

Germ and Preventing Illness: An Inner and Outer Experience

Grade Level: 1st grade

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Length of Unit: Six lessons (6-10 days)

I. ABSTRACT

In this unit first grade students will take an in-depth look at germs. They will have an opportunity to use a microscope to look at different types of germs and will identify the two germs that can make us sick: bacteria and viruses. They will also make comparisons as they look at germs from their mouth, before and after they brush their teeth. The students will learn how our amazing body is constantly combating these germs and preventing illnesses. By demonstrating proper hand washing techniques and brushing their teeth, they will learn how they can help their body prevent illnesses. First graders will also discover the valuable inventions of Edward Jenner and Louis Pasteur and develop an understanding of how they have helped in the decline of disease in our society.

II. OVERVIEW

A. Concept Objectives

1. Students understand the processes of scientific investigation. (Colorado State Science Standard #1)
2. Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado State Science Standard #3)
3. Students understand how science has developed, changed, and affected societies throughout history. (Colorado State History Standard #4)

B. Content from the *Core Knowledge Sequence*

1. Germs (page 38)
2. Diseases (page 38)
3. Preventing illnesses (page 38)
4. Vaccinations (page 38)
5. Taking care of your body: cleanliness (page 38)
6. Science biography: Edward Jenner (page 39)
7. Science biography: Louis Pasteur (page 39)

C. Skill Objectives

1. The students will learn that bacteria and viruses are two types of germs that usually make people sick.
2. The students will understand that germs are microscopic and can be found everywhere.
3. The students will identify ways in which germs enter our body.
4. The students will judge the effects of not washing their hands.
5. The students will identify the proper steps of hand washing and demonstrate proper hand washing.
6. The students will identify and draw bacteria using a microscope.
7. The students will predict what their slides will look like before and after they brush their teeth.
8. The students will compare the number of germs from their mouth before and after they brush their teeth using a microscope.
9. The students will demonstrate the proper way to brush their teeth.

10. The students will identify six ways that our body defends against germs.
11. The students will demonstrate how germs multiply.
12. The students will identify white blood cells as the cells in our blood that combat germs.
13. The students will learn that Edward Jenner developed a vaccine to make people immune to smallpox.
14. The students will define ‘vaccine.’
15. The students will be able to verbalize how Edward Jenner’s discovery helped people in the past and in the future.
16. The students will define “pasteurization.”
17. The students will learn who Louis Pasteur is and how his germ theory has helped prevent diseases in the world.
18. The students will understand how Louis Pasteur’s discoveries have helped us today.

III. BACKGROUND KNOWLEDGE

- A. For Teachers
 1. Levine, Shar and Leslie Johnstone. *Fun With Your Microscope*. New York: Sterling Publishing Co., Inc., 1953. ISBN 0-8069-9946-2.
 2. Obrien-Palmer. *Healthy Me*. Chicago: Chicago Review Press, 1999. ISBN 1-55652-359-9.
 3. Hirsch, Jr. E.D. *What Your First Grader Needs to Know*. New York: Dell Publishing, 1998. ISBN 0-385-31987-8.
- B. For Students

None

IV. RESOURCES

- A. *Germs Make Me Sick!*, by Melvin Berger (Lesson One)
- B. *Body Battles*, by Rita Golden Gelman (Lesson Four)
- C. *What Your First Grader Needs To Know*, by E.D. Hirsch, Jr. (Lessons Five and Six)
- D. *The Value of Believing in Yourself: The Story of Louis Pasteur*, by Spencer Johnson (Lesson One)
- E. *Hygiene and Your Health*, by Jillian Powell (Lesson Three)
- F. *Those Mean Nasty Dirty Downright Disgusting but... Invisible Germs*, by Judith Anne Rice (Lesson Two)
- G. *Wash Your Hands!*, by Tony Ross (Lesson Two)
- H. *I Know How We Fight Germs*, by Kate Rowan (Lesson Five)

V. LESSONS

Lesson One: Germs Are Everywhere! (approximately one hour)

- A. *Daily Objectives*
 1. Concept Objective(s)
 - a. Students understand the processes of scientific investigation and design.
 - b. Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
 - c. Students understand how science has developed, changed, and affected societies throughout history.
 2. Lesson Content
 - a. Germs
 - b. Louis Pasteur

3. Skill Objective(s)
 - a. The students will learn that bacteria and viruses are two types of germs that usually make people sick.
 - b. The students will understand that germs are microscopic and found everywhere.
 - c. The students will learn who Louis Pasteur is and how his germ theory has helped prevent diseases in the world.
 - d. The students will identify ways in which germs enter our body.

B. *Materials*

1. *Germs Make Me Sick*, by Melvin Berger
2. Microscopes (one for every two students, if possible)
3. Slide and cover slip for each microscope and a set for the teacher
4. One cup of water and eyedropper for each group of students
5. Container of plain yogurt (with live cultures)
6. Tissue for each group of students
7. One toothpick for each group
8. *The Value of Believing in Yourself: Louis Pasteur*, by Spencer Johnson, M.D.
9. Appendices A and B for each student (I suggest making a book for each student. Make a copy of Appendices A-H and Appendix J for each student. These appendices are numbered 1-10 on the bottom. Staple the pages together, using two pieces of construction paper for the front and back of the book. The book can be labeled "GERMS." In this way the students can take out their germ book daily and have a completed book to take home at the end of the unit.)
10. Overhead copy of Appendix A

C. *Key Vocabulary*

1. Germ - a microscopic living thing that is found everywhere on the Earth
2. Microscopic - anything that is too small to be seen with the eye; it requires a microscope to be seen
3. Bacteria - a type of germ; some bacteria can make you sick
4. Virus - a type of germ that is smaller than bacteria; viruses can also make you sick

D. *Procedures/Activities*

1. Read the book *Germs Make Me Sick*, by Melvin Berger. After reading the title, ask the students what they think a germ is. Listen to responses to give you an idea of any previous background knowledge that the students have.
2. The following are questions to elicit discussion either during the reading of the book or after:
 - a. If you can't see a germ with your eye, what can you use to look at a germ? (*a microscope*)
 - b. What are the two types of germs discussed in this book? (*bacteria and viruses*)
 - c. Do you have germs on you? (*yes*) On the table? (*yes*) On your pencil? (*yes*)
 - d. How do you think germs get inside our body? (*mouth, nose, ears, cuts in skin*)
 - e. How do you know if a bad germ gets inside your body? (*You may feel sick.*)
 - f. Do you remember which cells fight the germs in your body? (*white blood cells*)
3. Explain to the students that over the next couple of weeks they will be learning about germs and how we can keep germs from making us sick.

4. Emphasize from the book that only some germs make you sick and that germs are everywhere.
5. Explain that they will be looking at an example of bacteria that is not harmful in yogurt. These bacteria actually help turn milk into yogurt.
6. Ask the students if they remember the term from the book that means something is too small to be seen with the eye. (*microscopic*)
7. Explain that since bacteria are microscopic, they will need to look at the bacteria under a microscope. If students have not previously used a microscope, proper use of a microscope should be taught at this time.
8. The following are some important points for students (and teachers) to remember when using a microscope:
 - a. Always pick up the microscope with two hands. One hand should be on the arm and the other under the base of the microscope. If students are not familiar with the parts of a microscope, you may want to demonstrate this for them.
 - b. Place the microscope away from the edge of the table, but close enough so the students can comfortably look through it.
 - c. Make sure the low power objective is over the hole in the stage. It should be raised so it is about one inch from the stage.
 - d. Place your sample on the stage (over the hole) and secure it with stage clips.
 - e. Make sure your light source (mirror or light) is focused through the sample.
 - f. Use your coarse adjustment knob first to focus and then use the fine adjustment knob for further adjusting. Switch the objective to high power, if necessary.
 - g. Don't forget to switch the objective back to the lower power when the students are finished.
9. In order to observe the bacteria from the yogurt, the students will need to make a "smear slide."
 - a. **Step Number One:** Use the toothpick to take put a small amount of yogurt on the center of the slide.
 - b. **Step Number Two:** Use the eyedropper to place a drop of water on the sample to thin out the yogurt.
 - c. **Step Number Three:** Place the cover slip over the sample. Try not to trap any bubbles.
 - d. **Step Number Four:** Use a tissue to blot up any excess water or yogurt. Carefully place the sample over the hole and secure with the stage clips.
 - e. **Step Number Five:** Use the low and high-powered objectives to observe. Have Fun!!
10. It is important that you model steps 8 and 9 with your students, especially if the students have not had previous experience with a microscope. *Fun With Your Microscope* by Shar Levine and Leslie Johnstone is a great resource to use when using microscopes with children.
11. After the group of students have located the bacteria and you have checked each microscope, instruct the students to draw what the bacteria looks like in the appropriate space in their germs book (page 2, Appendix B).
12. After bacteria have been drawn and work areas have been cleaned up, have students come back to a whole group again to discuss what they saw under the microscope. Encourage students to describe what the bacteria looked like and

share their pictures of the bacteria. Have students answer questions #1 and #2 on page 2 of their germ book at this time.

13. Explain to students that in 1877 Louis Pasteur came up with the idea that diseases were caused by germs. If you have a timeline in your classroom, you can show that even though 124 years seems like a long time ago, it wasn't that long as compared to when the Ancient Egyptians built their pyramids or even when the English settlers began to arrive in America.
14. Read the book, *The Value of Believing in Yourself: Louis Pasteur* by Spencer Johnson, M.D. Ask the students why they think it was so important that Louis Pasteur came up with his "Germ Theory."
15. Review what the students have learned during the lesson by completing the first page of their germ book as a group. Make an overhead copy of the paper (Appendix A) so that the students can use correct spelling when filling in the blanks on that page. Encourage students to fill in the blanks and give answers whenever possible.
16. The answers to Appendix A are the following:
 - a. tiny living things
 - b. microscope
 - c. microscopic
 - d.
 1. air you breathe
 2. food you eat
 3. water you drink
 4. everything you touch
 - e.
 1. bacteria
 2. viruses
 - f. Louis Pasteur
 - g. rabies
 - h. vaccine

E. *Assessment/Evaluation*

1. Evaluation will be based on teacher observation of questions asked throughout the lesson and completion of Appendices A and B.
2. The students will also be evaluated on their drawing of the bacteria from the yogurt (Appendix B).

Lesson Two: Wash Those Germs Away (approximately one hour)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students understand the processes of scientific investigation and design.
 - b. Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
2. Lesson Content
 - a. Germs
 - b. Preventing illness
 - c. Taking care of your body: cleanliness
3. Skill Objective(s)
 - a. The students will judge the effects of not washing their hands.
 - b. The students will identify the proper steps of hand washing and demonstrate proper hand washing.
 - c. The students will understand that germs are microscopic and can be found everywhere.

B. *Materials*

1. *Those Mean Nasty Dirty Downright Disgusting but...Invisible Germs*, by Judith Anne Rice
2. *Wash Your Hands!* by Tony Ross
3. Appendix D - can rewrite on poster board or make an overhead copy for the students
4. Appendix C - Healthy Me Song
5. Hand lotion
6. Glitter

C. *Key Vocabulary*

1. Germ - a microscopic living thing that is found everywhere on the Earth

D. *Procedures/Activities*

1. Review from yesterday's lesson by asking the following questions:
 - a. Who remembers what we called the tiny living things that are found all over the Earth? (*germs*)
 - b. What are the two types of germs that usually make us sick? (*bacteria and viruses*)
 - c. How do these germs get inside our body? (*nose, mouth, open cuts, etc.*)
 - d. When something is so small that it has to be seen with a microscope, what do we call that? (*microscopic*)
 - e. Who was the person who first came up with the idea of "the germ theory"? He believed that germs are what cause diseases. (*Louis Pasteur*)
2. Inform the class that today they will begin to learn how we can keep germs from entering our body. Begin by reading the book, *Those Mean Nasty Dirty Downright Disgusting but...Invisible Germs*, by Judith Anne Rice.
3. After reading the book, have the students brainstorm a list of ways that they can prevent germs from entering their body. List their ideas on a large piece of chart paper to keep hanging up in the classroom throughout the rest of the unit. Encourage the students to add to or refer to the list. 'Washing hands' should definitely be on this list. Also discuss different times that they should wash their hands (after using the restroom, before and after eating, after blowing their noses, after playing with pets, after playing outside).
4. When asking the students when their hands should be washed, ask them to tell you why it is important that we wash our hands so often. Always emphasize that germs are living things and that they are absolutely EVERYWHERE.
5. Read the book *Wash Your Hands!* by Tony Ross. This is a funny book that emphasizes when you should wash your hands.
6. Tell the students that since they need to learn how to stay healthy and free from germs, you will be teaching them a song to help them remember what they need to do.
7. This song is on Appendix C or page 3 of their germ book. It is sung to the tune "*The Itsy Bitsy Spider*." You can either make an overhead copy of the song or rewrite it on poster board. Sing this song through a few times because they will need to know the song later.
8. Ask the students if they know how to wash their hands. Have them give you what they think are the appropriate steps and list on the board or chart paper. Then go over the correct way for washing hands by referring to Appendix D. Compliment the students on the steps they thought of on their own. Make sure the students understand "palms," "back of hands," and "wrists."

9. You will want to model this hand washing technique after reading over the steps. If a sink were not readily available, a bowl of warm water would work to demonstrate. Have the students sing through the "Healthy Me" song two times while you are demonstrating how to scrub all parts of the hands.
10. After demonstrating the hand washing technique, show the students how germs can spread by doing the following activity. (I found this activity at <http://www.teachers.net/lessons/posts/1887.html>):
 - a. Put some lotion on each student's hand and have him or her rub it into his or her hands.
 - b. Put a small amount of glitter into one student's hand and have the student rub the glitter around in their hand. Tell the students that they will be pretending that the glitters are germs.
 - c. To demonstrate how germs can spread have another student come to the front of the room and shake the hand of the person with the "germs."
 - d. Have them hold their hands up so that the entire class can see how the "germs" have spread.
 - e. Proceed by putting a small amount of glitter into the hands of every student. Students can see that they can transfer their "germs" by touching almost anything.
11. After all the students are sufficiently covered with glitter, tell them that they will be washing their hands. Pick one or two students to show the class what happens when they try to use cold water. (Not all of the glitter will come off.) Have another student try to remove the glitter with only paper towels. This will emphasize the importance of using soap and warm water when they wash their own hands.
12. Have the students use the hand washing technique that was taught earlier to wash their hands. Remind them to sing the "Healthy Me" song through two times while they are washing.
13. Ask the following questions:
 - a. What happens if we do not wash our hands regularly? (*We transfer germs to other people or we may become sick from the germs.*)
 - b. What happened when we tried to use cold water to wash our hands? (*Not all of the "germs" came off of our hands.*)
 - c. Can we see the germs around us like we could see the glitter? (*No. Germs are microscopic, which means that they can't be seen with our eyes.*)
14. After they have washed their hands, have them return to their desks to complete Appendix E or page 5 in their germ book.

E. *Assessment/Evaluation*

1. Teacher observation of how they wash their hands.
2. Teacher observation of their ability to answer the questions throughout the lesson.
3. Completion of Appendix E.

Lesson Three: Sparkle, Sparkle, Pearly Whites (approximately one hour)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students understand the processes of scientific investigation and design.
 - b. Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

2. Lesson Content
 - a. Germs
 - b. Preventing illness
 - c. Taking care of your body: cleanliness
 3. Skill Objective(s)
 - a. The students will identify and draw bacteria using a microscope.
 - b. The students will predict what their slides will look like before and after they brush their teeth.
 - c. The students will compare the number of germs from their mouth before and after they brush their teeth using a microscope.
 - d. The students will be able to explain the effects of bad bacteria on their teeth.
 - e. The students will be able to demonstrate the proper way to brush their teeth.
- B. *Materials*
1. One toothbrush for each student (many dentist offices are willing to give these away for free)
 2. Toothpaste
 3. Toothpicks (two for each student)
 4. Microscopes (try to have **at least** one for every two students)
 5. Two slides and cover slips for **each** student
 6. Food coloring (one for each group of students)
 7. Song *Sparkle, Sparkle, Pearly Whites* (Appendix G or page 8 in germ book)
 8. Tape recorder
 9. Appendix F, page 1 and Appendix F, page 2 (pages 6-7 in germ book)
 10. Overhead copy of Appendix F, page 1
 11. *Hygiene and Your Health*, by Jillian Powell
- C. *Key Vocabulary*
1. Germ - a microscopic living thing that is found everywhere on the Earth
 2. Bacteria - a type of germ; some bacteria can make you sick
 3. Virus - a type of germ that is smaller than a bacteria; viruses can also make you sick
- D. *Procedures/Activities*
1. Review with the students what a germ is and ask them to name the two types of germs that they've learned (bacteria and virus). Also review the steps in hand washing.
 2. Read with the students the list that they made yesterday about what they can do to prevent germs from entering their body. (Brushing their teeth will hopefully be on this list. If it is not, add it now.)
 3. Read the "Teeth and Hygiene" chapter in the book *Hygiene and Your Health* (pages 12 and 13).
 4. After reading, ask the following questions:
 - a. When should you brush you teeth? (*after every meal*)
 - b. What do the germs (or bacteria) in your mouth like to eat? (*sugar*)
 - c. If too many bacteria are allowed to grow in your mouth, what could happen? (*You could get a cavity.*)
 - d. You should try not to eat too much of what type of food? (*sugary foods*)
 5. Explain to the students that everyone has bacteria in their mouth. Some of the bacteria are good and some are bad.
 6. Give them Appendix F, page 1 and Appendix F, page 2 or tell them to turn to pages 6 and 7 in their germ book. You may want to make an overhead of

Appendix F, page 1 so the students can see what needs to be written and do so with correct spelling.

7. By the question, "What will we do?" have the students write the following statement: *We will look at the bacteria from our mouth using a microscope before we brush our teeth and after we brush our teeth.*
 8. Have them develop their own hypotheses by having them answer the question, "What do you think will happen?"
 9. The students should follow these steps in order to observe the bacteria:
 - a. Use the toothpick to scrape between your teeth and along the gums.
 - b. Smear the sample from the toothpick onto the slide.
 - c. Put **one drop** of the food coloring on top of the sample. (Students may need help with this because it is easy to get more than one drop.)
 - d. Place the cover slip over the sample, trying not to trap any bubbles.
 - e. Carefully put the slide over the hole and secure with the clips.
 - f. Use your low and high-powered objectives to view the bacteria. The food coloring should stain the plaque and bacteria from the sample.
 10. Instruct the students to draw a picture of what they see in the microscope on the appropriate space in their germ book (Appendix F, page 1 or page 6).
 11. Tell the students that they will now be brushing their teeth so that they can finish their observation. First teach them the song *Sparkle, Sparkle, Pearly Whites* sung to "Twinkle, Twinkle, Little Star" (Appendix G or page 8). (You can either make an overhead of this song or write the song on a piece of poster board.)
 12. After practicing this song a few times, tell the students that they will need to brush their teeth during the time it takes to sing *Sparkly, Sparkly, Pearly Whites* and *The ABC Song* through two times.
 - a. Sparkly, Sparkly, Pearly Whites (1st time) - Brush the **outside** top teeth.
 - b. ABC Song (1st time) - Brush the **inside** top teeth.
 - c. Sparkly, Sparkly, Pearly Whites (2nd time) - Brush the **outside** bottom teeth.
 - d. ABC Song (2nd time) - Brush the **inside** bottom teeth.
 13. Since the students can't brush their teeth and sing at the same time, tape record the students singing the songs two times like in the order above.
 14. Students can then practice once through without toothpaste and then actually brush their teeth with the paste. The teacher should be emphasizing an up and down movement with the brush. Play the music while the students are brushing their teeth and give directions during the music about where they should be brushing.
 15. Repeat steps 9 & 10 with the microscope so that they can now observe the germs in their mouth after they've brushed.
 16. Have the students answer the remaining questions on page 7 of their germ book (Appendix F, page 2).
- E. *Assessment/Evaluation*
1. The students will be assessed based on their completion of Appendix F, page 1 and Appendix F, page 2.
 2. The students will be evaluated based on their ability to answer the questions asked throughout the lesson.
 3. The teacher will observe how they brushed their teeth.

Lesson Four: The War Against Germs (approximately 45 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
2. Lesson Content
 - a. Preventing illness
 - b. Germs
3. Skill Objective(s)
 - a. The students will identify six ways that our body defends against germs.
 - b. The students will demonstrate how germs multiply.
 - c. The students will identify white blood cells as the cells in our blood that combat germs.

B. *Materials*

1. *Body Battles*, by Rita Golden Gelman
2. One white and one green piece of construction paper for each student
3. One paper bowl per student
4. Appendix H (make one overhead copy and one copy for each student)
5. Appendix I (for teacher information)
6. Appendix J (make one overhead copy and one copy for each student)

C. *Key Vocabulary*

1. Germ – a microscopic living thing that is found everywhere on Earth

D. *Procedures/Activities*

1. Review with students by asking, “Why is it important to stay clean?” Have students name ways they can practice good cleanliness. Also review proper technique for hand washing.
2. Show students the book, *Body Battles*, by Rita Golden Gelman. Have the students predict what the book may be about as they read the title and look at the front cover.
3. After reading the book through one time, have the students identify the pictures on the front of the book.
4. Then have the students identify the six weapons that our body uses as a defense against germs as discussed in the book by filling in the blanks on Appendix H or page 9 in their germ book. Make an overhead of this appendix so the students can copy the words using correct spelling. Encourage the students to fill in the blanks whenever possible. The answers are located on Appendix I.
5. Explain to students that bacteria and viruses can multiply very quickly and they will be able to see this in the following activity. Pass out a piece of green construction paper and a bowl to each student. Also, have each student turn to page 10 in his or her germ book (Appendix J). Tell the students that the green piece of paper represents one germ and the bowl will be used for holding all of the germs as they proceed.
6. Tell the students that everything that they do to their germ, they will draw a picture of in their book.
7. In box No. 1 on Appendix J, have the students draw a picture of their single germ. Under box #1, have the students write “1” on the blank line next to germ because there is one germ in that box. You may want to demonstrate this on the overhead.

8. Then have the students tear the piece of paper in half. Ask the students how many germs they have now. (*two*) Have them draw those two germs in box #2 and write the number “2” on the line.
 9. Instruct the students to tear the two germs in half and place the germs in the bowl as soon as they are torn. This way they will not lose track of which germs they have split and which germs they have not split. Now each student should have four germs. Again, the students should draw the germs in box #3 and write “4” on the blank line.
 10. Have the students take the “germs” out of the bowl and repeat the steps again. They should end up with 8 germs for box #4, 16 germs for box #5 and 32 germs for box #6.
 11. The students will be amazed that the germs only split 6 times and there are already 36 germs. Boxes #7 and #8 are available if the students would like to continue. Have the students make predictions before they “split” the germs as to how many germs there will be in the next box.
 12. Now have the students do the same thing with the white piece of construction paper. These pieces of paper represent our white blood cells. Explain to the students that our white blood cells multiply in the same way when our body is trying to fight off bacteria or viruses.
- E. *Assessment/Evaluation*
1. The students will be evaluated based on the completion of Appendix H and Appendix J.

Lesson Five: Vaccinations and Edward Jenner (approximately one hour)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
 - b. Students understand how science has developed, changed, and affected societies throughout history.
2. Lesson Content
 - a. Germs
 - b. Preventing Illnesses
 - c. Science Biography: Edward Jenner
 - d. Science Biography: Louis Pasteur
3. Skill Objective(s)
 - a. The students will identify white blood cells as the cells in our blood that combat germs.
 - b. The students will learn that Edward Jenner developed a vaccine to make people immune to smallpox.
 - c. The students will be able to define ‘vaccine.’
 - d. The students will be able to verbalize how Edward Jenner’s discovery helped people in the past and in the future.

B. *Materials*

1. Name tag stickers (one for each student) Label the stickers in the following way:
 - a. 1/3 of the stickers labeled “GERM”
 - b. 1/3 of the stickers labeled “WHITE BLOOD CELL”
 - c. 1/3 of the stickers labeled “PERSON” or simply draw a stick person
2. *I Know How We Fight Germs*, by Kate Rowan and Katharine McEwen

3. *What Your First Grader Needs to Know*, by E.D. Hirsch (the story about Edward Jenner on pages 314 – 316)
 4. Appendix K (use this Appendix to create a book for each student)
 5. Large piece of construction paper with a blank Venn Diagram drawn on it (the students will be comparing Edward Jenner and Louis Pasteur with this diagram)
- C. *Key Vocabulary*
1. Vaccination – a shot used to produce immunity against a specific disease
 2. Immunity – having protection against a specific disease
- D. *Procedures/Activities*
1. Review with the students about the ways that our bodies protect us against germs. See if they can remember the six weapons against germs:
 - a. Skin
 - b. Mucus
 - c. Cili
 - d. Earwax
 - e. Stomach acid
 - f. Immune system
 - g. White blood cells
 2. Read the book, *I Know How We Fight Germs*, by Kate Rowan and Katharine McEwen. This is a short book that reviews the importance of cleanliness and the role of white blood cells in our body.
 3. To emphasize how white blood cells fight against germs, play the following tag game.
 - a. Find a clear area where the students can run.
 - b. Split the class into thirds: 1/3 germs, 1/3 white blood cells, and 1/3 people. Use the nametags to label the students (see Materials list).
 - c. Explain to the students that the object of the game is to protect the people from the germs.
 - d. The “germs” will try to touch the people, infecting them with the disease. When the people are infected, they have to sit down and can no longer run.
 - e. The “white blood cells” can free the people by touching them. At this time, the people can stand up and run again. The white blood cells can also touch the germs to kill them.
 - f. After a “germ” has been touched by a white blood cell, that germ will need to sit out until the game is over. The game is officially over when the white blood cells have zapped all of the germs.
 4. After playing the game and returning to the classroom, explain that today they will be learning about an important person who learned how to fight against disease, Edward Jenner.
 5. Read the students the story about Edward Jenner on pages 314 – 316 of *What Your First Grader Needs to Know*. Then ask the following questions:
 - a. What did Edward Jenner realize after talking with the woman who had cowpox? (People who had cowpox never developed smallpox.)
 - b. What was his idea? (*To give people a small amount of cowpox so that they would never develop smallpox.*)
 - c. What was the disease that Edward Jenner developed a vaccine for? (*smallpox*)
 - d. What did he put in the vaccine? (*germs from the cowpox disease*)
 - e. Who did he first give the vaccine to? (*an eight year old boy*)

- f. Why was his discovery so important? How has his invention helped us today? (*Edward Jenner's invention of the vaccine helped save many lives at that time. We are still vaccinated to give us immunity against small pox. Since then, many vaccines have been developed to give us protection against a multitude of diseases.*)
 6. Repeat for the students when Edward Jenner first experimented with the smallpox vaccine (1796). If you have a timeline in your classroom, put this on the timeline now. Emphasize to the students that it is actually before Louis Pasteur first came up with his germ theory and developed his vaccine for rabies.
 7. Give students their own book about Edward Jenner and the invention of the vaccination using Appendix K. You may want to introduce some of the following words to the students before having them read the book: vaccination, disease, smallpox, immunity, cowpox, invention, measles, and polio.
 8. Read the book the first time through, out loud, encouraging the students to read along with you.
 9. Then, have the students read to each other in groups of two. If there is time, encourage the students to illustrate the pages in their book.
 10. After reading, as a whole group, have the students tell what they have learned about Edward Jenner. Write the information that the students give you on one side of the Venn Diagram. The other side will be filled in tomorrow with information about Louis Pasteur.
- E. *Assessment/Evaluation*
1. The students will be assessed through observation of their ability to answer discussion questions and help fill in the Venn Diagram.

Lesson Six: Louis Pasteur (30-45 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
 - b. Students understand how science has developed, changed, and affected societies throughout history.
2. Lesson Content
 - a. Preventing illnesses
 - b. Vaccinations
 - c. Diseases
 - d. Science biography: Louis Pasteur
 - e. Science biography: Edward Jenner
3. Skill Objective(s)
 - a. The students will define "pasteurization."
 - b. The students will understand how Louis Pasteur's discoveries have helped us today.

B. *Materials*

1. *What Your First Grader Needs to Know*, by E.D. Hirsch (pages 316-317)
2. Venn Diagram on large poster board (from previous lesson)
3. *The Value of Believing in Yourself: The Story of Louis Pasteur*, by Spencer Johnson, M.D. (optional)
4. One pint of milk for each student (also can be optional)

C. *Key Vocabulary*

1. Pasteurize – heating a liquid to kill harmful germs

2. Vaccination – an injection that makes the recipient immune to a specific disease
- D. *Procedures/Activities*
1. Review from the previous lesson the work of Edward Jenner and why his invention of the vaccine is so important to us today.
 2. Tell the students that today they will be learning more about the work of Louis Pasteur. Encourage them to tell you what they already know about Louis Pasteur. You may want to read *The Value of Believing in Yourself: The Story of Louis Pasteur* by Spencer Johnson, M.D. again to review.
 3. Read pages 316 and 317 in *What Your First Grader Needs to Know*. Ask students the following questions:
 - a. Did Louis Pasteur develop his “germ theory” before or after Edward Jenner developed the vaccine for smallpox? (*after*)
 - b. What do we call the process of heating a liquid to kill germs? (*pasteurization*)
 - c. What vaccine did he develop that saved the life of a little boy who was bitten by a dog? (*rabies vaccine*)
 4. Pass out the cartons of milk to each student. Write the word “pasteurize” on the board and challenge the students to find the word on their milk carton.
 5. Explain to the students that because Louis Pasteur developed the process of pasteurization, we can drink milk without worrying about harmful germs.
 6. Tell the students that Louis Pasteur also developed other vaccines during his lifetime.
 7. Have the students fill in the opposite side of the Venn Diagram with information about Louis Pasteur. The teacher will write as the students give the information.
 8. Then have the students think about how the two scientists were the same. Write their similarities in the space where the two circles combine. Also have students draw conclusion about their personalities. For example, they both wanted to help others, they were obviously hard working, they did not give up, etc.
- E. *Assessment/Evaluation*
1. The students will be evaluated based on the answers given while completing the Venn Diagram.

VI. CULMINATING ACTIVITY

- A. Invite a doctor or nurse to talk with the class about the importance of cleanliness and vaccinations. The doctor could even bring a flu vaccine to give to the teacher, if willing. You could also have a veterinarian come in to show how vaccines are also given to animals.

VII. HANDOUTS/WORKSHEETS

- A. Appendix A – What are Germs?
- B. Appendix B – Bacteria
- C. Appendix C – Healthy Me Song
- D. Appendix D – Hand Washing
- E. Appendix E – Wash Those Germs Down the Drain
- F. Appendix F – Bacteria (two pages)
- G. Appendix G – Sparkle, Sparkle, Pearly Whites Song
- H. Appendix H – Weapons Against Germs
- I. Appendix I – Weapons Against Germs Answer Key
- J. Appendix J – Germs Multiply
- K. Appendix K – Edward Jenner Book

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Appendix A – Germs and Preventing Illnesses

WHAT ARE GERMS?

Germs are _____ . You cannot see them with your eyes. You need to look through a _____ to see them, so we say they are _____ .

Some germs make you sick, some do not. Where can you find germs?

1. _____
2. _____
3. _____
4. _____

GERMS ARE EVERYWHERE!!

The two germs that usually make you sick are:

1. _____ & 2. _____

_____ was the first person to discover germs. He made a medicine that could cure people of _____ called a _____ .

Appendix B – Germs and Preventing Illnesses

BACTERIA

1. WHAT DID I DO? _____

2. WHAT DID I SEE? _____

3. THE BACTERIA ON THE SLIDE LOOKED LIKE THIS:



Appendix C – Germs and Preventing Illnesses

Healthy Me

In order to stay healthy, there are things I need to do.

I keep myself clean and I brush my chompers too.

I eat good food and exercise each day

So I'll grow big and strong and have energy to play.

(Sung to "The Itsy Bitsy Spider")

Hand Washing

1. Adjust the temperature of the water so it is warm.
2. Put your hands under the warm water so that they are completely wet.
3. After your hands are wet, put soap on them. Scrub all parts of your hands. Scrub your palms, the backs of your hands, between your fingers, your thumbs, your wrists, and under your fingernails.
4. While you are scrubbing, sing the "Healthy Me" song through two times.
5. Rinse your hands under the warm water until you cannot feel any more soap.
6. Grab a paper towel and dry your hands thoroughly. Turn off the water with the paper towel, not with your bare hands.

Appendix E – Germs and Preventing Illnesses

WASH THOSE GERMS DOWN THE DRAIN

The following sentences are the steps of hand washing. However, they are not in the correct order. Read the sentences and put them in the correct order at the bottom of the page.

1. Dry your hands.
2. Turn off the water.
3. Wash all parts of your hands.
4. Turn the water on to a warm temperature.
5. Get your hands wet.
6. Put soap on your hands.
7. Rinse your hands until you cannot feel the soap.

I will wash my hands in this order:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

BACTERIA

What will we do?

What do you think will happen?

This is what my slide looked like before I brushed my teeth.

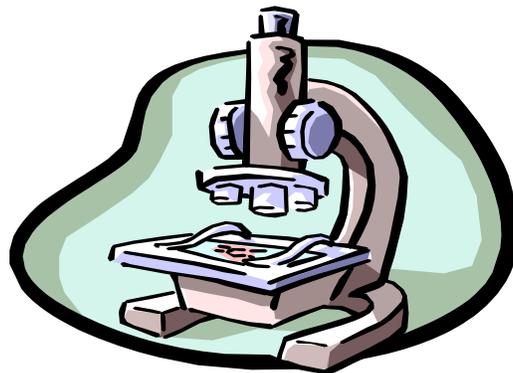
Appendix F, page 2 – Germs and Preventing Illnesses

This is what my slide looked like after I brushed my teeth.



Were my two slides different? _____

How were they different? _____



pg. 7

Appendix G – Germs and Preventing Illnesses

Sparkle, Sparkle, Pearly Whites

Sparkle, sparkle, pearly whites,
Make my smile shine big and bright.
Brush my chompers every day,
Floss to keep the plaque away,
Sparkle, sparkle, pearly whites,
Make my smile shine big and bright.

(Sung to "Twinkle, Twinkle, Little Star")

Appendix H – Germs and Preventing Illnesses

Weapons Against Germs

Weapon #1: _____
Our skin protects our entire body.

Weapon #2: _____
The breathing tube from your nose to your lungs is wet and slimy. This slimy stuff is called _____ . It can _____ bacteria and viruses.

Weapon #3: _____
Cilia are microscopic _____ that grow in your breathing tube. They push through the mucus and also trap germs.

Weapon #4: _____
Earwax is a yellow “mush” that collects in your _____. It can trap dirt, insects and germs that can hurt your hearing.

Weapon #5: _____
The acid that your _____ makes is very powerful. It can destroy a lot of the bacteria and viruses that enter your stomach.

Weapon #6: _____
When harmful germs do enter your body, your _____ go to work. The white blood cells attack & kill the bacteria and viruses that get past your stomach and into your blood.

Appendix I – Germs and Preventing Illnesses

Weapons Against Germs

Weapon #1: skin
Our skin protects our entire body.

Weapon #2: mucus
The breathing tube from your nose to your lungs is wet and slimy. This slimy stuff is called mucus. It can trap bacteria and viruses.

Weapon #3: cilia
Cilia are microscopic hairs that grow in your breathing tube. They push through the mucus and also trap germs.

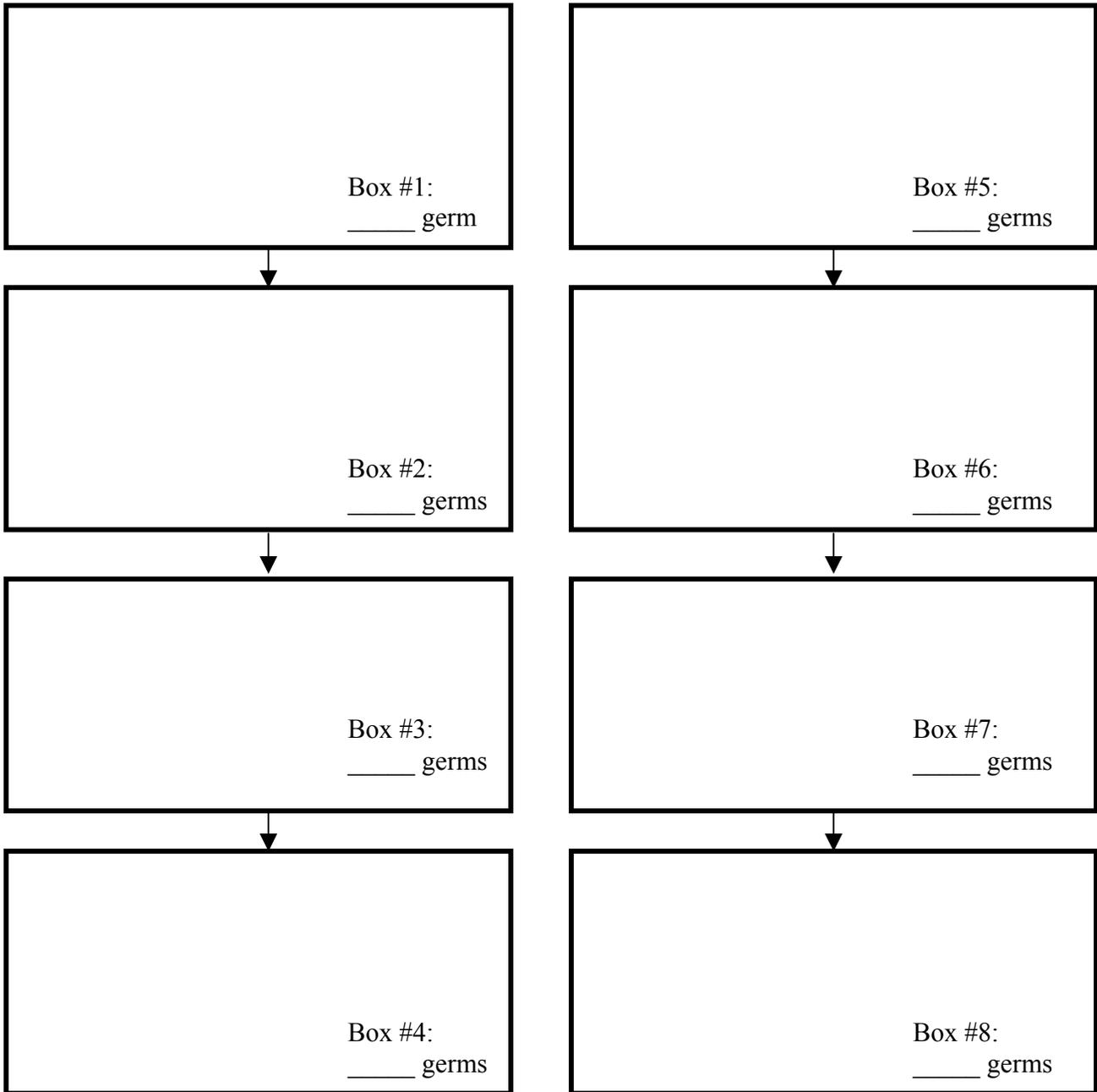
Weapon #4: earwax
Earwax is a yellow “mush” that collects in your ears. It can trap dirt, insects and germs that can hurt your hearing.

Weapon #5: stomach acid
The acid that your stomach makes is very powerful. It can destroy a lot of the bacteria and viruses that enter your stomach.

Weapon #6: immune system
When harmful germs do enter your body, your white blood cells go to work. The white blood cells attack & kill the bacteria and viruses that get past your stomach and into your blood.

Appendix J – Germs and Preventing Illnesses

GERMS MULTIPLY



Appendix K – Germs and Preventing Illnesses

Rewrite or type the following sentences on separate pieces of paper to create a book for your students. The students can then read and illustrate their book.

Title: Edward Jenner & Vaccinations

Pg. 1: Do you remember getting a shot when you went to the doctor? You may not have liked it, but that shot will keep you from getting sick. A shot that keeps you from getting sick is called a vaccination.

Pg. 2: When you get a vaccination, the doctor or nurse is usually putting a tiny bit of the disease germs in you. The vaccination does not make you sick because your white blood cells kill the germs easily.

Pg. 3: The great thing about getting a vaccination is that it gives you immunity. Immunity means that you will never get that disease. You are immune.

Pg. 4: We didn't always have vaccinations and it was hard for people to protect themselves from many diseases. Many people died from diseases.

Pg. 5: Over 200 years ago, many people were dying from a disease called smallpox. People who caught smallpox would get sores on their bodies. Some people even went blind.

Pg. 6: One day a doctor named Edward Jenner met a woman who had cowpox. She helped him realize that people who got cowpox never caught smallpox. This gave him an idea.

Pg. 7: Edward Jenner developed a shot that gave people a tiny bit of the cowpox disease. He first tried it on an eight year old little boy. It worked! The little boy got a little sick from the cowpox, but he never got smallpox.

Pg. 8: Edward Jenner called his shot a vaccination. Because of his invention, many lives were saved. Now we have vaccinations for many other diseases, such as measles, polio, and even the chicken pox. Thank you, Edward Jenner!