



SC.5.N.1.1 Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

ESSENTIAL QUESTION

How Does Technology Improve Our Lives?



Engage Your Brain

Find the answer to the following question in this lesson and record it here.

It looks like a map of a city with streets and buildings of all sizes. But all those bumps and lines are actually the “brain” of a computer! How has the invention of technology such as computers changed the way people communicate?



ACTIVE READING

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

Cause and Effect

Some ideas in this lesson are connected by a cause-and-effect relationship. Why something happens is a cause. What happens as a result of something is an effect. Active readers look for effects by asking themselves, What happened? They look for causes by asking, Why did it happen?

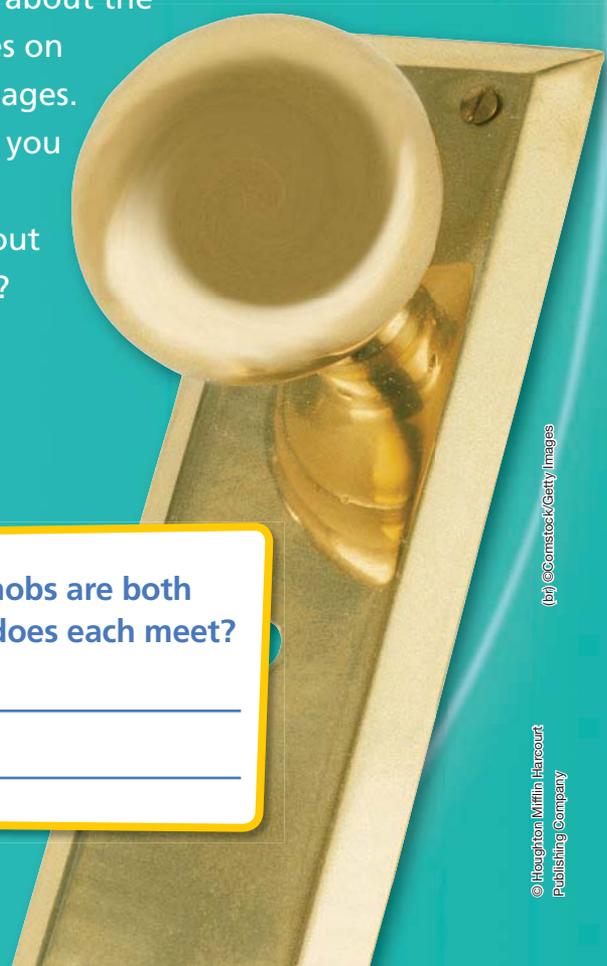
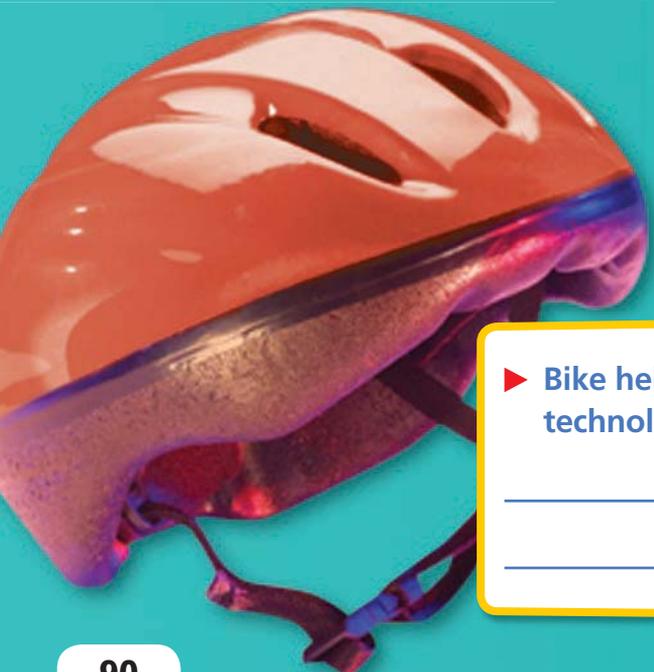
The Technology Zone

Pick up your pencil, and look at it carefully. You are holding technology in your hand.

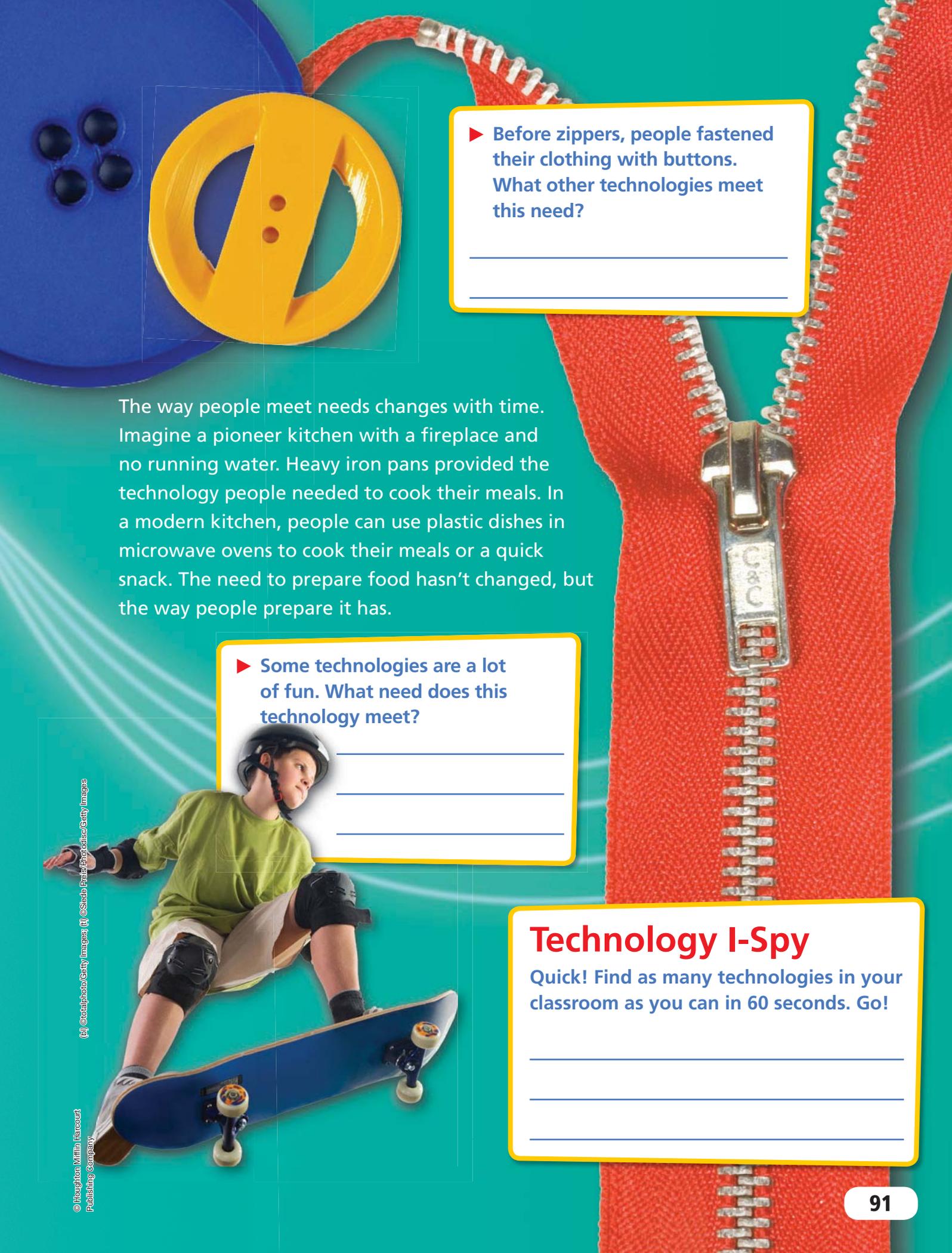
ACTIVE READING As you read these two pages, draw boxes around the names of two things that are being compared.

Most of the things you use every day are *technology*. Pencils, bikes, light bulbs, even the clothes you wear are technology. Cooking food uses technology. What makes something technology is not how modern it is. Technology doesn't need to be complex or require electricity to operate.

What technology must do is meet a human need. A pencil lets you write your thoughts or work math problems. Think about what needs are being met as you read about the technologies on these two pages. How would you meet those needs without these items?



► Bike helmets and doorknobs are both technology. What need does each meet?



► Before zippers, people fastened their clothing with buttons. What other technologies meet this need?

The way people meet needs changes with time. Imagine a pioneer kitchen with a fireplace and no running water. Heavy iron pans provided the technology people needed to cook their meals. In a modern kitchen, people can use plastic dishes in microwave ovens to cook their meals or a quick snack. The need to prepare food hasn't changed, but the way people prepare it has.

► Some technologies are a lot of fun. What need does this technology meet?

Technology I-Spy

Quick! Find as many technologies in your classroom as you can in 60 seconds. Go!



(t) ©gettyimages/Getty Images (l) ©Shade Pratz/Photisc/Getty Images

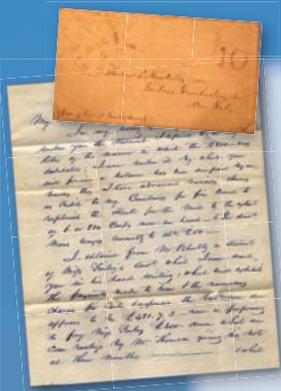
Meeting People's Needs

It's 1860. You want to contact a distant friend. Today, you might send a text message. What about then?

ACTIVE READING As you read these two pages, draw one line under a cause. Draw two lines under its effect.

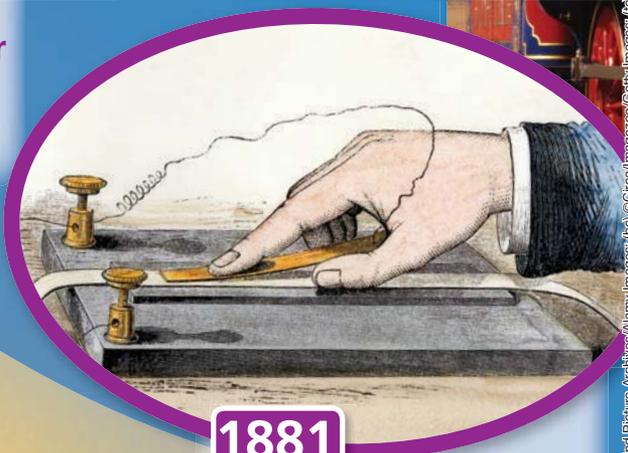
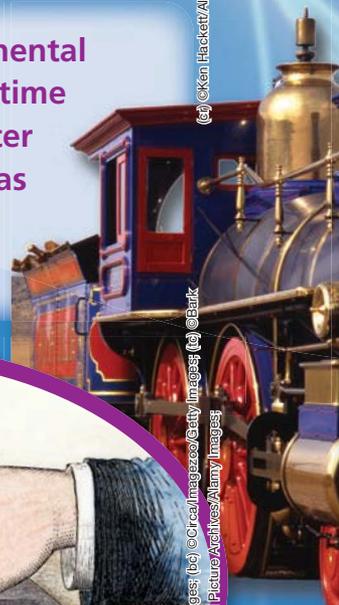
1858

In the early 1800s, long-distance mail was carried by horseback riders, steamboats, and stagecoaches. A stage coach took 25 days to carry a letter 3,000 km (1,700 mi) from St. Louis to San Francisco.



1869

When the transcontinental railroad opened, the time it took to move a letter across the country was cut down to a week or less.



1881

The time it took to send a message across the country was reduced to minutes with the invention of the telegraph.

In the early 1800s, communicating with someone far away might take weeks or months. Sometimes such communications were not possible at all. As people began to move westward across the growing United States, the need for reliable communication increased. The timeline on these pages shows ways technology changed in response to this need.

The time it took to communicate with someone across the country decreased as new technologies developed. What once took weeks, then days, then minutes now happens almost instantly! Today, people text back and forth almost as fast as they can talk in person. E-mails can be sent to many people at one time. New technologies for communicating seem to develop faster and faster. What could be next?



1915

Cross-country telephone service began in the United States.

1993

The first smart phone was developed.



DO THE MATH

Solve a Problem

Suppose you can send 2 text messages per minute. How many text messages could you send in the time it took to deliver a letter by stagecoach from St. Louis to San Francisco in 1858?

Technology Risks and Benefits

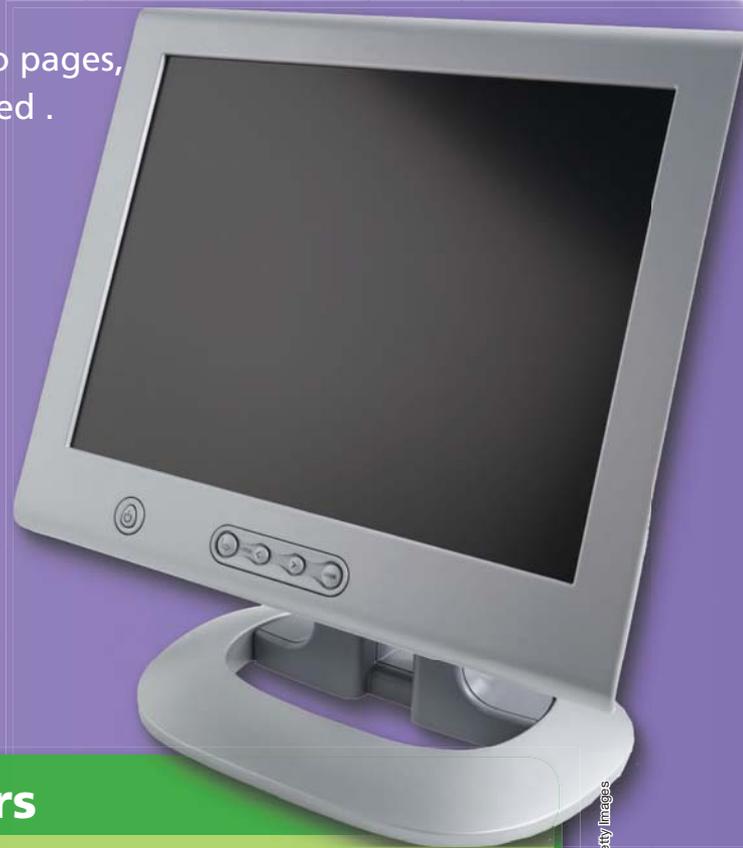
A cell phone lets you communicate from almost anywhere. What happens when the phone dies or a newer, better model comes out?

ACTIVE READING As you read these two pages, **underline** the things that are being contrasted.

Technology can have both positive and negative effects. Positive effects are called *benefits*. Benefits are the ways that a technology fills a need. For example, a cell phone lets friends and family communicate with you wherever you are. It might let you surf the Internet or download useful applications, too.

Negative effects are called *risks*. Cell phone technology changes fast, and some people switch to new models after just a few months. More resources are used up, and the old phones sometimes end up in a landfill. This risk is environmental.

No matter what the technology, there are both risks and benefits. Think about how each technology described here impacts your life. Are the benefits worth the risks?



Computers

BENEFITS

Computers let you communicate with friends and family. They let you surf the Internet for information that can help with homework, and they let you play games.

RISKS

Computer technology changes quickly, and many computers end up in landfills. Computers are expensive, and using the Internet can expose you to sites that are unsafe.

Automobiles

BENEFITS

Cars allow personal freedom by letting you go almost anywhere. They carry heavy items that you could not move on your own.

RISKS

Cars use gasoline that is made from a limited resource—oil. They cause air pollution, and they can be dangerous if not driven properly.



Audio Players

BENEFITS

Audio Players let you download and listen to your favorite music without disturbing others.

RISKS

Turning up the volume can damage your hearing. You may not be able to download some songs.



Risks Versus Benefits

Frozen foods and canned foods come prepackaged. Write down some benefits and risks of using prepackaged foods.

BENEFITS

RISKS



Living Technology

The many branches of science are often connected. Engineered devices are sometimes used on living things. This connects engineering and biology.



This plant cleans waste water to make it safe to return to the environment.

Engineers who work with living things are called bioengineers. When bioengineers apply the engineering design process to living things, they are practicing **bioengineering**.



A bioengineer may design a fish farm to raise large numbers of fish for food or other uses.

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An important part of bioengineering has to do with the environment. Bioengineers design tools to prevent or clean up pollution, for example. Any product used to benefit organisms or their environment is an example of **biotechnology**.

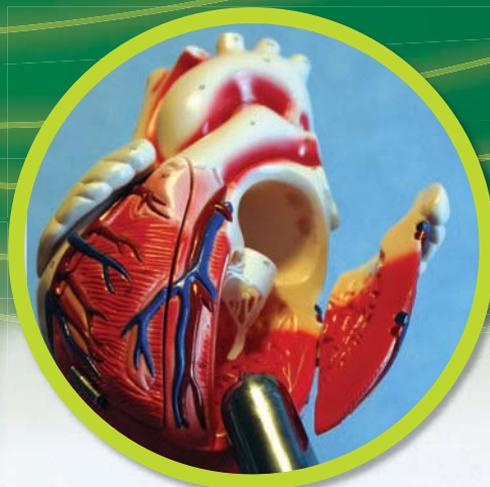
Bioengineering also deals with health and nutrition. For instance, plants can be engineered to grow faster or larger to feed more people. Food for livestock may be engineered to make the animals healthier.

Bioengineers also design biotechnology that helps detect or treat diseases. For example, scanners in hospitals can look inside the body. They let doctors see a diseased or damaged organ. Other devices help surgeons perform operations.

Some bioengineers design devices that replace human body parts. Artificial legs help people who have lost their own. Artificial skin helps people with burns. Bioengineers have even developed artificial hearts.



Surgeons today can use computer-assisted machines in delicate operations.



This artificial heart may not look like a real human heart, but it does the same job.

Bioengineering and Human Needs

Identify the human need met by each of these biotechnologies.

Biotechnology	Need
Water treatment plant	
Fish farm	
Robotic surgery	
Artificial heart	