Tasting and Smelling!

FRAMEWORK	
I.	Scientific and Engineering Practices
II.	Cross-Cutting Concepts
III.	Physical Sciences

SKILLS/OBJECTIVES

- Advance understanding of the senses and the neurons that make up our nervous system an allow us to perceive the world around us.
- Explain that taste and smell together create the flavor that we experience when we eat or drink. Many of our senses work together to give us a richer experience of the world.

NOTE: The miracle fruit activity would be expensive, but also very interesting a fun. A glycoprotein in *Synsepalum dulcificum*, the miracle berry, binds to the taste buds on the tongue and triggers the sweetness pathway when it comes it contact with acids. Bitter and sour foods taste sweet because of this! I think it would be a cool way to further explain taste buds and neurons having specific receptors, but the cheapest I have found would be $75 to be enough for 100 people.

Also for the tasting soda activity, should we just use one cup and have them rinse it in between so it is less wasteful? Or is four cups better so they can try multiple times and mix up the order so they are less influenced by other kids?

MATERIALS

-Grape/Purple colored, Cherry/Red colored and Lemon/Yellow colored soda
-Clear seltzer (colored orange)
-Orange food coloring (or another color and get orange soda instead of one of the others)
-Strong smelling fruit juice (I tried it with apple cider vinegar and it worked well) in different concentrations mixed with water
-4 Water proof containers for cider vinegar/water mixtures **WELL LABELED with a triangle for least, circle next, then a square, and finally a star for highest concentration.**

-Cotton Balls
-Vanilla Extract
-Vinegar
-Apples
-Small cups (~115)
-Large cups (~30)
-Napkins

BACKGROUND

- The nervous system of your body is made up of small cells called nerves all over your body that connect to your brain and send messages about what is happening in the environment and to you in it. **What do you remember from our other lesson about the nervous system and neurons? What are your five main senses?**
- Today we will talk about Taste and Smell, two of your senses! They are very important senses. **How do your sense of taste and smell help you?** (you can tell when food has gone bad, when there is smoke from a fire, taste delicious food)
- Smell is when substances in the air, odors, pass into your nose as molecules and attach to little hairs (cilia, like in the ear!) there. These excite the nerves there to send messages to your brain about what you are smelling (**NOTE:** is that simple enough to understand with still being correct)
- Taste is when food touches the taste buds on your tongue that send messages to your brain about the food that you are eating.
- Together taste and smell make up what we experience as flavor. Have you ever had a cold and had trouble tasting your food? This is why!

-Sharpies

NOTES

NOTES:
Make sure to color the seltzer orange somewhere the kids can't see so they don't know that it is just plain seltzer.
Also if the apple cider vinegar mixtures are low, to make new concentrations is simple. In the lowest concentration (the triangle container) only put a few drops (~2 drops) of vinegar. In the next (the circle) put double that amount (~5 drops). In the square container put half a capful. In the final star container, the most concentrated, put a whole capful). Then in each fill to the same place with water, probably half way but you can decide as long as they all get the same amount of water.

Activity #	**Taste with your nose?**
Materials	-Cotton Balls -Vanilla Extract -Vinegar -Apples -Small cups -Napkins
Worksheet	N

- Pass out a 3-4 small pieces of apple to each child in a small cup as well as two cotton balls. **Tell them not to eat their apple yet, that will come later.**
- Have each child eat one piece of apple. **Ask them to describe in detail how it tastes, smells, feels, etc.**

- Go around with a cup of vinegar. Have them dip one cotton ball in vinegar (not too much so that it drips) and hold it over the napkin until everyone is ready.
- Have them eat another piece of apple, this time while holding the vinegar cotton ball under their nose and smelling. **Ask them again to describe the taste, smell, etc.**
- Do this again with the vanilla extract. Have each kid dip the cotton ball into vanilla, then eat apple while smelling the cotton ball. **Ask again to describe taste, smell, etc.**
- **This shows again how taste and smell work together to make up flavor. What other senses do we use when we eat? Sight, touch?**

Activity #	**Taste with your eyes?**
Materials	- Grape/Purple colored, Cherry/Red colored and Lemon/Yellow colored soda -Clear seltzer (colored orange) -Orange food coloring (or another color and get orange soda instead of one of the others) -Small cups
Worksheet	N

- Pass out four cups to each student while a different volunteer goes around and fills them each with a different type of soda. **Make sure the kids don't drink the soda yet.**
- Tell them that even though soda has artificially created flavors, we can recognize their taste. **Have them take sips of each type of soda.**
- Ask students what flavor the **purple soda** is? The **red soda**? The **yellow soda?** The **orange soda**?
- If they guess that the orange soda was flavored orange, tell them **that the orange soda was just plain fizzy water colored orange!** Sometimes our eyes can convince our brain that a food tastes the way the color makes us expect. That is why soda companies color drinks a certain way, to make up for the fact that the flavors don't perfectly match up to what they are trying to mimic.

Activity #	**How accurate is your nose?**
Materials	-Strong smelling fruit juice (I tried it with apple cider vinegar and it worked well) in different concentrations mixed with water -4 Water proof containers for cider vinegar/water mixtures **WELL LABELED with a triangle for least, circle next, then a**

	square, and finally a star for highest concentration. -Large cups -Sharpies
Worksheet	N

- Split the club into smaller groups, 4-5 kids in each
- **Ask the group to name some professions where it might be important to have a good sense of smell**. This might be a chef (if a poor sense of smell it is hard to taste flavor like we talked about when you are sick), a perfume maker, someone who has to check pollution quality of a place, or any others that they can come up with
- **Today we will be testing the accuracy of your sense of smell. We have four containers that have a mixture of vinegar and water, but with different amounts of vinegar.**
- Have the kids **mark their four cups with a triangle, a circle, a square, and a star.**
- **Pour the matching concentration into each cup.**
- Ask the kids in their group to use their sense of smell to figure out the order of which liquid has the least to the most amount of vinegar in it. Have them line up their cups.
- **Ask the groups which cup they thought had the least vinegar? The second least? The second most? The most?**
- Ask them if it was hard to tell the differences just based on smell? **Do you think a dog would have had an easier time with this task?** They have more acute senses of smell, which is why they are used by police forces to find certain people or things and would do a lot better in this experiment than any human could.

CONCLUSIONS

-Your nervous system sends information to your brain so it can make sense of the world around you. This is what happens when you eat food, a combination of senses work so your brain can process what we call “flavor”.

-Our brain combines many senses to make up our perception of the world around us. Sight, taste, smell, feeling, and hearing all together let us experience the world. Alone, our senses are not as strong and we cannot get a full experience of the world.