

Science of Microbes

Activity 10
Infectious Disease
Case Study

PowerPoint Slides and
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Science of Microbes

Infectious Disease Case Study is the tenth lesson in the unit, *The Science of Microbes*. It addresses National Science Education Content Standards related to Inquiry and Life Science. See the downloadable lesson PDF (web address below) for a complete list of the standards addressed.

In this activity, students will determine whether a patient has a cold, the flu or a strep infection. Students also will learn the differences between bacterial and viral infections.

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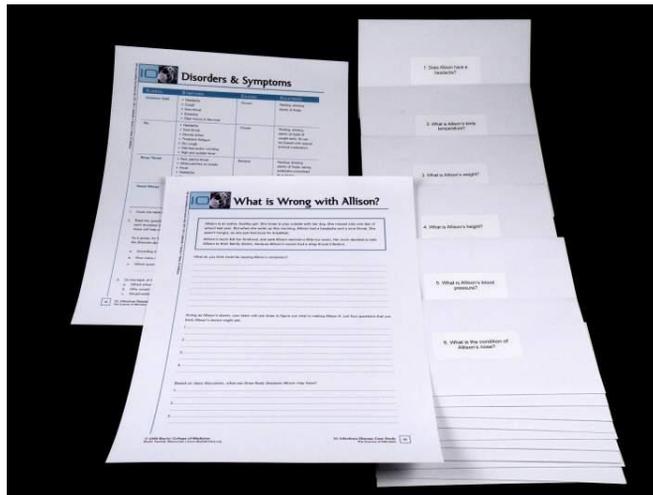
Reference:

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Materials for Each Group of Students



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Materials

The following materials will be required to conduct this activity.

- 90 letter-sized envelopes
- 6 sheets of white, self-stick folder labels (3-7/16 in. x 2/3 in.), with 30 labels per sheet (Avery #5366, 5378, or 8366)

Photocopy the label template sheet (see PDF activity listed with this presentation) onto the six sheets of self-stick folder labels. Use one page of photocopied labels to create each set of envelopes. Place Question label #1 on the outside of an envelope and stick the corresponding Clue label on the inside flap of the same envelope. Close the flap, but do not seal the envelope. Repeat until you have a set of 15 envelopes. Make six sets (one for each group of four students). Make an overhead transparency of the Disorders & Symptoms sheet.

Each student or group will need the following materials.

- One set of prepared envelopes (15 envelopes per set)
- Copy of *What is Wrong with Allison?* and *Disorders & Symptoms* student sheets
- Group concept map (ongoing)

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Image Reference:

Denk, J. (2009). Materials for activity 10. Baylor College of Medicine. Houston, Tx.

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Safety Considerations

- Follow all instructions.
- Begin investigation only when instructed.
- Have a clear understanding of the investigation in advance.
- Wash hands thoroughly after the investigation.



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Safety Considerations

It is important that students always think about safety when conducting a science investigation. This slide may be used to review safety with your class before starting the activity. Also, keep the following points in mind.

- Always follow district and school safety guidelines.
- Have a clear understanding of the investigation in advance (practice any investigation with which you are not familiar).
- Continually monitor the area where the investigation is being conducted.

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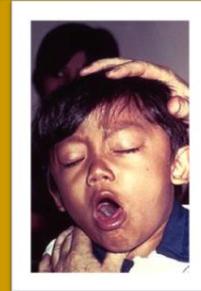
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What Do You Know About Being Sick?

- How do you know when you are sick?
- What are some common diseases?
- Are all diseases alike?
- Are all diseases caused by a kind of microbe?
- Do some different diseases have similar symptoms?



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What Do You Know About Being Sick?

Open a conversation with your students by asking them to respond to and discuss the following questions. *How do you know when you are sick? What are some common diseases? Are all diseases alike? Are all diseases caused by a kind of microbe? Do some different diseases have similar symptoms?* You may want to list students' responses on the board.

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Image References:

Gathany, J. (2009). How germs spread, #11162. Centers for Disease Control and Prevention. Retrieved 11-15-2009, from <http://phil.cdc.gov/phil/>.
Boy with diphtheria #6378. (1995). Centers for Disease Control and Prevention. Retrieved 11-15-2009, from <http://phil.cdc.gov/phil/>.

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The Case of Allison

- Have each group read and discuss *What is Wrong with Allison?*
- Each group should ask four questions a physician might Allison.
- Next, each group should ask three possible diseases that Allison might have, based on what the students currently know.



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The Case of Allison

Inform your students that they will be acting as medical personnel trying to diagnose a patient. Have one student in each group read the case, *What is Wrong with Allison?* to the rest of the group.

Allow students time to discuss Allison's illness. One person from each group, designated as the "recorder," should write down the group's ideas about what may be wrong with Allison. Have each group compose four questions they might ask Allison if they were her physician. Lead a class discussion of the questions from each group.

Each group also should identify and record three possible diseases that Allison may have, based on all of the information presented so far.

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Medical personnel. National Institutes of Health. Retrieved 11-15-2009, from <http://www.cc.nih.gov/participate/patientinfo/welcomepts.shtml>.

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Disorders and Symptoms

- Individually study the Disorders and Symptoms sheet.
- Are there any similarities between the illness described and the possible diseases you suggested earlier?
- Read and complete the What is Wrong with Allison? worksheet.
- Decide which envelopes contain certain information that will be helpful to reach a diagnosis for Allison.
- Open the questions/clues one at a time, until the group reaches a diagnosis for Allison. Use as few envelopes as possible.
- Answer the questions on the Disorders & Symptoms worksheet.



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Disorders and Symptoms

Distribute the Disorders and Symptoms sheet to each student. Introduce each disease and have students compare these illnesses with the ones they suggested earlier. Tell students that Allison has one of the four diseases listed on the sheet.

Following the class discussion, give each group of students a set of envelopes with questions or clues. Instruct groups to decide which envelopes contain the most useful information and select the fewest number of envelopes possible to diagnose Allison's illness. They should open the envelopes one at a time, until they have enough information to make a diagnosis. Each group should record its diagnosis, the number of envelopes required, and the individual question numbers (1-15) they used in the diagnosis on the appropriate lines of the Disorders & Symptoms sheet.

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Let's Talk About It

- What was your group's diagnosis for Allison?
- What symptoms led you to this diagnosis?
- Were any questions/clues not very useful in making your diagnosis? If so, what are some examples?
- Which questions/clues were most critical for identifying Allison's disease?



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Let's Talk About It

List each group's diagnosis for Allison on the board. (From the symptoms presented in this activity, the diagnosis for Allison is the common cold.) If there is not consensus among groups regarding Allison's illness, have each group discuss the key symptoms that led to its choice. Among groups that diagnosed Allison's disease correctly, determine which one used the fewest questions/clues.

Lead a class discussion to make sure students know that certain medical information, although correct, was not very useful in diagnosing this particular disease (e.g., Allison's weight, height and blood pressure). On the other hand, some of the information was essential for differentiating between disease states (e.g., body temperature, appearance and/or presence of disease-causing bacteria in the throat, body aches, type of cough, medications used, and condition of Allison's nose).

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Sick teddy bear. 123rf

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Let's Talk About It

- Why was it important to know if Allison had taken any medications?
- Would antibiotics help to cure Allison's cold? Why or why not?



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Let's Talk About It

Be sure the class understands why it was important to know if Allison had taken any medications. (The use of medications before an examination could mask symptoms and interfere with the correct diagnosis.)

The common cold is caused by a virus. Since antibiotics do not kill viruses, they would not cure Allison's cold. However, viral infections may increase an individual's susceptibility to secondary bacterial infections by compromising the immune system. Knowing that microbes are growing increasingly resistant to antibiotics, should a patient with a viral infection receive antibiotics as part of his/her treatment? As a class, discuss this controversy.

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Image Reference:

Different kinds of medications, #891041. 123rf

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Extensions

- After viewing the video clips below, define antibiotic resistance and describe what medical personnel and researchers are doing to help prevent it.
 - YouTube, *The Wonderful World of Antibiotic Resistance*
 - United Streaming, *Antibiotic Resistance* (4:47)
 - United Streaming, *The Global Implications of Antibiotic Resistance* (3:30)
- What can individuals do to help prevent antibiotic resistance?



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Extension

Have the class view the YouTube video, *The Wonderful World of Antibiotic Resistance* (<http://www.youtube.com/watch?v=e03YH7cE46A>), to educate students about the increasing problem of bacterial resistance.

If your district has access to Discovery Education Streaming videos, visit the Internet link below. Log in to access the video, *Understanding Bacteria*, and scroll down the right-hand column to view the following video clips, about antibiotic resistance and their global implications.

Antibiotic Resistance (4:47)

The Global Implications of Antibiotic Resistance (3:30)

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