

Grade: 5th Science

GPS/GSE addressed:

- S5P2a, b, c

Time needed: 50-60 minutes

Materials needed:

- gloves for students
- mixing bowls
- handheld food processor
- induction burner or hotplate (or pre-cooked pasta)
- pot
- water source
- colander; dish/wastewater bucket
- paper towels
- tongs/spoons for serving
- measuring tools
- bowls and forks for eating
- *Before We Eat* by Pat Brisson (optional)

Ingredients needed (see end of lesson for recipe):

- Turnip greens (or any other sort of green—we used turnip greens because it was our Harvest of the Month)
- Olive oil
- Garlic
- Parmesan cheese
- salt

Key vocabulary:

- physical change
- chemical change
- precise



Farm to School Lesson Plan: Physical and Chemical Changes in the Kitchen (Turnip Green Pesto Pasta)

Concept: distinguishing between physical changes and chemical changes; how to talk respectfully and intelligently about new foods

Objective: Students will be able to distinguish between physical and chemical changes in common cooking processes. Students will recognize real world examples of physical and chemical changes. Students will also be able to respectfully express their opinion about a new food using precise, grade-level appropriate vocabulary.

Set-Up:

- Prepare flipchart paper or powerpoint slide with definitions of physical and chemical changes.
- Prepare flipchart paper or powerpoint slide with pesto recipe outlined.
- Instructor can pre-grate the parmesan cheese, pre-wash turnip greens, and pre-measure all ingredients besides turnip greens to simplify cooking process.
- Instructor can also pre-cook pasta if there's no way to boil water in classroom space.
- If desired, experiment with quantities of ingredients/space in your food processor/yields beforehand (or just embrace the unknown! Cooking in the classroom is an art, not a science).

Lesson Outline:

Warm Up (5 minutes): (We taught this lesson to introduce physical and chemical changes—adjust warm up as necessary if students have already studied physical and chemical changes to some extent). Instructor asks students to think-pair-share about what is a physical change? What is a chemical change? After a few students share their ideas, instructor displays definitions written on a flipchart/smartboard. Instructor asks students if they can think of examples of each kind of change.

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Introduce Cooking Activity (10 minutes): Instructor announces that we're going to learn about physical and chemical changes by cooking in class today! Instructor displays recipe on flipchart/smartboard (**see end of lesson for recipe**). Instructor explains why we're using turnip greens (Harvest of the Month/taste test item, locally grown).

One or two students read recipe aloud to class. Instructor asks class which steps represent physical changes, and which steps represent chemical changes. (tearing, chopping, shredding, boiling water are all physical changes; cooking pasta is a chemical change).

Prepping the Greens (5 minutes): (If cooking pasta in the classroom, this is a good time to turn the heat on to begin boiling the water).

Instructor or student passes out gloves, 1 mixing bowl to each group, then turnip greens. Each student should get about 1-2 leaves to rip up. Students should rip leaves off of their stems, and tear leaves into smallest pieces possible.

While students rip up leaves, instructor can add other ingredients to food processor.

Once students are finished, one or two students collect mixing bowls full of greens. Another student collects stems/other food waste, either for trash can or for school compost.

Instructor adds greens to food processor. If they don't all fit, that's okay! It's an art, not a science. If desired, experiment with what works with your equipment/ingredients beforehand.

How to talk about new foods (10 minutes): Once all ingredients are placed in food processor, instructor asks students if anyone has eaten turnip green pesto pasta before? So, since it's many of our first times trying this new food, what are some productive, precise, respectful ways we can describe new food?

Instructor creates a space for a word wall (either on whiteboard, smartboard, or flipchart), with a space for words we can use and words we won't use. (Words we will use are precise, like "sweet," "crunchy," or "bitter." Words we won't use are either not precise or are disrespectful, like "good," "nasty," or "disgusting.") Remind students that words can describe taste, smell, or texture.

Instructor solicits contributions to word wall from students by using the handheld food processor as a "talking stick" (students give 1 word, crank food processor 1-3 times, and pass it on). You may want to tape food processor closed, just to be on the safe side.

(Don't forget to keep an eye on your pasta! Turn off heat and drain using colander into dish pan when necessary).

Tossing the pasta/appreciating/eating (10 minutes): Once pasta is cooked and pesto is sufficiently chopped and blended, instructor tosses pasta and pesto together while one or two students pass out bowls with which to eat and forks.



If time allows, read *Before We Eat* and connect appreciation of food workers to talking about food respectfully. Pass out pasta using tongs, and enjoy!

If time allows, solicit students' ideas about pasta out loud.

Wrap-up: (5 minutes): Appoint one student per table to collect trash. Appoint one student per table to wipe messes with paper towel. Other students work on exit ticket that lists one physical change from lesson, one chemical change from lesson, and at least one precise, respectful adjective that expresses their opinion of the pasta.

Send copies of recipes home with students to build home-school connection.

Possible Extensions:

- Experiment with different greens (collards, carrot tops, kale spinach, mustard greens—the possibilities are endless) and have a taste test to decide which is the class's favorite.
- Have students vote on their opinion of the pesto (*e.g.* "I loved it," "I liked it", or "No, thank you") and analyze the data (graph, calculate proportions, calculate fractions or decimals).
- To practice mathematical operations with fractions, ask students to calculate how much of each ingredient if would be need to make $\frac{1}{2}$ the recipe? Twice the recipe? Seven times the recipe?

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Cheesy Turnip Green Pesto Pasta

From Rachel Head, FoodCorps North Carolina

Ingredients:

- about 4 cups of pasta cooked
- 3 cups (chopped) fresh turnip greens
- ½ cup olive oil
- 2 cloves garlic (you can do just one if you want to tone the garlic down!)
- 1/3 cup parmesan cheese
- 1/8 tsp salt

Instructions:

1. While you are doing steps 2-4, boil water. Once water is boiling, add a pinch of salt and add pasta to the water and cook until tender.
2. Tear up or chop turnip green leaves into very small pieces. Put stems in trash or compost.
3. Shred parmesan cheese.
4. Add turnip greens, parmesan cheese, and other ingredients into food processor. Chop using food processor until all ingredients are completely mixed together.
5. Toss pesto mixture with cooked pasta. Eat and enjoy!

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