#. What is a "fruit"?
Seed-bearing fleshy part of a plant that results from a pollinated flower
#. What are some typical properties of fruits?
Sweet/high sugar content, often highly colored, contain seeds,
#. What is the evolutionary purpose of fruit?
To aid in distribution/reproduction of the plant
#. Why do fruits initially accumulate carbohydrates as starch instead of sugar?
Sugars can grow spoilage microbes more easily than starches; to prevent animals from eating the fruit before the seeds are mature
#. When tasting and preparing fruit, what is the major type of food molecules present besides water?
Sugars! Also other carbohydrates (starch, cellulose, etc). In general, lower in fats and proteins.

#. What is an anti-oxidant?
A molecule that prevents the oxidation of other molecules; a molecule that scavenges free-radicals to prevent DNA damage
#. What are some typical molecular structures/features to look for in an anti-oxidant?
Many anti-oxidants have a 6-membered ring with 2 or more "-OH" groups, most have some double bonds
#. Why do some molecules in plants have hormone-like activity?
Shape and location of "OH" groups or nitrogen-containing portions. If the shape of the molecule and orientation of "O" and "N" groups are similar to a hormone, then the molecule can bind to hormone receptors and fool the cells/enzymes
#. What is the function of carotenoids in plants?
They provide color, also act as a filter to absorb certain wavelengths of light that might damage the photosynthetic process, serve as antioxidants to protect components of photosynthesis
#. What aspect of the molecular structure of carotenoids makes them colorful?
Long chains of alternating single and double bonds

#. What are the 3 major types of molecule that are present in the cell wall of plants?
Cellulose, hemicellulose, pectin. (water and things that are soluble in water are also present in smaller amounts…)
#. What function does each of the 3 major types of molecules in a cell wall serve?
Cellulose = rigid sticks, provide a lot of the structure. Hemicellulose and Pectin = flexible strings that tie the rigid cellulose sticks together, form a network, keep the cell wall from falling apart.
#. What is a vacuole and what purpose does it serve in plant cells?
A bag of water. If the vacuole is very full, it stiffens the overall plant cell structure. Vacuoles can also store defensive compounds (bitter tastes, bad smells, etc) that repel plant or insect attack.
#. What are the 4 types of plant tissue and what does each type of plant tissue do?
Ground tissue = most of the cells, diverse function, usually thin cell walls, tender
Vascular tissue = nutrient transport up from the roots and/or down from the leaves
Dermal tissue = outer surface of the plant, protects and retains moisture
Secretory tissue = produce and store aroma chemicals to attract or repel
#. What is a "vegetable"?
Any edible part of a plant that's not a "fruit"

#. Describe/define the main categories of flavor
Sweet, sour, bitter, salty, "savory"/umami – other names/categories depending on where you look, these are the ones from your book
#. What is a taste bud and how does it recognize different flavors?
A pore that allows flavor molecules in and recognizes different molecules by approximate shape. Similar to hormone mimics above. This is why we don't taste starch even though it's made of sugar molecules, the starch molecule is too big to get into the taste bud and be recognized as a sugar
#. What are the 2 main ways that the structure of chlorophyll molecules can be altered during cooking?
Hydrolysis of the tail = makes the colored part more water soluble. Removal of the Mg^{2+} from the middle = changes the color from bright green to a more olive green
#. What steps can be taken to prevent chlorophyll from losing its natural green color?
Neutralize acid in cooking water. Acid promotes hydrolysis AND the H^{+} can displace the Mg^{2+} .
#. What happens when anthocyanins are exposed to acid or base?
Color changes. More red in acidic environments, more blue or green in basic environments.

#. *Name a couple fruits/vegetables/plants that have a significant amount of anthocyanin. How can you tell?*

Grapes, black beans, red cabbage – they have intense red-purple colors. Not all red-purple colors are due to anthocyanins, but most plant-based red-purple colors are due to anthocyanins. To test, try adding a little acid or base to the raw food to see if the color changes.

#. *Why do metal ions with a +2 charge (like calcium, Ca^{+2}) affect food and food molecules differently than metal ions with a +1 charge (like sodium, Na^{+})?*

Generally, +2 metal ions can act as bridges/cross-linkers that hold things together. +1 metal ions are more likely to act as caps

#. *On a cellular/molecular level, what happens to starchy plants (potatoes, etc) when they are cooked?*

The small, hard starch granules absorb water and swell up, in some cases bursting through cell walls and other cell structures

#. *What are the main differences between boiling, steaming and pressure-cooking?*

Boiling and pressure cooking extract more of the water soluble components than steaming does.

Pressure cooking can be done at a higher temperature than regular boiling or steaming

#. *Why does the addition of salt change the boiling point of water?*

When salt (sodium chloride) is added to water, the sodium ions and chloride ions get in the way of water molecules escaping from the surface of the liquid, changing the vapor pressure of the solution. Changing the vapor pressure changes the boiling point.

#. *What is "vapor pressure"?*

The pressure that develops above a liquid in a sealed container. Some of the liquid molecules will have enough energy to escape into the vapor phase; some of the vapor molecules will condense back to the liquid phase; when the container is sealed, the rate of liquid → vapor is equal to the rate of vapor → liquid, so a constant pressure develops. Pressure is due to molecules colliding with the walls of the container.

#. *What does a phase diagram tell you about a substance?*

How its phase will change as temperature and/or pressure are changed.

#. *What are the 3 main mechanisms for heat transfer in preparing food?*

Conduction, convection, radiation

#. *How does baking incorporate all 3 main mechanisms for heat transfer?*

Heat is *conducted* from the cooking vessel to the food, heat is spread around the oven by *convection* of heated air, and the hot walls of the oven *radiate* infrared energy.

#. *Describe the major similarities and differences between boiling and deep-fat frying.*

Both use the convection of a liquid medium. Both *can* extract nutrients and flavors from the food; boiling in water extracts water-soluble (hydrophilic) components while oil can extract lipophilic substances. Because deep-fat frying takes place at a much higher temperature than boiling, it tends to seal the outside of whatever is being fried which minimizes extraction of lipophilic substances and seals in water to steam the food from the inside.

#. *What is the "smoke point" of an oil used for frying?*

It's when the oil starts to burn. For good high-temperature frying, the oil should have a high smoke point

#. *Why is hot oil essential for deep-fat frying?*

Seals the food, creates steam, prevents oil from soaking into food

#. *Why does cold-storing foods preserve them?*

It slows down the reactions that cause spoilage

#. *Describe the origins of the Fahrenheit and Celsius temperature scales.*

Both are based upon the properties of water, Fahrenheit set zero as the coldest ice-salt-water bath he could make and 96 as "blood heat". Celsius used the freezing and boiling points of water and set them at 0 and 100.

#. *If a substance is 25°C, what is its temperature in °F?*

25°C is ¼ of the way from freezing water to boiling water. In the Fahrenheit scale, there are 180°F between freezing and boiling water. ¼ of 180 is 45, so this temperature must be 45°F warmer than the freezing point of water. 45 + 32 = 77°F

#. *Why are absolute temperature scales useful/necessary?*

If temperature is a way to describe energy and molecular motion, negative numbers don't make much sense. In absolute temperature scales, zero really is zero.

#. Describe the similarities and differences between drying and freeze-drying, both the process and the effect on the foods.

Typical "drying" involves heating the food which cooks it. Cooking food changes its texture, often irreversibly. Freeze-drying involves freezing the food and removing the water under vacuum (look at a water phase diagram…). Food that is freeze-dried can often be re-hydrated by adding water .

#. What role does sugar play in the preparation and storage of sugar preserves?

High-sugar environments do not support spoilage microbes. Sugar also helps to dehydrate plant cells, lower water content also inhibits the activity of spoilage microbes

#. What happens to the freezing point of a solvent (like water) when a solute (like sodium chloride, NaCl) is added?

Freezing point is depressed. Solute molecules and/or ions get in the way of crystallizing solvent molecules.

#. During photosynthesis, _____, _____, and _____ react to for _____ and _____.

Carbon dioxide, water, light energy react to formglucose.oxygen

#. What happens on a cellular/molecular level when a vegetable "wilts"?

Water is lost from the vacuoles. Shrinking vacuoles cause the cells to be less rigid/stiff.

#. What are the main differences between sauerkraut and kimchi?

Sauerkraut = shredded cabbage, room temperature fermentation, less salt, more acidic

Kimchi = small cabbage leaves and pieces and other spices, cooler temperature fermentation, more salt, less acidic

Both are delicious.

NOTE: These questions are in groups of 5 just to make it easier for me to keep track of how many questions there are.