	6	0
Broccoli	2,095	3	3
Cabbage	754	17	< 1
Carrots	1,774	6	3
Cauliflower	2,118	3	2
Celery	1,788	4	3
Sweet Corn	813	16	7
Cucumbers	731	17	36
Eggplant	861	8	36
Grapes (table)	2,143	1	7
Greens	889	11	2
Lettuce (iceberg)	2,040	7	0
Lettuce (Romaine)	2,055	6	0
Mushrooms	381	4	0
Onions (dry)	1,675	15	10
Peaches	1,674	8	2
Pears	1,997	4	0
Peas (green)	2,102	1	30
Peppers (bell)	1,261	12	27
Potatoes (table)	1,239	14	0
Pumpkins	233	5	0
Spinach	2,086	6	< 1
Squash	781	12	43
Strawberries	1,944	2	15
Sweet Potatoes	1,093	4	0
Tomatoes	1,369	18	34
Watermelons	791	14	2

* The weighted average source distance is a single distance figure that combines information on distances from production source to consumption or purchase endpoint. For these calculations, USDA Agricultural Marketing Service arrival data for 1998 were used to identify production origin (state or country). Distances from production origin to Chicago were estimated by using a city located in the center of each state as the production origin, and then calculating a one-way road distance to Chicago using the Internet site Mapquest (mapquest.com). Estimations do not include distance from the Chicago Terminal Market to point of retail sale.

Source: Leopold Center for Sustainable Agriculture, Rich Pirog and Tim Van Pelt, 2002

CARROTS TRAVEL AN AVERAGE OF 1,774 MILES FROM THE FARM TO YOUR TABLE

WHICH IS ROUGHLY THE SAME DISTANCE FROM FIVE POINTS, CA TO MILWAUKEE, WI

ASPARAGUS TRAVELS AN AVERAGE OF 1,671 MILES FROM THE FARM TO YOUR TABLE

WHICH IS ROUGHLY THE SAME DISTANCE FROM PHOENIX, AZ TO HARTFORD, MI

BROCCOLI TRAVELS AN AVERAGE OF 2,095 MILES FROM THE FARM TO YOUR TABLE

WHICH IS ROUGHLY THE SAME DISTANCE FROM SUMMERLAND, CA TO WHITE CREEKS, TN

APPLES TRAVEL AN AVERAGE OF 1,555 MILES FROM THE FARM TO YOUR TABLE

WHICH IS ROUGHLY THE SAME DISTANCE FROM OLYMPIA, WA TO BIG LAKE, TX

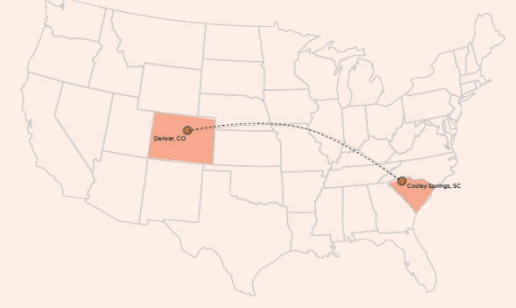
GRAPES TRAVEL AN AVERAGE OF 2,143 MILES FROM THE FARM TO YOUR TABLE

WHICH IS ROUGHLY THE SAME DISTANCE FROM LA HABRA, CA TO HUNTINGTON, IN

LETTUCE TRAVELS AN AVERAGE OF 2,055 MILES FROM THE FARM TO YOUR TABLE

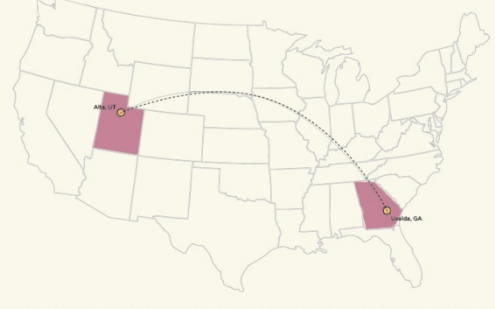
WHICH IS ROUGHLY THE SAME DISTANCE FROM YUMA, AZ TO CHARLOTTESVILLE, VA

PEACHES TRAVEL AN AVERAGE OF 1,674 MILES FROM THE FARM TO YOUR TABLE

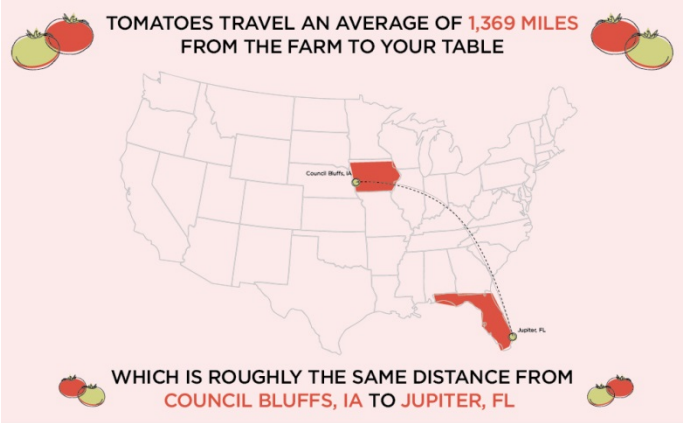


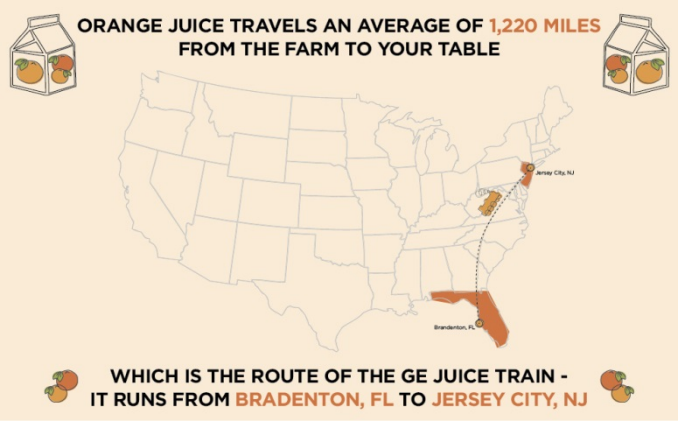
WHICH IS ROUGHLY THE SAME DISTANCE FROM DENVER, CO TO COOLEY SPRINGS, SC

ONIONS TRAVEL AN AVERAGE OF 1,774 MILES FROM THE FARM TO YOUR TABLE



WHICH IS ROUGHLY THE SAME DISTANCE FROM ALTA, UT TO UVALDA, GA





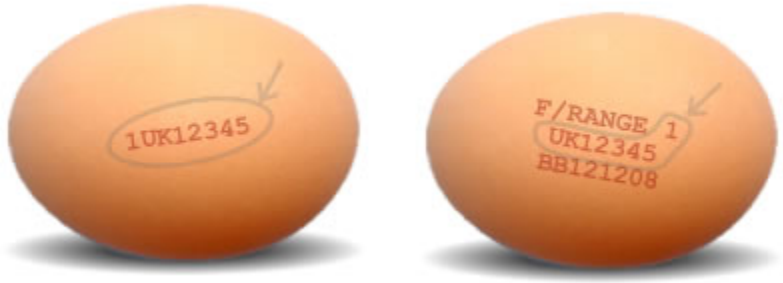
See the full journey here… "Florida to New Jersey in 156 Seconds"
http://www.buzzfeed.com/generalelectric/how-far-does-your-food-travel-6ieg

Have students discuss advantages (fresher food, support for local growers, savings in energy) and disadvantages (not all foods available at all times of year, limited availability of markets) of buying locally-grown food as opposed to food distributed in the conventional manner.

Where are your Eggs From?

Did you know? In the European Union every egg has a unique code printed on it enter the code to find out how far your egg has travelled to reach you. According to EU law all eggs produced within the EU must have a code printed on the shell to allow the egg to be traced.

The producer may choose to add a logo or other information, but at a minimum it must have a code like the one shown in the image below, e.g. 1UK12345.



The codes on eggs indicate the following:

0	Organic
1	Free-Range
2	Barn
3	Cage
UK	Origin
12345	Producer ID

pie

noun \'pī\

: a dessert consisting of a filling (as of fruit or custard) in a pastry shell or topped with pastry or both

Easy as Pie!

They're simple, they're American and come Thanksgiving, everybody saves room for them. But the pies we know today are a fairly recent addition to a history that goes back as long as mankind has had dough to bake into a crust and stuff to put inside it. The purpose of a pastry shell was mainly to serve as a baking dish, storage container, and serving vessel, and these are often too hard to actually eat. For hundreds of years, it was the only form of baking container used, meaning pretty much everything was a pie.

The earliest ovens were actually large clay pots were fire was burned inside to heat them. Bread was baked in flat cakes on hot hearthstones. Clay in its wet form seem similar to dough. Meat was cooked directly exposed to fire on spits or over hot coals.

The problem of cooking meat this way is that the thing got burnt. The tasty juices dripped away and the meat was tough and dry. They got around this problem by wrapping the meat with leaves or mud to preserve the juices. Since dough seem like clay or wet mud, they wrapped the meat with dough made from flour and water to preserve the meat juices and prevent burning. This created the primitive juicy meat pie.

So, the first pies, called "coffins" or "coffyns" (the word actually meant a basket or box) were savory meat pies with the crusts or pastry being tall, straight-sided with sealed-on floors and lids. Open-crust pastry (no tops or lids) were known as "traps." These pies held assorted meats and sauce components and were baked more like a modern casserole with no pan (the crust itself was the pan, its pastry tough and inedible). These crust were often made several inches thick to withstand many hours of baking.

Historians trace pie as we know it’s initial origins to the Greeks, who are thought to be the originators of the pastry shell, which they made by combining water and flour. The pies during this period were made by a flour-water paste wrapped around meat; this served to cook the meat and seal in the juices. The Romans, sampling the delicacy, carried home recipes for making it (a prize of victory when they conquered Greece). The wealthy Romans used many different kinds of meats — even mussels and other types of seafood — in their pies. Meat pies were also often part of Roman dessert courses, or secundae mensea.

In medieval England, they were called pyes, and instead of being predominantly sweet, they were most often filled with meat — beef, lamb, wild duck, magpie pigeon — spiced with pepper, currants or dates.

There was actually more crust than filling. Often these pies were made using fowl and the legs were left to hang over the side of the dish and used as handles.

Contrary to grade school theater productions across the United States, there was no modern-day pie — pumpkin, pecan or otherwise — at the first Thanksgiving celebration in 1621. Pilgrims brought English-style, meat-based recipes with them to the colonies. As in the Roman times, the early American pie crusts often were not eaten, but simply designed to hold the filling during baking.

The colonists cooked many a pie: because of their crusty tops, pies acted as a means to preserve food, and were often used to keep the filling fresh during the winter months. And they didn't make bland pies, either: documents show that the Pilgrims used dried fruit, cinnamon, pepper and nutmeg to season their meats. Further, as the colonies spread out, the pie's role as a means to showcase local ingredients took hold and with it came a proliferation of new, sweet pies. A cookbook from 1796 listed only three types of sweet pies; a cookbook written in the late 1800s featured 8 sweet pie varieties; and by the 1947 the Modern Encyclopedia of Cooking listed 65 different varieties of sweet pies.

There are few things as American as apple pie, as the saying goes, but like much of America's pie tradition, the original apple pie recipes came from England. These pre-Revolutionary prototypes were made with unsweetened apples and encased in an inedible shell. Yet the apple pie did develop a following, and was first referenced in the year 1589, in Menaphon by poet R. Greene: "Thy breath is like the steeme of apple pies." (500 years later, we have "I'm Lovin' It", thanks to McDonald's and its signature apple pie in an individual-serving sleeve.) Pies today are world-spanning treats, made with everything from apples to avocados.

What is pie and what is not pie?

Believe it or not a concise definition for pie does not exist that everyone agrees with.

There are some pie definitions that some like while others would hate. Pies are not pies just because they are called pies.

First Law of Pies: Pies must have a pastry made from some sort of grain, wheat, rice, cracker or cookie crumbs. No pastry, No pie!

Second Law of Pies: Pies must be baked in an oven at some time of the process or pseudo bake - like no baked pie custards. Pies are not fried, boiled or steamed.

Third Law of Pies: A pie shall be baked in some form of a dish - metal, ceramic or glass.

Fourth Law of Pie: A pie in America must have a bottom crust of some sort of pastry.

Is a tart, a pie and a pie a tart? Tart comes from the word torture, which comes from the same Latin root. The pastry is twisted or torture to fit the dish which is layered with custard and jam, decorated with fruit, leaving it in all other respects ‘open’, just a bottom crust.

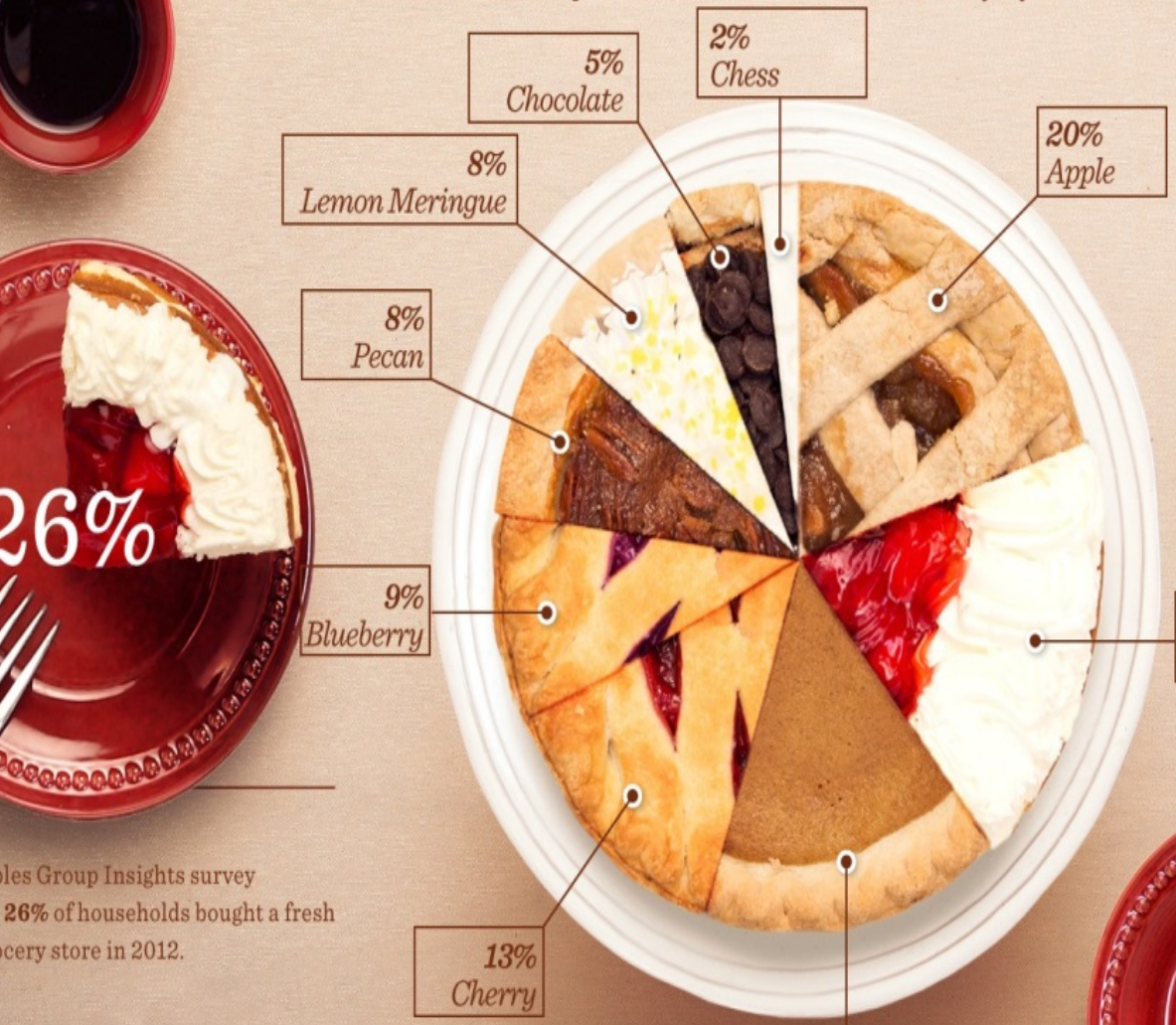
A tart **never** has a top crust. The filling of tarts are not as deep as a pie and tend to be somewhat shallow. Not mandatory but tarts have optional sides of pastry, and if there is one, the sides are in most cases perpendicular to the base.

Fifth Law of Pie: A pie must have a pastry that comes up on the sides to contain its filling. A tart is a subset of the pie. If sides are perpendicular, filled with custard and topped with fruit, the pie is called a tart.

Now, let's have fun, experiment, and make pie!

There's Always Room For Pie

If turkey is the star of Thanksgiving dinner, then pie is most certainly the encore. America's love affair with this golden-crusted treat has been well-documented in pop culture; in fact, a 2012 survey by NPR examined pie preferences and determined that, indeed, there is nothing more American than apple pie. Take a look to see which other pies Americans will leave room for on turkey day.



A Perishables Group Insights survey found that **26%** of households bought a fresh pie at a grocery store in 2012.

— VS. —
BUYING READY-MADE

Prepackaged 9-inch pie crust *(set of two)*	*$3.49*
Cost per crust	*$1.75*

Total time: *0 minutes*

Homemade Pie Crust *(enough for three crusts)*	*$3.52*
2 tbs. sugar:	*$0.04*
1/2 c. shortening:	*$0.72*
1 c. butter:	*$2*
1/2-3/4 c. cold water:	*$0*
Cost per crust:	*$1.17*

Total time: *20 minutes*

Cost of pie filling was not considered

SOURCES: NPR.ORG, PERISHABLESGROUP.COM

Not only C is for Cookie!

Each country has its own word for "cookie." What we know as cookies are called biscuits in England and Australia, in Spain they're galletas, Germans call them keks or Plätzchen for Christmas cookies, and in Italy there are several names to identify various forms of cookies including amaretti and biscotti, and so on. The name cookie is derived from the Dutch word koekje, meaning "small or little cake." Biscuit comes from the Latin word bis coctum, which means, “twice baked.” In America, a cookie is described as a thin, sweet, usually small cake. By definition, a cookie can be any of a variety of hand-held, flour-based sweet cakes, either crisp or soft. Perfect for snacking or as dessert, cookies are consumed in 95.2 percent of U.S. households. Americans alone consume over 2 billion cookies a year, or 300 cookies for each person annually.

Cookies were first made after sugar became available as a baking ingredient about 1400 years ago.(1) They were an enhancement to grain and water based breads made as early as 10,000 years ago. Persian bakers added sugar to bread recipes to create sweet cakes that baked in a clay oven fueled by dry wood fires. Because it was hard to estimate baking temperatures in that kind of oven, small amounts of cake batter, placed inside at intervals, determined the best time to start cooking the full-sized cakes. Eventually, those small "test" cakes became a delicacy in their own right, and today we know them as cookies, the Dutch word for "little cake."

The earliest cookie recipes made use of sweet cake ingredients such as flour, sugar, butter, spice and nuts. Baked twice to make a crisp biscotti cookie; they kept well for a long time. Dried fruit embellishments such as raisins and dates made these treats quite nourishing, and they soon ended up as a staple for sailors, nomadic traders, and soldiers.

After cakes became widespread in Persia they caught the eye of soldiers in the armies of Alexander the Great, and were soon brought back with them to Greece. From there, the idea of making small cakes into cookies spread to India, Asia, Africa and the rest of Europe. By the end of the 16th century, individual "fine cake" cookie recipes began making their way into the bread section of nationally representative cookbooks. Early explorers from Spain and France were instrumental to introducing cookies to South America, and pioneers from the Netherlands, Scotland and England made sure that cookie recipes became a part of North American colonial history.

When more exotic cookie ingredients, such as flaked coconut and chocolate, became available through international trade, the range of cookie types quickly expanded. In addition, with new recipes came novel ways for shaping cookies into fanciful and remarkable designs and some were called by such names as "Jumbles," "Plunkets," and "Cry Babies” and we have no idea why.

Cookies are so beloved in modern history that most home cooks make them and more than half of the cookies baked at home are chocolate chip cookies. The chocolate chip cookie was invented in 1930 at the Toll House Inn by Ruth Graves Wakefield.

An Unexpected Surprise

One day, while preparing a batch of Butter Drop Do cookies, a favorite recipe dating back to Colonial days, Ruth cut a bar of NESTLÉ® Semi-Sweet Chocolate (chips hadn’t been invented yet) into tiny bits

and added them to her dough, expecting them to melt. Instead, the chocolate held its shape and softened to a delicately creamy texture.

A Favorite Was Born

The resulting creation became very popular at the Inn. Soon, Ruth's recipe was published in a Boston newspaper, as well as other papers in the New England area. Regional sales of the delicious Semi-Sweet Chocolate Bar skyrocketed. Eventually, the NESTLÉ® TOLL HOUSE® Cookie recipe was printed on the wrapper of the Semi-Sweet Chocolate Bar.

As the popularity of the original NESTLÉ® TOLL HOUSE® cookie continued to grow, Nestle looked for ways to make it easier for people to bake. Soon, we began scoring the Semi-Sweet Chocolate Bar, and packaged it with a special chopper for easily cutting it into small morsels.

The World's First Morsels

Shortly after, in 1939, they began offering tiny pieces of chocolate in convenient, ready-to-use packages and that is how the first NESTLÉ® TOLL HOUSE® Real Semi-Sweet Chocolate Morsels were introduced. Since they were first used by Ruth Wakefield in what would become the most popular cookie of all time, NESTLÉ® TOLL HOUSE® Semi-Sweet Morsels inspired millions of people to bake. As a result, the chocolate chip cookie became regionally famous and later renowned throughout the country. In 1997, Massachusetts designated it as the state cookie.

Cookies are most often classified by method of preparation - drop, molded, pressed, refrigerated, bar and rolled. Their dominant ingredient, such as nut cookies, fruit cookies or chocolate cookies, can also classify them. Whether gourmet, soft or bite-sized cookies, new categories are always cropping up as the American appetite for cookies continues to grow.

Like the inventiveness displayed in each region that adapted cookies to their own tastes and cooking techniques, perhaps you and your students can discover something that will leave your own unique and indelible impression on cookies of the future!

Sources and Resources

http://plantsofillrepute.tumblr.com/post/30610508691/tomato-solanum-lycopersicum

http://www.monticello.org/site/research-and-collections/ice-cream

http://howfoodworks.blogspot.com/2009/02/ice-cream-how-much-air-are-you-buying.html

http://howfoodworks.blogspot.com/2009/02/pepperoni-is-raw-meat.html

http://www.ideafinder.com/history/inventions/icecreamcone.htm

http://www.artofmanliness.com/2008/06/05/soda-connoisseur/

Source: The story of Eskimo Pies is told in Jeri Quinzio, *Of Sugar and Snow: A History of Ice Cream Making* (University of California Press, 2009), 173-174. Wilbur ad from *Confectioners Journal* March 1922.

http://pabook.libraries.psu.edu/palitmap/BSplit.html

http://www.todayifoundout.com/index.php/2011/07/why-carbonated-beverages-are-called-soft-drinks/

http://www.eatouteatwell.com/the-ice-cream-sandwich-and-the-pushcart-peddler/

http://www.ediblemanhattan.com/departments/notable-edibles/the-ice-cream-sandwich-born-on-the-bowery-and-eaten-by-economists/

http://www.history.com/news/hungry-history/a-brief-history-of-bread

http://www.history.com/news/hungry-history/edward-kidders-pies-the-first-cooking-school

http://dessertfirstgirl.com/baking-conversions

http://www.motherearthnews.com/real-food/klondike-style-sourdough-pancake-recipe-zmaz85ndzgoe.aspx#ixzz2yswRX5pZ

http://www.history.com/news/hungry-history/sourdough-from-start-to-finish-video

Baggett, Nancy. “Late, but Great, Banana Split Centenary.” National Public Radio. 6 June 2009. 11 Feb. 2010 <http://www.npr.org/templates/story/story.php?storyId=10744877>.

“Banana Split Began in Latrobe.” Pittsburgh Post Gazette 26 July 1996: C4.

“Banana Split Turns 100.” USAToday. 24 Aug. 2004. Gannett, Co. 11 Feb. 2010 <http://www.usatoday.com/news/offbeat/2004-08-26-banana-split_x.htm>.

DeFlitch, Gerard. “Born In Pennsylvania.” Pittsburgh Tribune-Review. 4 Apr. 2004. 10 June 2011 <http://www.pittsburghlive.com/x/pittsburghtrib/s_187296.html>.

Smith, Rachel. “Latrobe's banana split a sweet 'Taste of America'.” Greensburg Tribune-Review. 22 Jun. 2006.

“The History of the Golden Age of Soda Fountains.” Drugstore Museum. 2004. Soderlund Village Drug. Feb. 11, 2010 <http://www.drugstoremuseum.com/sections/level_info2.php?level_id=47>.

Wissolik, Richard D. Ice Cream Joe the Valley Dairy Story. Ann Arbor, MI: Sheridan Books, 2004.

Lamb, Robert. "How Wheat Works" 01 October 2008. HowStuffWorks.com. <http://science.howstuffworks.com/life/botany/wheat.htm> 15 April 2014.

http://www.takepart.com/photos/homemade-vs-processed-8-shocking-examples-ingredient-overload/next-gallery

http://www.100daysofrealfood.com/2013/09/23/homemade-healthy-lunchables/

http://www.candyfavorites.com/shop/catalog-candybars-history.php

http://www.ideafinder.com/history/inventions/candybar.htm

History of Cookies - Cookie History © copyright 2004 by Linda Stradley - United States Copyright TX 5-900-517- All rights reserved to the author Linda Stradley, and to the web site What's Cooking America.

http://www.verybestbaking.com/toll-house/about-us/the-nestle-toll-house-story.aspx