Name _____ Date _____

Science and Social Studies

Use with Lesson 1.

Antibiotics: A Wonder Weapon...For A While

Making the Connection: When antibiotics were first discovered and developed, they were widely considered a wonder drug in the human war against disease. Why is there a problem with antibiotics now?

Until the 1940s bacterial infections such as pneumonia, meningitis, or simple ear infections could kill people. Children often died well before they reached your age. Illnesses that were easily spread (like tuberculosis—by coughing) turned into epidemics that took thousands of lives. In fact, illness killed many more people than violence or disasters.

It was Louis Pasteur who first discovered that one type of microorganism could destroy another, and by the time his discovery was put into wide use as penicillin, it seemed nothing short of miraculous. For the first time in human history, doctors had high hopes for curing patients who, before penicillin, would have died. It wasn't long before many doctors believed we'd found the ultimate weapon in the war against disease.

But the high hopes raised by penicillin underestimated the enemy. Bacterial microorganisms are programmed by nature to survive. Up against the threat of antibiotics, it was only a matter of time before some microorganisms mutated to fight back. Some bacteria changed form and shared genes, becoming "superstrains" of diseases, strains resistant to antibiotics.

By the 1960s many different strains of bacteria resistant to antibiotics had been discovered. Rather than accept defeat against bacterial disease, drug companies came up with formulas for new antibiotics. However, the cycle of war between humans and microorganism continues to escalate. With each new antibiotic, scientists now believe some microorganism will eventually mutate to outsmart it.

Overusing antibiotics is like revealing the biological war plan to the enemy. It gives the microorganisms a running start in their next mutation. Unfortunately, we seem to have taken antibiotics, the wonder weapon, for granted, and in doing so we have weakened their power to save us from sickness. Now some public-interest groups and doctors are trying to convince people to use antibiotics more carefully.

* Read the following [redacted] science Articles that are about our current unit of study, genetics and heredity. Then answer the following questions.

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Make inferences and predictions about the use of antibiotics by answering the questions.

1. Would we be better off if we had never used antibiotics?

2. Who is winning the war on bacterial disease, Humans or Microorganisms?

3. What causes antibiotic resistance?

4. What will happen if we keep overusing antibiotics? If we stop overusing them?

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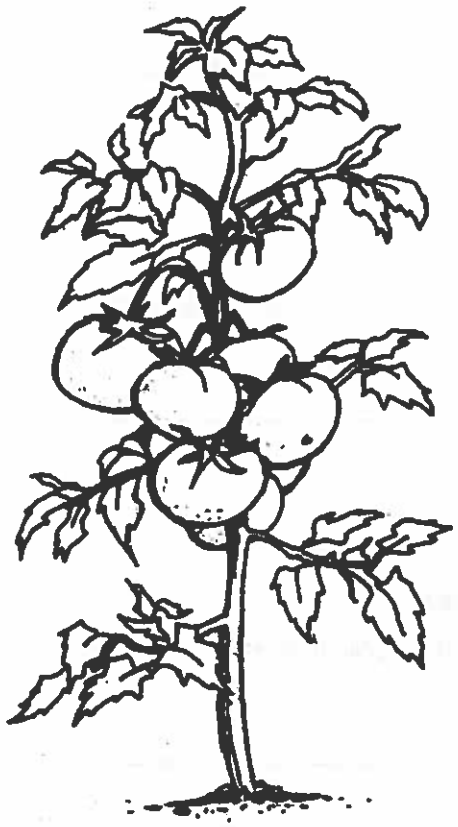
Science/ Technology/Society

Use with Lesson 3.

What Do You See?

Making the Connection: Bioengineering combines scientific techniques with many aspects of life and so influences major life-events in society.



What do you get when you cross an Antarctic fish with a raspberry? Hmmm. Fishberries? Berry cold fish? Fruity fish sticks?

Actually, it's not as silly as it sounds. Scientists are working on a way to protect soft berries such as raspberries and strawberries from frost damage. The fish have a gene that lets them thrive in icy waters. By transferring that gene to berry plants, they hope to develop a "natural antifreeze" in the plants.

Genetic engineering is also creating plants that are more resistant to disease, insects, and herbicides. Genes are being added to make plants that are stronger and healthier and foods that are tastier and more nutritious.

The Flavr-Savr tomato is a good example. Ideally, tomatoes should ripen on the vine. But if farmers wait to pick them as they ripen, they can spoil on their way to market. They have to be picked early. Of course, the problem with that is that tomatoes picked early have little or no flavor. Enter science. Bioengineers have added a gene to tomatoes that slows the ripening process. The tomatoes stay firm much longer after they're picked, so they can be left to ripen naturally on the vine.

Is this a taste of good things to come?

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Answer the following questions.

1. Why is bioengineering in agriculture important?

2. List three ways people and other animals can benefit from bio-engineered plants.

3. Could there be problems or dangers with bioengineering? If so, what might they be?

You Are the Scientist (and the ad campaign manager)

Think about your favorite fruit or vegetable. What is it that you like about it? What does it look and feel like? Where and when does it grow?

Now think of a way to improve on your favorite or combine two favorites to make a new food. Use the space below to jot down notes and sketch out a description of your "invention." What will you name it? Who, besides you, will enjoy or benefit most from your new plant? How or why?

Finally, use your ideas and your notes to create an ad for your new product on a separate piece of paper. Make sure you include a drawing of the product. Then see if your ideas fit together with another student's and make up an advertisement for a combination product.