ACTIVITY 1.1 First installment of "Chew It Over," a group game to be played during a meal

This activity is designed to be something you do with family and/or friends during a meal. The questions are designed to be one of the following: informative, funny, challenging, or thought-provoking. Everyone will learn something either about science or about each other. You can use the questions in many ways. If you want to be the quiz master, you can simply read the questions out loud and see who knows the answer. Or, you could use scissors to cut them apart and then put them into a bag or bowl and go around the table letting each person draw out a question to answer. (If a question has a right answer, it is printed on the back of this page.)

CHAPTER 1: WATER, SALT, SUGAR 1) Can you name a natural substance other than water that is seen in all three states (solid, liquid, gas)?	CHAPTER 1: WATER, SALT, SUGAR 2) Which do you think uses less water, a bath or a shower?
CHAPTER 1: WATER, SALT, SUGAR 3) 90% of the world's fresh water is located on which continent?	CHAPTER 1: WATER, SALT, SUGAR 4) What % of your body weight is water? a) 1% b) 10% c) 60% d) 90%
CHAPTER 1: WATER, SALT, SUGAR 5) Plants release water vapor from their leaves. How much water does an acre of corn release in one day? (one gallon is about 4 liters) a) 4 gallons b) 40 gallons c) 400 gallons d) 4,000 gallons	CHAPTER 1: WATER, SALT, SUGAR 6) Can you guess which of these countries is NOT one of the top five producers of salt? USA, Russia, China, India, Germany, Canada
CHAPTER 1: WATER, SALT, SUGAR 7) Can you guess which one of these foods doesn't rely on salt as a key ingredient? cheese, yogurt, ketchup, mustard, soy sauce, olives, pickles	CHAPTER 1: WATER, SALT, SUGAR 8) Salt is often found underground in formations called salt domes. What other substance is usually found around or under the salt dome? a) oil b) water c) iron d) magma
CHAPTER 1: WATER, SALT, SUGAR 9) Which type of outdoor water do you like best? Ocean, lake, river, stream, puddles	CHAPTER 1: WATER, SALT, SUGAR 10) If you were required to give up either sugar or salt for one month, which would you choose?
CHAPTER 1: WATER, SALT, SUGAR 11) What is your favorite sweet food?	CHAPTER 1: WATER, SALT, SUGAR 12) What is your favorite salty food?

ACTIVITY 2.1 Root beer float word puzzle

"Floats" are a combination of the two things we learned about in this chapter: carbonation and milk (in the form of ice cream). Fill in the correct answers below, then transfer the letters to their places on the float puzzle.

1) The things that are dissolved in solvents. ___ ___ ___ ___ ___ ___ ___
14 65 25 16 11

2) Attraction between water molecules is called ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
77 84 5 31 8 75

3) Plants make caffeine as a ___ ___ ___ ___ ___ ___ ___ ___ ___ (a chemical to kill insect pests).
68 28 55 81

4) The number of carbon atoms in a glucose molecule: ___ 5) The number of tastes your tongue can sense: ___
21 34

6) This ring molecule has this formula: C_6H_6. ___ ___ ___ ___ ___ ___ ___ 7) Unprocessed milk is "___ ___ ___."
67 57 52 95 135 46 112

8) Substances that might cause cancer are called ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
10 96 129 12 24 130 133

9) This element has the symbol K: ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
50 78 36 115 86 71 18 124

10) Benzoic acid will turn into benzene if it comes into contact with ___ ___ ___ ___ ___ ___ ___ ___
26 9 2 94 85

11) This acid, found in cola drinks, doesn't dissolve nails! ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ acid
138 49 56 82 30 97

12) The correct name for OH^- is the ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
79 69 60 61 91 29

13) When you combine an acid and a base you get ___ ___ ___ ___ ___ and a ___ ___ ___ ___.
23 15 140 41 54 20

14) Things that are 7 to 14 on the pH scale are described as ___ ___ ___ ___ ___ ___ ___ ___ ___
58 142 43 93 37 109 27

15) When milk has been heated to kill germs we say that it's been ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
7 100 51 22 83 70 126

16) When milk has been pressed through a screen it's been ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
4 89 48 17 125 64 72

17) The smallest amino acid is called ___ ___ ___ ___ ___ ___ ___ ___
35 38 98 40 13

18) In a triglyceride fat molecule, the fatty acid "tails" are attached to ___ ___ ___ ___ ___ ___ ___ ___ ___
59 114 80 121 39 62

19) Strings of casein protein are clumped together in little balls called ___ ___ ___ ___ ___ ___ ___ ___ (page 24)
1 127 32 88 3

20) Enzymes that can tear apart proteins are called ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
131 33 6 99 19 117

21) The shape of a molecule determines its ___ ___ ___ ___ ___ ___ ___ ___ ___ (page 18)
53 90 128 87 110

22) This agency regulates food and drugs in America. ___ ___ ___
120

23) Glucose, fructose and galactose are ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___.
16 143 92 44 113 111 102

24) Triglycerides are made of three ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___.
74 116 45 103 108 63

25) This molecule can be used to patch the unhappy ends of broken bonds. ___ ___ ___ ___ ___ ___
66 42 104

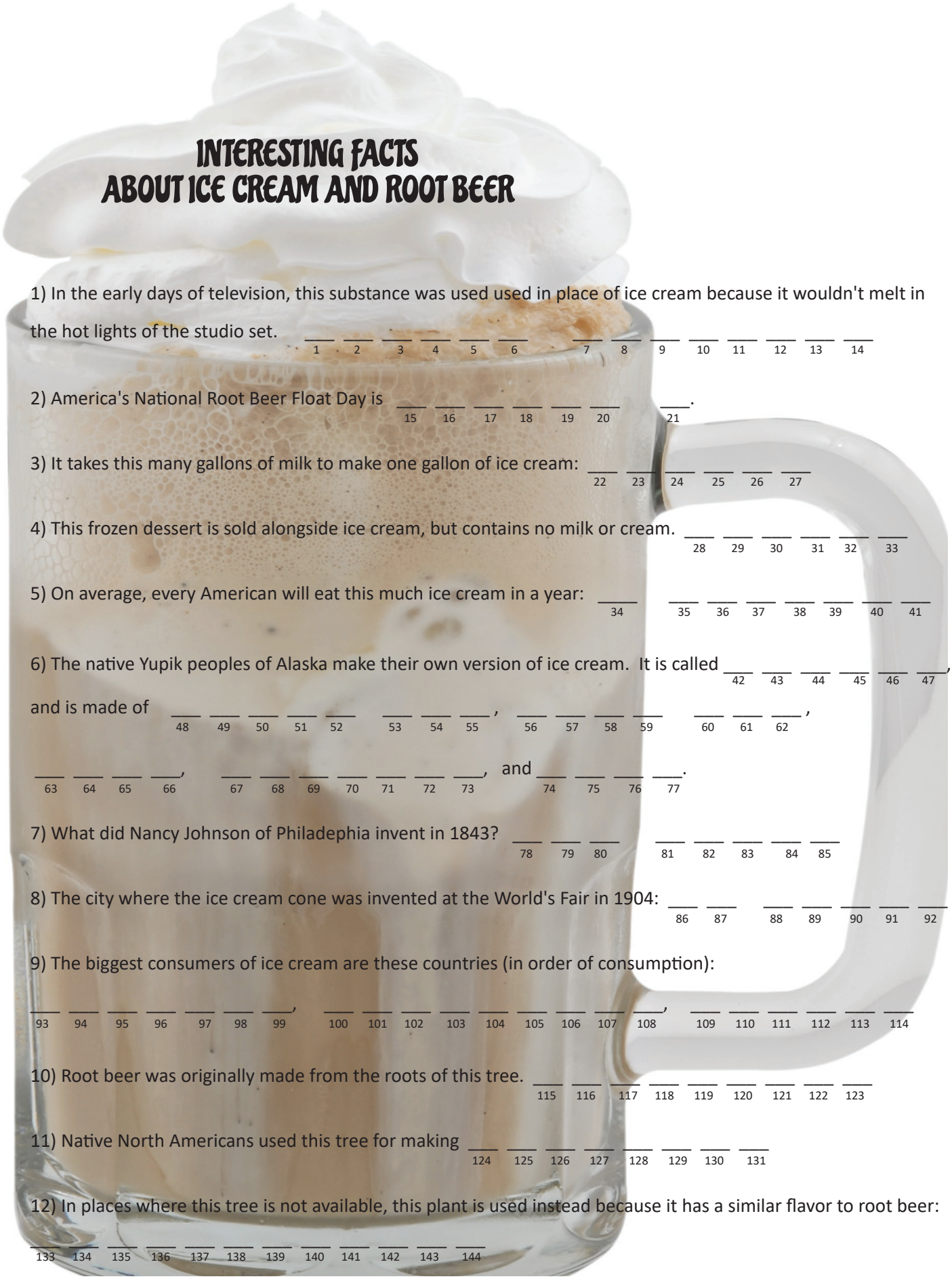
26) Carbonation is when a ___ ___ ___ (CO_2), is dissolved into a ___ ___ ___ ___ ___ ___ ___ (water).
105 73 106 141 47 107

27) Industrial carbonating machines use high ___ ___ ___ ___ ___ ___ ___ ___ ___ to push the CO_2 into the cold water.
118 101

28) (We need more A's!) Woodstock, Ontario, is the dairy farming capital of the country of ___ ___ ___ ___ ___ ___ ___
122 134 144

29) (We still need more A's, and another S!) These yellow fruits grow in bunches. ___ ___ ___ ___ ___ ___ ___ ___ ___
137 139 119 136

30) (More A's and another S!) Beverages are served in ___ ___ ___ ___ ___ ___ ___ ___.
105 123 73 76



INTERESTING FACTS ABOUT ICE CREAM AND ROOT BEER

1) In the early days of television, this substance was used used in place of ice cream because it wouldn't melt in the hot lights of the studio set. ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
1 2 3 4 5 6 7 8 9 10 11 12 13 14

2) America's National Root Beer Float Day is ___ ___ ___ ___ ___ ___ ___.
15 16 17 18 19 20 21

3) It takes this many gallons of milk to make one gallon of ice cream: ___ ___ ___ ___ ___ ___
22 23 24 25 26 27

4) This frozen dessert is sold alongside ice cream, but contains no milk or cream. ___ ___ ___ ___ ___ ___
28 29 30 31 32 33

5) On average, every American will eat this much ice cream in a year: ____ ___ ___ ___ ___ ___ ___ ___
34 35 36 37 38 39 40 41

6) The native Yupik peoples of Alaska make their own version of ice cream. It is called ___ ___ ___ ___ ___ ___,
42 43 44 45 46 47

and is made of ___ ___ ___ ___ ___ ___ ___ ___, ___ ___ ___ ___ ___ ___ ___,
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

___ ___ ___ ___, ___ ___ ___ ___ ___ ___ ___, and ___ ___ ___ ___.
63 64 65 66 67 68 69 70 71 72 73 74 75 76 77

7) What did Nancy Johnson of Philadephia invent in 1843? ___ ___ ___ ___ ___ ___ ___ ___
78 79 80 81 82 83 84 85

8) The city where the ice cream cone was invented at the World's Fair in 1904: ___ ___ ___ ___ ___ ___ ___
86 87 88 89 90 91 92

9) The biggest consumers of ice cream are these countries (in order of consumption):

___ ___ ___ ___ ___ ___ ___, ___ ___ ___ ___ ___ ___ ___ ___ ___, ___ ___ ___ ___ ___ ___
93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114

10) Root beer was originally made from the roots of this tree. ___ ___ ___ ___ ___ ___ ___ ___ ___
115 116 117 118 119 120 121 122 123

11) Native North Americans used this tree for making ___ ___ ___ ___ ___ ___ ___ ___
124 125 126 127 128 129 130 131

12) In places where this tree is not available, this plant is used instead because it has a similar flavor to root beer:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
133 134 135 136 137 138 139 140 141 142 143 144

ACTIVITY 2.2 Mammal milk trivia

All female mammals make milk. The chemistry of each animal's milk is just what its babies need. See if you can match these descriptions with the correct mammals. They aren't easy! Use any clues you can in the descriptions, including geography and animal behavior.

Possible answers: sheep, goat, donkey, whale, seal, horse, black rhino, wallaby, hippo, rabbit

1) The milk of this mammal holds the record for being highest in fat content. The mother only feeds her baby for about a week, but during that time the baby will double its weight, as well as putting on a thick layer of fat under the skin. The baby will need a lot of fat to protect it from the cold. _____

2) The milk of this endangered mammal holds the record for being lowest in fat content. The mother's body can't put a lot of energy into the fat content of the milk because her pregnancy lasted for over a year, and then she will nurse her baby for over two years. _____

3) The milk of this mammal is excellent for making cheese because it is high in both fat and protein. (It has twice the fat content of cow's milk.) Cheeses often made with this milk include feta (Greece), Roquefort (France), and ricotta (Italy). This mammal only produces milk naturally at certain times of the year because of seasonal breeding. To get year-round milk production, farmers must give hormone shots to these animals. _____

4) This mammal produces milk that has one of the highest protein levels in the animal kingdom. The milk also has twice as much fat as cow's milk. The mother only nurses her babies in the morning and evening and spends all day foraging for food (in gardens if she gets the chance). Mammals that only nurse their babies once or twice a day often have milk that is high in protein and fat. Those few meals have to be good ones! _____

5) This mammal's milk is the subject of an untrue "fact" that circulates on the Internet. The Internet rumor says that this mammal's milk is pink. Supposedly the milk mixes with a red body chemical, and the red and white combine to make pink. The part about the red chemical is mostly true, although it is clear when it is secreted by the skin. This chemical acts as a natural sun screen, turning red and then brown as it absorbs UV rays. The milk produced by this mammal is white, as is the milk of every mammal on the planet, although direct studies of the milk have rarely been done because of the ferocity of the animal. It would be very hard to get close enough to a nursing mother without being injured or killed. _____

6) The milk of this mammal does not separate into milk and cream. The fat globules are bound to the other solids in the milk so they are not able to float to the top. Milk experts say that this is one of the most digestible milks and one of the most similar milks to human milk. It is often used to make cheeses. The milk has a strong flavor to it (tasting a bit like the animal smells), which makes it less popular than cow's milk. _____

7) It is critical that this mammal's milk be high in fat so that the milk won't mix with the water around it. If the milk was low in fat it could more easily mix with water, making it difficult for the baby to get enough of it into its mouth. The mother's teats are not visible most of the time and only come out when the baby nudges them. _____

8) This mammal's milk was first recommended by Hippocrates in 400 BC. In the ancient world it was used both as a health remedy for sick infants and as a skin cosmetic product for women. Right up until modern times this milk has been used to feed orphaned human babies if no source of human milk was available. The nutritional content of this milk is very similar to human milk except that it is slightly lower in fat. The babies would be given liquid fats such as olive oil to make up for this difference. _____

9) In central Asia and Mongolia, the milk of this animal is used to make a fermented drink called kumis. _____

10) This mammal can produce different types of milk in different teats because she can have babies of different ages both suckling at the same time. The teats that are suckled by the tiny infant in her pouch will produce milk high in sugar. The teats for the older babies will produce milk low in sugar but high in fat and protein.

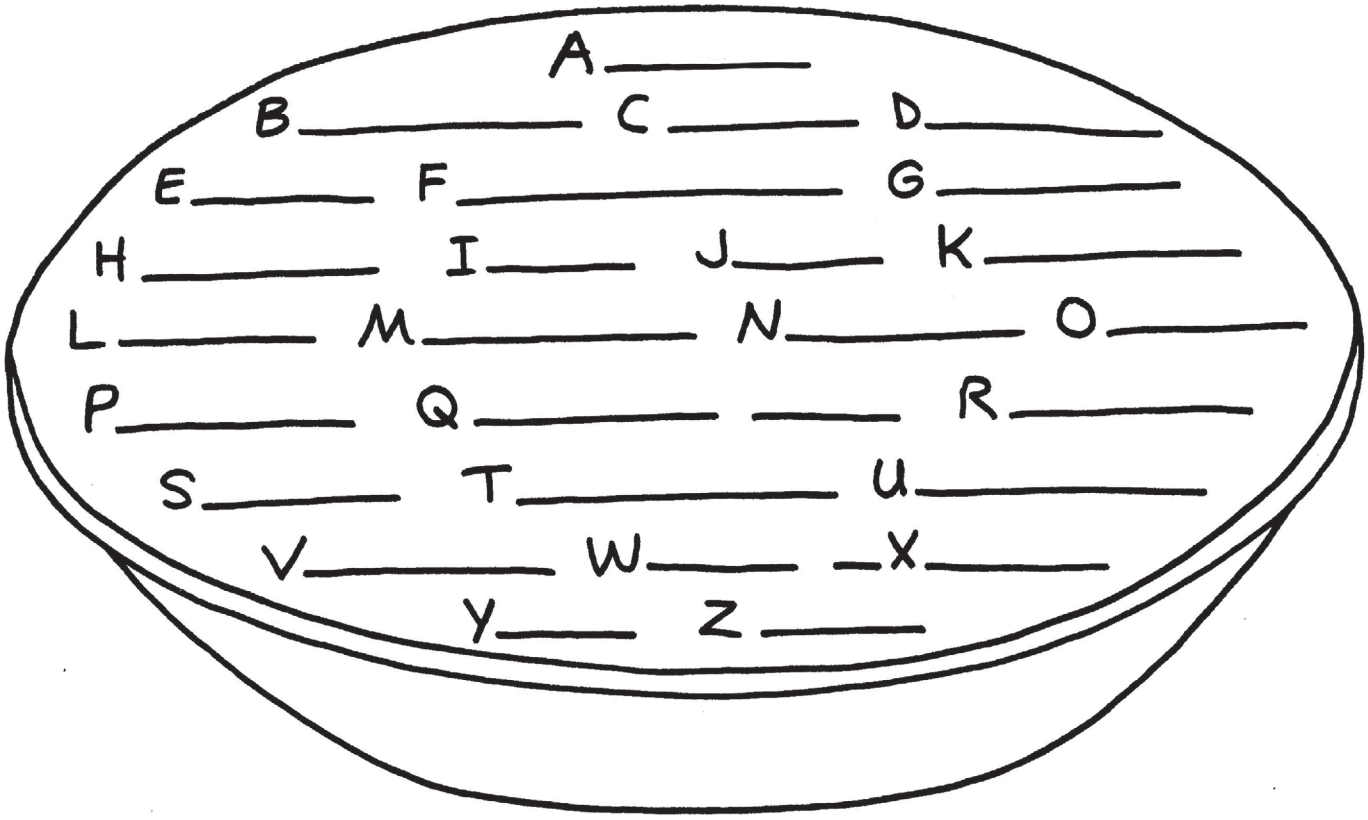
ACTIVITY 2.3 Second installment of "Chew It Over," a group game to be played during a meal

Here is another round of questions for you to use at a mealtime that you share with family or friends. These questions relate to the topics we learned about in this chapter. Again, you can use these questions in a varity of ways. You can be the quiz master and determine who gets which questions, or you can cut the questions out of the book and put them into a bag or bowl and let people choose a question randomly. The answers on are the back of this page.

CHAPTER 2: CARBONATED BEVERAGES and MILK 1) The average cow can produce about how many glasses of milk each day?	CHAPTER 2: CARBONATED BEVERAGES and MILK 2) In the U.S., which month is National Dairy month?
CHAPTER 2: CARBONATED BEVERAGES and MILK 3) There are some pretty strange soft drink flavors around the world. All of these are real flavors except one. Which one is not a real flavor? a) Black Garlic b) Onion c) White Fungus d) Mustard	CHAPTER 2: CARBONATED BEVERAGES and MILK 4) Until 1950, this carbonated drink contained lithium citrate, which is today used as a brain medicine: a) Coke b) Pepsi c) 7-Up d) Dr Pepper
CHAPTER 2: CARBONATED BEVERAGES and MILK 5) About how many teaspoons of sugar are in a can of soda (pop/coke)?	CHAPTER 2: CARBONATED BEVERAGES and MILK 6) Which of these frozen desserts does not contain milk? a) sherbet (sherbert) b) sorbet c) spumoni d) gelato
CHAPTER 2: CARBONATED BEVERAGES and MILK 7) The name of the orange-flavored soft drink "Fanta" is a German word for what? a) imagination b) happiness c) intelligence d) courage	CHAPTER 2: CARBONATED BEVERAGES and MILK 8) Years ago, there was a rumor that ship-wrecked sailors from France used the milk of one of the native animals on the island to make some cheese. Can you guess the animal? a) mice b) rats c) pigs d) rabbits
CHAPTER 2: CARBONATED BEVERAGES and MILK 9) Have you ever tasted goat milk or goat cheese? Would you recommend it?	CHAPTER 2: CARBONATED BEVERAGES and MILK FUNNY FACT: When Pepsi's slogan "Come alive with Pepsi" was translated into Chinese, it said, "Pepsi brings your ancestors back from the grave."
CHAPTER 2: CARBONATED BEVERAGES and MILK 11) What is your favorite carbonated beverage?	CHAPTER 2: CARBONATED BEVERAGES and MILK 12) Which is your least favorite carbonated beverage?

ACTIVITY 3.1 ALPHABET SOUP

Fill in a word for each letter of the alphabet. The clues below are in random order. Cross them out (or put a mark next to them) as you use them.



The tiny mineral clumps found in casein micelles are mostly made of calcium _____.
Beta-carotene makes food yellow or _____.
This amino acid is found in the strings hanging off casein micelles and it is very good an hanging on to sugars.
This molecule is created when enzymes add hydrogens to pyruvate.
Milk can be curdled instantly by using vinegar or lemon _____.
If you give an electron to a proton, you have made a _____.
Long strings of glucose molecule that can be broken apart by amylase
Oat protein
Corn protein
The watery liquid that is created during the cheese making process
The amino acid cysteine contains the element sulfur which allows proteins to form _____ bonds.
This is the room in your house where you do food chemistry experiments.
This organelle is found inside of animal and plant cells and harvests energy from pyruvate molecules.
An enzyme called Lactate Dehydrogenase puts H's onto pyruvate in order to _____ "shuttle bus" molecules.
Cornish _____ is a type of cheese.
Watery substance left over when butter is made.
This atom is used to patch the ends of the beta-carotene molecule when it is chopped in half.
The correct name for COOH
The part of gluten that causes problems
The casein micelles are surrounded by a _____ electrical charge.
Each of the 20 amino acids has a unique group of atoms located at the place where we put a _____ _____.
An empty bubble inside a yeast cell
The rate at which a starch can be broken down and absorbed by the body is called the glycemic _____.
A protein with a special shape that allows it to do a particular job
The molecule that fits into a protein holder in the cells in the retina of your eye
The process of turning pyruvate into lactic acid

ACTIVITY 3.2 STINKY CHEESE PUZZLE

Bacteria can be blamed for a lot of smells in the natural world—stinky feet, smelly arm pits, intestinal gas, bad breath, rotting meat, fermenting sauerkraut, and more. However, not all bacteria smell bad; a few actually smell flowery or fruity. But that's no fun. Smelly bacteria are more interesting. It's not just bacteria and molds that are used to make cheese—insects and arachnids are used, too. Yuck!

Learn the names of the stinkiest cheeses by using the key words at the bottom.





1) ___ ___ ___ ___ ___ ___ ___ ___ ___
16 10 5 4 8 2 20 14 17

Made using *Brevibacterium linens*, a bacteria found on our feet, so it smells like stinky socks and armpits. Has been made for centuries in Belgium and Germany, and is probably the most famous stinky cheese.

2) ___ ___ ___ ___ ___ ___ ___ ___ ___
18 21 5 14 5 4 14 17 13

This cheese is said to smell like a barnyard or like stinking laundry with hints of garlic. It uses raw, unpasteurized milk and is very runny because of the fluids produced by the fermentation process.

3) ___ ___ ___ ___ ___ ___ ___ ___
14 1 2 10 22 22 12 22

Made with raw milk and rinsed in brandy. Internet rumors say it is so smelly that it was banned from public transport in France. So runny it has to be sold in boxes. Napoleon loved it.

4) ___ ___ ___ ___ ___ ___ ___ ___
13 21 16 14 20 20 10 2

Made in Italy, smells like a combination of wet socks and wet grass. Is one of the oldest soft cheeses, dating back to the 10th century. Washed in seawater once a week. The taste is not so bad, a bit salty and fruity.

5) ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
22 13 10 11 6 10 11 20 4 10 22 15 2 1

Smells like wet hay, or the changing room of a football team. Based on a recipe that dates back to 1615. Uses milk from a rare breed of cow. The curing cheeses are washed in fermented juice made from "Stinking bishop" pears.

6) ___ ___ ___ ___ ___ ___ ___ ___ ___
17 2 7 8 14 12 2 17 13

Made using a blue *penicillium* mold that was orignally found in caves in southern France. Some people think it smells like rotten butter. Uses unpasteurized sheep milk so there is a small risk of *Listeria* food poisoning.

7) ___ ___ ___ ___ ___ ___ ___ ___
17 21 18 16 14 13 13 14

This is one of the runniest cheeses in the world. It is served warm, which makes is even runnier. It comes from the Alps of Switzerland where it is most often eaten at social gatherings. Some people think it smells like dirity feet.

8) ___ ___ ___ ___ ___ ___ ___ ___ ___
5 10 5 2 16 14 13 13 14

Made in France. It is formed into balls that look like cantaloupes. One of the key ingredients in its fermentation is the presence of mites, a tiny member of the spider family. The mites secret chemicals that give it flavor.

9) ___ ___ ___ ___ ___ ___ ___ ___ ___
18 21 22 8 5 21 17 9 8

Made on the island of Sardinia, this cheese contains live maggots (larvae) from the cheese fly. The maggots can jump as far as 15 cm, so you have to hold your hand over the cheese as you eat. Or, you can put the cheese in a plastic bag an hour before you want to eat the cheese and the maggots will die.

10) ___ ___ ___ ___ ___ ___ ___ ___
1 21 17 5 14 22 10 11

This Italian cheese is very smelly, but you have probably eaten some of it and enjoyed it. It is a very hard cheese, so hard that it must be shredded with a grater before eaten. It is often sprinkled over spaghetti.

KEY WORDS:

Amino acids are bonded together to make a ___ ___ ___ ___ ___ ___ ___
1 2 3

The watery stuff leftover during the process of making butter: ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
4 5 6

Whey is the ___ ___ ___ ___ ___ ___ leftover when producing curds.
7 8

This messenger molecule tells the intestines to leak, to allow immune cells to enter. ___ ___ ___ ___ ___ ___ ___
9 10 11

Beta-carotene ___ ___ ___ ___ ___ ___ ___ ___ orange and yellow light but absorbs green and blue light.
12 13

This alcohol is produced by yeast as they harvest energy from pyruvate molecules. ___ ___ ___ ___ ___ ___ ___
14 15 16

When butter goes bad we say that is has gone ___ ___ ___ ___ ___ ___
17 18 19

White butter can be made from the milk of sheep and ___ ___ ___ ___ ___
20 21 22

ACTIVITY 3.3 Third installment of "Chew It Over," a group game to be played during a meal

Here is another round of questions for you to use at a mealtime that you share with family or friends. These questions relate to the topics we learned about in this chapter. Again, you can use these questions in a varity of ways. You can be the quiz master and determine who gets which questions, or you can cut the questions out of the book and put them into a bag or bowl and let people choose a question randomly. The answers on are the back of this page.

CHAPTER 3: BUTTER, CHEESE, and BREAD 1) What makes the holes in Swiss cheese?	CHAPTER 3: BUTTER, CHEESE and BREAD 2) Which state in the U.S. is famous for its cheese making?
CHAPTER 3: BUTTER, CHEESE and BREAD 3) Queen Victoria received a giant wheel of Cheddar cheese as a wedding gift. About how much did it weigh? a) 50 lbs (23 kg) b) 500 lbs (225 kg) c) 1,000 lbs (450 kg) d) 10,000 lbs (4,535 kg)	CHAPTER 3: BUTTER, CHEESE and BREAD 4) How many varieties of cheese are there in the world? a) 100 b) 2,000 c) 10,000 d) a million
CHAPTER 3: BUTTER, CHEESE and BREAD 5) What is the most popular (and most used) type of cheese in the world?	CHAPTER 3: BUTTER, CHEESE and BREAD 6) "Pule," the most expensive cheese in the world (300 US dollars per pound) comes from Serbia and is made from the milk of: a) sheep b) donkeys c) elephants
CHAPTER 3: BUTTER, CHEESE and BREAD 7) What did ancient Egyptians use moldy bread for? a) making soup b) feeding cats c) treating wounds d) temple offerings	CHAPTER 3: BUTTER, CHEESE and BREAD 8) Where was a 2,000 year old loaf of bread found? a) volcanic ruins in Italy b) pyramid in Egypt c) under a glacier in Norway
CHAPTER 3: BUTTER, CHEESE and BREAD 9) Many words are used to describe the smells of stinky cheeses. If you had to eat a stinky cheese, which of these would you choose? funky, musty, goaty, tangy	CHAPTER 3: BUTTER, CHEESE and BREAD STRANGE FACT: During World War II, when food was rationed, it was illegal to sell fresh bread in the UK. They thought the delicious smell of the fresh bread would cause people to too much all at once. The bread had to sit for 24 hours before it could be sold.
CHAPTER 3: BUTTER, CHEESE and BREAD 11) How many people do you know who don't eat gluten?	CCHAPTER 3: BUTTER, CHEESE and BREAD 12) Go around the table and try to guess each person's favorite starchy food. (anything made from rice, corn, wheat, or various types of flour)

ACTIVITY 4.2
SALAD SCIENCE
CROSSWORD








ACROSS:
1) This group of polyphenols gives tea its tangy taste.
3) The scientist that gave us the word "vitamin."
5) The scientific name for vitamin B2
6) This yellow spice contains the polyphenol curcumin.
11) This word means "water fearing/hating."
13) This condition is caused by lack of vitamin D.
14) The _____ layer in a leaf has many air spaces.
15) The process of turning sunlight, water and carbon dioxide into glucose (plus oxygen and water).
17) A small molecule that completes the shape of an enzyme.
18) Anything with a seed is technically a _____.
23) A substance that can hold both polar and non-polar molecules.
24) The scientific name for vitamin B6
26) This polyphenol is found dark red or blue fruits and has anti-inflammatory properties.
27) This very long molecule is a primary building material plants use to make their cell walls.
28) Any molecule or substance that can catch and trap dangerous molecules, such as lone oxygen atoms.
29) The empty "bubble" in the middle of a plant cell.

DOWN:
2) A string of glucose molecules that can be broken apart by the enzyme amylase.
3) The general word describing any substance that goes through our intestines undigested.
4) The scientific name for vitamin B1
7) The term used to describe all the bacteria that live in and on you.
8) The organelle in a plant cell where you find chlorophyll molecules
9) Phytonutrients that have in their molecular structure at least one hexagonal ring of carbon atoms with an OH attached.
10) The name of the molecule that forms membranes
12) Vitamin C is also called _____ acid.
14) The microscopic holes in a leaf
16) Phytochemicals that reflect orange light
19) The waxy surface layer of a leaf
20) The molecule in our blood cells that carries oxygen molecule (similar structure to chlorophyll)
21) The enzyme that can break apart cellulose
22) The atom at the very center of the chlorophyll molecule, where photons of light are captured
25) DNA and RNA are _____ acids.

ACTIVITY 4.3 Fourth installment of "Chew It Over," a group game to be played during a meal

Here is another round of questions for you to use at a mealtime that you share with family or friends. These questions relate to the topics we learned about in this chapter. Again, you can use these questions in a varity of ways. You can be the quiz master and determine who gets which questions, or you can cut the questions out of the book and put them into a bag or bowl and let people choose a question randomly. The answers on are the back of this page.

CHAPTER 4: SALAD 1) Name a plant that you like to eat if it is cooked, but you don't like if it is raw. Then name one you like raw but not cooked.	CHAPTER 4: SALAD 2) Guess what percentage of the population in America admits that they almost never eat vegetables.
CHAPTER 4: SALAD 3) Guess which root vegetable is reportedly the most hated (according to a U.S. survey)? a) beet b) turnip c) rutabaga d) radish	CHAPTER 4: SALAD 4) All of these vegetables have purple varieties except one. Which one is never purple? a) carrot b) cabbage c) potato d) cucumber d) cauliflower 3) pepper
CHAPTER 4: SALAD 5) Guess which of these scores higher on the favorite vegetables list (according to a U.S. survey): Green beans or green peas?	CHAPTER 4: SALAD 6) Guess which U.S. state holds the record for growing the largest vegetables. a) Alaska b) Hawaii c) Texas d) Florida
CHAPTER 4: SALAD 7) Four of these vegetables belong to the same family of plants, commonly called the "nightshades." Can you guess which one is not related to the others? a) potato b) pepper c) eggplant d) avocado e) tomato	CHAPTER 4: SALAD 8) STRANGE FACT: The Vegetable Orchestra, based in Austria, makes all their instruments from fresh vegetables. They assemble the edible instruments before each performance, then serve vegetable soup to the audience afterwards.
CHAPTER 4: SALAD 9) How many salad greens or vegetables can you name that are <u>always</u> eaten raw and never cooked?	CHAPTER 4: SALAD 10) INTERESTING FACTS ABOUT CUCUMBERS: 1) The skin of a cucumber can erase pen marks. 2) A slice of cucumber can be used as a breath freshener. 3) Cucumber juice has been used for waterproofing.
CHAPTER 4: SALAD 11) Go around the table and have each person try to name five foods they have eaten today or yesterday that contain some kind of phytonutrient. (You don't have to name the phytonutrients.)	CHAPTER 4: SALAD 12) If you had to take a job working with lab animals, which one would you choose? a) mice b) rats c) guinea pigs d) chickens

ACTIVITY 5.1 Matching

Each word in the numbered list has some kind of association with a word in the letter list. The associations are of different types, but you should be able to figure out which words go together. Write the correct letter in each blank. (Use the process of elimination if necessary, and start with the ones that you are sure of.)

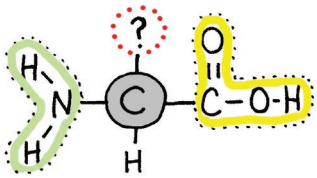
1) ___ beans
2) ___ potatoes
3) ___ amyloplasts
4) ___ peppers
5) ___ seed leaf
6) ___ true leaf
7) ___ corn
8) ___ raffinose
9) ___ sweet potato
10) ___ chloroplast
11) ___ myosin
12) ___ heme
13) ___ salmon
14) ___ triglceride
15) ___ amine

a) actin
b) astaxanthin
c) cotyledon
d) capsaicin
e) endosperm
f) fatty acids
g) green
h) nitrogen
i) plumule
j) phytohemagglutinin
k) solanine
l) alpha-galactosidase
m) starch granules
n) root tuber
o) oxygen

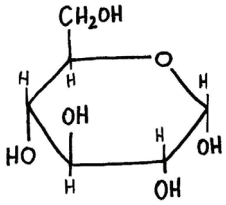
ACTIVITY 5.2 What are these things?

Match a word to each picture. All the answers are given at the bottom...plus a few extra words you won't use.

1) _____



2) _____



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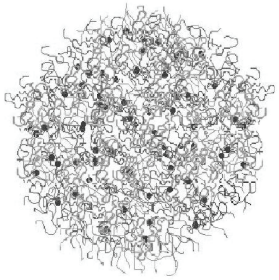

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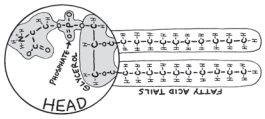

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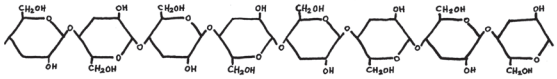

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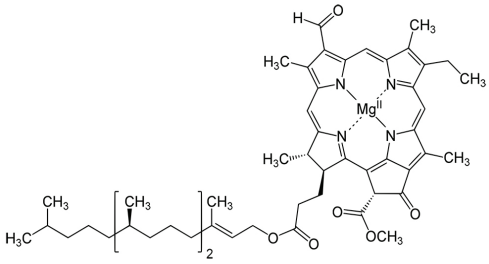

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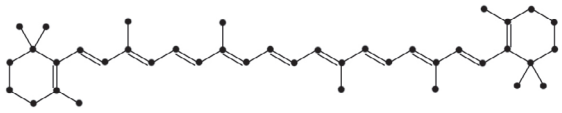

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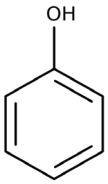

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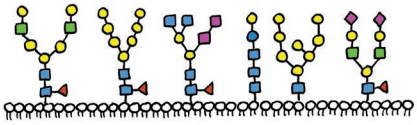

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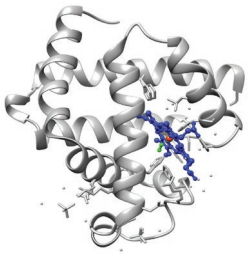

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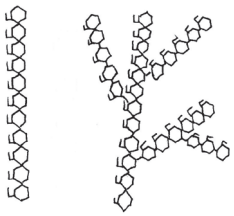


enzyme, phospholipid, glucose, cellulose, carotene, micelle, amino acid, phenol, oligosaccharides, myoglobin, myosin, chlorophyll, sucrose, triglycerides, emulsifier, starch, gluten

ACTIVITY 5.3 Meet the "nightshades" (Solanaceae family of plants) *(so-LAN-uh-SEE-uh)*

In this chapter we learned that potatoes and peppers and tomatoes all belong to the same family of plants, the Solanaceae, often called the "nightshades." All the members of this family make an **alkaloid** chemical. We've met two of these alkaloids: **capsaicin** and **solanine.** Another alkaloid you may have heard of is **nicotine**, the addictive chemical in cigarettes. Nicotine is made by tobacco plants, which are members of the Solanaceae.

Of the four major type of alkaloids, the tropanes are the least well-known. One of the most interesting and useful tropanes is **atropine**, a chemical that in high doses is a harmful stimulant, but in low doses becomes an essential medicine. Eye doctors use atropine eye drops to dilate pupils so they can get a better look at the inside of their patients' eyes. The action of atropine on the eye was discovered a long time ago. During the Renaissance period, Italian women would take the juice of the "**bella donna**" plant (also known as the deadly nightshade) and squeeze it into their eyes to open their pupils, thinking that this would make them more attractive. Another medical use for atropine is to reverse the effects of insecticide poisoning or exposure to gases used in chemical warfare.

One of the most unusual flowering plants is a member of this family: the **moonflower**. The flower is large and white, and has 5 petals that unfurl in the evening. The flower stays open all night then closes in the morning. The flowers smell good, but if you crush the leaves or stems they are said to stink like rotten peanut butter. Moonflower plants produce atropine as well as hyoscine, a chemical used to treat motion sickness.

There are thousands of plants in the Solanaceae family, many with strikingly beautiful flowers.


bella donna


jimson weed


petunia


moonflower unfurling


flower of potato


many varieties of tomatoes


tomatillo


many varieties of peppers


eggplant (aubergine)


tobacco

ACTIVITY 5.4 Fifth installment of "Chew It Over," a group game to be played during a meal

Here is another round of questions for you to use at a mealtime that you share with family or friends. These questions relate to the topics we learned about in this chapter. Again, you can use these questions in a varity of ways. You can be the quiz master and determine who gets which questions, or you can cut the questions out of the book and put them into a bag or bowl and let people choose a question randomly. The answers on are the back of this page.

CHAPTER 5: MAIN COURSE 1) Which U.S. state as a potato museum and is known as the potato state? a) Idaho b) Montana c) Oregon d) Washington	CHAPTER 5: MAIN COURSE 2) How many species of fish can you name that are likely to be in your local food store?
CHAPTER 5: MAIN COURSE 3) What are these animals called once they are cooked and served for dinner? a) cow b) sheep c) pig d) young calf	CHAPTER 5: MAIN COURSE 4) JOKES Why is it so hard to keep a secret on a farm? What day of the week do potatoes hate?
CHAPTER 5: MAIN COURSE 5) There is a hotness scale for peppers, called the Scoville scale. Green bell peppers score less than 100. Jalepeños can score as high as 10,000. Guess the score of the hottest peppers in the world (such as Carolina Reaper).	CHAPTER 5: MAIN COURSE 6) Guess which country eats more potatoes--United States or Germany?
CHAPTER 5: MAIN COURSE 7) WHICH STATEMENT IS FALSE? 1) Marie Antoinette wore potato flowers in her hair. 2) Napoleon ate potatoes for breakfast every day. 3) Thomas Jefferson introduced French fries to America.	CHAPTER 5: MAIN COURSE 8) WHICH STATEMENT IS FALSE? 1) All peppers start out green, then turn yellow or red. 2) Birds can't sense the hotness of spicy peppers. 3) Peppers were discovered about 1,000 years ago. 4) Bell peppers can be purple.
CHAPTER 5: MAIN COURSE 9) How many varieties of potatoes can you name? How many ways of cooking pototoes can you name?	CHAPTER 5: MAIN COURSE 10) WHICH STATEMENT IS FALSE? 1) Peppers have more vittamin C than oranges. 2) Peppers originally came from India. 3) Sweet peppers and hot chili peppers are members of the same species.
CHAPTER 5: MAIN COURSE 11) Which person at your table can tolerate the hottest spices? Which person has the lowest tolerance for spicy foods?	CHAPTER 5: MAIN COURSE INTERESTING FACT: In November, 2021, a family in New Zealand accidentally discovered a giant potato growing in their garden. It weighed over 17 pounds (8 kg). They named it Doug. Last we heard, Doug was still in their freezer.

ACTIVITY 6.1 And now for the bad news...

Sugar is so sweet and so much fun to eat, but sadly, the truth is that it's really not very good for us. Scientific studies have shown that eating more than a certain amount of added sugars per day can significantly affect your health, even if you are young. So how much is too much? Many health agencies recommend no more than about 36 grams (9 teaspoons) for an adult male and no more than 25 grams (6 teaspoons) for an adult female.

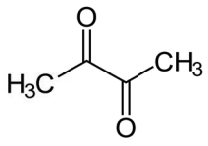
Food products that come in boxes and bags are required to tell you how many grams of sugar have been added. Some products have a surprising amount of sugar. For example, a can of soda ("pop") has about 40 grams (10 teaspoons) of sugar. Can you imagine eating 10 spoons of sugar? Yet when you drink a can of sweetened soda, that's how much sugar you are taking in.

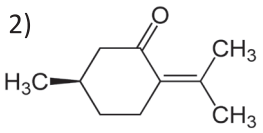
Find out how many grams of added sugar you eat in a day. Keep track of at least three days because, as we all know, some days you eat more or less of various foods. (The days don't have to be all in a row.) Under each day, list the name of the food and how many grams of sugar. (Don't count natural sugars, like apples.)

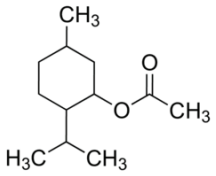
DAY 1	DAY 2	DAY 3
TOTAL:	TOTAL:	TOTAL:

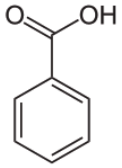
ACTIVITY 6.2 How many carbon atoms?

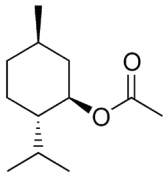
At the very end of this chapter we learned how chemists draw carbon-based molecules. They assume everyone knows that at every vertex (corner or intersection), or at the end of every empty stick, there is a carbon atom and enough hydrogen atoms to give the carbon the four bonds it wants. Figure out how many carbons are in each of these molecules. (Your answer will include any carbons that are shown as "C".)

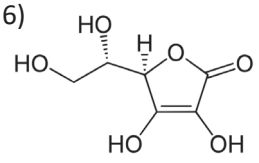
1) 

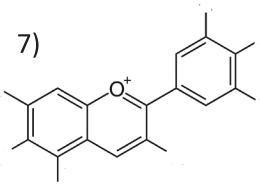
2) 

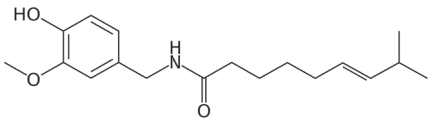
3) 

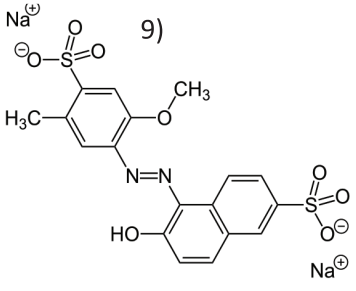
4) 

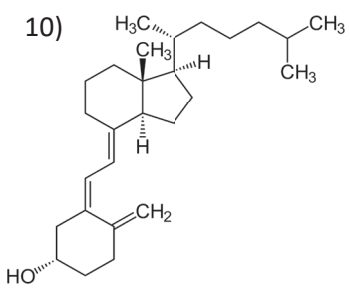
5) 

6) 

7) 

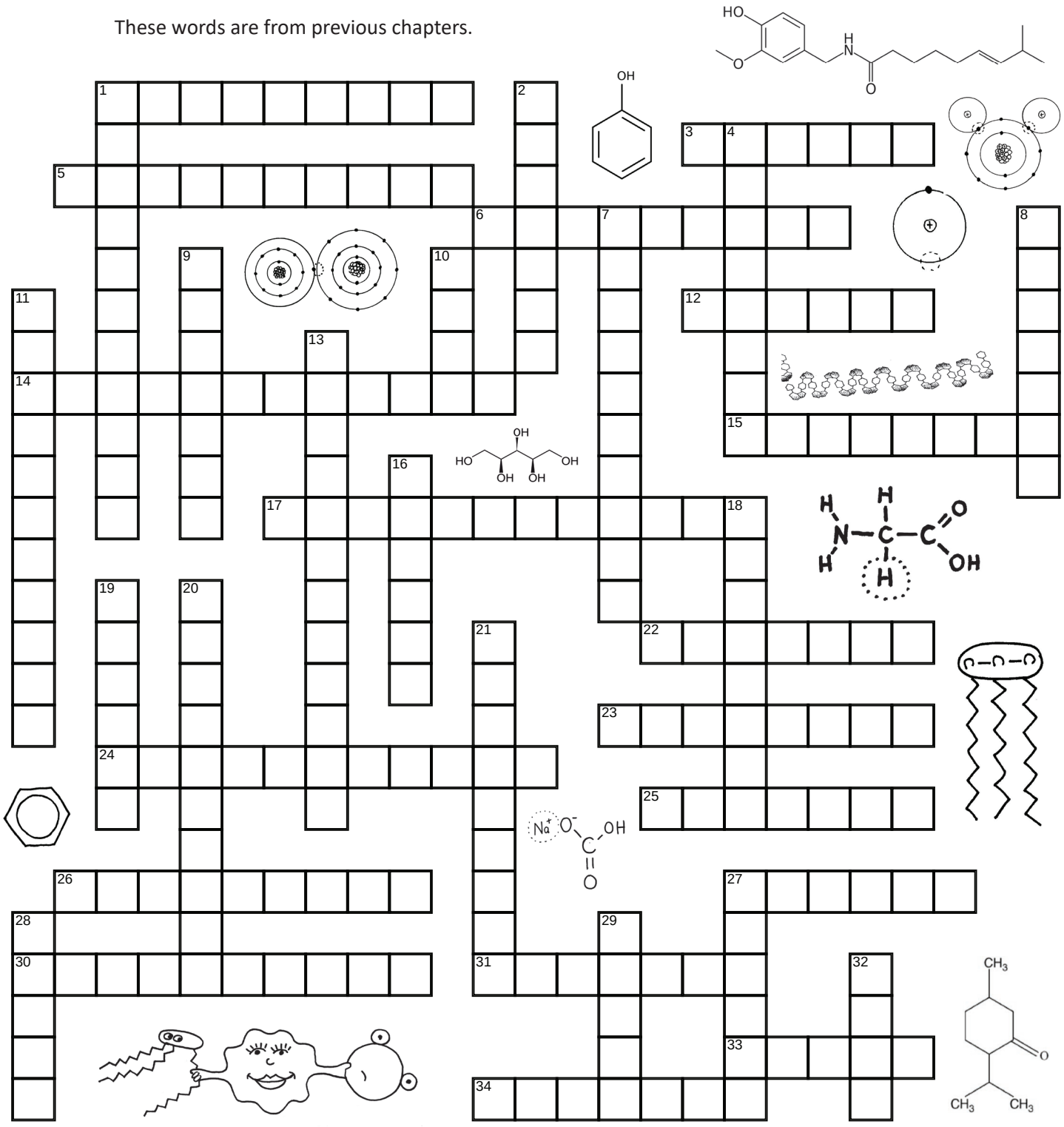
8) 

9) 

10) 

ACTIVITY 6.3 REVIEW CROSSWORD PUZZLE

These words are from previous chapters.



ACROSS

1) (OH-) is called the _____ ion.
3) A polyphenol found in tea.
5) The structure in a plant cell where starch molecules are stored.
6) The molecule found in peppers that triggers the hot sensors in our tongue.
12) A "hydrogen ion" is the same thing as a _____.
14) A glycerol molecule with three fatty acids attached to it.
15) Liquids that have particles evenly dispersed through them. (Milk is an example.)

ACROSS (continued)
17) If you cut this molecule in half you get two retinol molecules.
22) A microscopic ball of protein found in milk.
23) The "amine" group contains two hydrogen atoms and a _____ atom.
24) The molecule that makes leaves green.
25) Six carbon atoms and six hydrogen atoms will form a _____ ring.
26) Most of a corn seed is made of _____, which stores starch plus some other nutrients.
27) This element (type of atom) allows molecular bridges between long chains, such as glutenin and gliadin.
30) A substance that can hold on to both fat molecules and to water molecules.
31) Carbon dioxide and _____ are waste products created by yeast during the bread making process.
33) A potato is classified as this plant part.
34) The enzyme that can cut apart a molecule made of glucose and fructose.

DOWN
1) When milk fat globules are put through a screen that makes them all the same size they have been _____.
2) This type of nutrient is essential to life and was discovered by studying deficiency diseases.
4) Another name for vitamin C is _____ acid.
7) These are the things that enzymes put together or tear apart. (Bet you've forgotten what they are called!)
8) The enzyme that can take apart the sugar molecule found in milk.
9) The enzyme that can disassemble the long chains of glucose molecules that form starch.
10) These are usually blue or green and are put into certain cheeses to create distinctive flavors.
11) This pigment molecule produces both red and blue colors, depending on the surrounding pH.
13) When bacteria turn pyruvate molecules into lactic acid this process is called _____.
16) The milk protein used for paint and glue.
18) A tiny particle with a negative charge.
19) A long chain of glucose molecules that we can digest.
20) Most of a bean seed is made of the "seed leaves" which are also called the _____.
21) A long chain of glucose molecule that we CAN'T digest.
27) In a salt water solution, the salt is the _____.
28) A one-celled fungus that is used to make bread rise.
29) What is known as the universal solvent?
32) Casein is the main protein in milk. All the other smaller proteins are known collectively as _____.

ACTIVITY 6.4 Questions, questions, questions...

Imagine you are shopping with a 5-year old, and as you walk through the aisles they do what all kids do—ask a zillion questions. Here are a few of them. Can you answer them? (They aren't one word answers!)

1) Why is goat butter white?
2) Is corn a vegetable?
3) Why don't oil and water mix?
4) Why do people say carrots are good for your eyes?
5) How to beverage companies get so much fizz into their cans of carbonated drinks?
6) How can cows live on nothing but grass?
7) Why is brown rice better for you than white rice?
8) What's so bad about gluten?
9) Why does crispy brown bread crust smell and taste so good?
10) What's wrong with trans fats?
11) Is margarine better than butter?
12) Can any vegetable be purple?

ACTIVITY 6.5 Final installment of "Chew It Over," a group game to be played during a meal

Here is another round of questions for you to use at a mealtime that you share with family or friends. These questions relate to the topics we learned about in this chapter. Again, you can use these questions in a varity of ways. You can be the quiz master and determine who gets which questions, or you can cut the questions out of the book and put them into a bag or bowl and let people choose a question randomly. The answers on are the back of this page.

CHAPTER 6: DESSERT 1) Guess the weight of the world's largest chocolate bar (as recorded by Guinness): a) 500 lbs (225 kg) b) 2,300 lbs (1,043 kg) c) 12,770 lbs (5790 kg) d) 47,500 lbs (21,500 kg)	CHAPTER 6: DESSERT 2) We get our word for chocolate from the Aztec word "xocolatl." Guess what it means. a) sweet food b) dark medicine c) bitter water d) edible gold
CHAPTER 6: DESSERT 3) Guess the melting point of chocolate: a) 80º F (26.6 ºC) b) 93º F (33.9º C) c) 100º F (37.7º C) d) 120º F (48.8º C)	CHAPTER 6: DESSERT 4) Try to guess each person's favorite kind of pie. (For those who don't like pie, you can guess another favorite food.)
CHAPTER 6: DESSERT 5) Can you guess which country consumes more chocolate per person that any other country? a) United States b) France c) Italy d) Switzerland	CHAPTER 6: DESSERT 6) WHICH STATEMENT IS FALSE? 1) Grape juice is much lower in sugar than soda. 2) Cats cannot taste sugar. 3) Sugar can be used as a preservative. 4) Most sugar comes from beets, not sugar cane.
CHAPTER 6: DESSERT 7) WHICH STATEMENT IS FALSE? 1) Benjamin Franklin sold chocolate in his print shop. 2) George Washington told his wife never to serve chocolate. 3) Soldiers during the American Revolutionary War were sometimes paid with chocolate.	CHAPTER 6: DESSERT 8) WHICH STATEMENT IS FALSE? 1) An egg can have two yolks. 2) The color of a hen's earlobes predict what color eggs they will lay. 3) Brown eggs are more nutritious than white eggs.
CHAPTER 6: DESSERT 9) How many ways can you think of to cook an egg?	CHAPTER 6: DESSERT 10) WHICH STATEMENT IS FALSE? 1) Older hens will lay eggs with thinner shells. 2) "Free range" hens always live outdoors. 3) Fresh eggs will sink in a glass of water. 4) Some chickens lay blue eggs.
CHAPTER 6: DESSERT 11) INTERESTING FACT: Did you know that the less sugar you eat, the more sensitive you will be to its taste? Once your brain adjusts, a lower amount of sugar will taste just as sweet.	CHAPTER 6: DESSERT 12) INTERESTING FACT: White chocolate doesn't contain any theobromine. The only part of the cocoa bean that is used is the fat (the "cocoa butter").