**Demonstrate safe methods for food handling, preparation, and storage**

**Pillar 2 D.** The Relationship between agriculture and food, fiber, and energy (Grades 4th – 8th)

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| **Website:** <http://www.learnnc.org/lp/editions/nutrition/6469>  **Hands On:** Food Keepers App <https://www.foodsafety.gov/blog/2016/12/foodkeeper-open-data.html> |

Activity: Germ Multiplication activity

Digital Activity: On iPads explore Food Keepers App <https://www.foodsafety.gov/blog/2016/12/foodkeeper-open-data.html>

Keeping food safe to eat

This fourth-grade lesson plan, from the *Food for Thought* nutrition curriculum, teaches students about the germs that can be found in foods and the ways to prevent food-borne illnesses by washing our hands, using safe food handling procedures, and keeping foods refrigerated.

Learning outcomes

Students will:

* Learn how germs multiply in different temperatures.
* Learn the best way to wash their hands to kill germs

Teacher planning



Document courtesy of [Partnership for Food Safety Education](http://www.fightbac.org/)

Open as [PDF](http://www.learnnc.org/lp/media/projects/nutrition/COLOR_BROCHURE_04262007.pdf) (683 KB, 2 pages)

**Most wanted: E.coli**



Document courtesy of [Indiana’s Food for the Hungry](http://www.cfs.purdue.edu/safefood/sfhungry.asp)

Open as [PDF](http://www.learnnc.org/lp/media/projects/nutrition/ecoli.pdf) (24 KB, 1 page)

**Most wanted: Salmonella**



Document courtesy of [Indiana’s Food for the Hungry](http://www.cfs.purdue.edu/safefood/sfhungry.asp)

Open as [PDF](http://www.learnnc.org/lp/media/projects/nutrition/salmonella.pdf) (24 KB, 1 page)

**Most wanted: Clostridum perfringens**



Document courtesy of [Indiana’s Food for the Hungry](http://www.cfs.purdue.edu/safefood/sfhungry.asp)

Open as [PDF](http://www.learnnc.org/lp/media/projects/nutrition/colstridium.pdf) (24 KB, 1 page)

**Most wanted: Staphylococcus aureus**



Document courtesy of [Indiana’s Food for the Hungry](http://www.cfs.purdue.edu/safefood/sfhungry.asp)

Open as [PDF](http://www.learnnc.org/lp/media/projects/nutrition/Staph.pdf) (67 KB, 1 page)

Materials

* Calculators
* Cooking oil
* Cinnamon
* Access to hand washing
* Hot water
* Measuring cup
* One shallow and one tall container (one cup minimum) made from the same material (glass or plastic)
* Food thermometer

**Handouts**

**Multiplying germs (they’re everywhere!)**



Provided by [Nutrition Services Branch of the North Carolina Division of Public Health](http://www.nutritionnc.com/ResourcesForSchools/index.htm) and published in the *Food for Thought* curriculum.

Open as [PDF](http://www.learnnc.org/lp/media/uploads/2010/03/multiplying_germs.pdf) (14 KB, 2 pages)

**FBI Case: Perils at the picnic**



Document courtesy of [Partnership for Food Safety Education](http://www.fightbac.org/)

Open as [PDF](http://www.learnnc.org/lp/media/uploads/2010/03/picnic.pdf) (45 KB, 2 pages)

**All washed up: Soapy solutions**



Document courtesy of [Partnership for Food Safety Education](http://www.fightbac.org/)

Open as [PDF](http://www.learnnc.org/lp/media/uploads/2010/03/soap.pdf) (84 KB, 1 page)

**Chill Out: Cooling counts**



Document courtesy of [Partnership for Food Safety Education](http://www.fightbac.org/)

Open as [PDF](http://www.learnnc.org/lp/media/uploads/2010/03/cooling_counts.pdf) (85 KB, 1 page)

Pre-activities

Students should be familiar with the scientific method and multiplication to complete the handouts.

Activities

1. Tell students to imagine a fictional germ:
   1. It doubles once every hour at room temperature (70°F/21°C),
   2. It doubles once every six hours when cooled in the refrigerator (35°F/4°C),
   3. It doubles once every four hours when heated in the oven (120°F/49°C).
2. Instruct students to estimate how many germs would be present in twenty-four hours in each of the three environments. The answers are:
   1. Room temperature — 16,777,216
   2. Refrigerator — 16
   3. Oven — 128
3. Using the “Most Wanted” fact sheets and “Fight BAC!: Four simple steps to food safety” teacher resources, discuss food-borne illnesses and how to keep food safe.
4. Distribute and direct students to complete the “Multiplying Germs (They’re Everywhere!)” handout.

Optional

Create a chart as a class with the calculations.

Note

The answer for room temperature after two days is larger than 99,999. This is beyond the Standard Course of Study competencies for grade four.

In addition, standard calculators may not be able to accommodate the solution.

* Distribute and direct students to complete the “FBI Case: Perils at the Picnic” handout.
* As a class, conduct the experiments outlined in the “All washed up: Soapy solutions” and “Chill Out: Cooling counts” handouts.
* Instruct students to write a report on the findings from the experiments. Direct them to follow the general outline for writing a lab report to include: problem, hypothesis, materials, procedure, observation, conclusion, and questions for further investigation.

Assessment

An assessment may be made from the students’ completed handouts and the report of their findings from the experiments done in class. They should be able to respond to verbal questions about food safety and food-borne illnesses.