

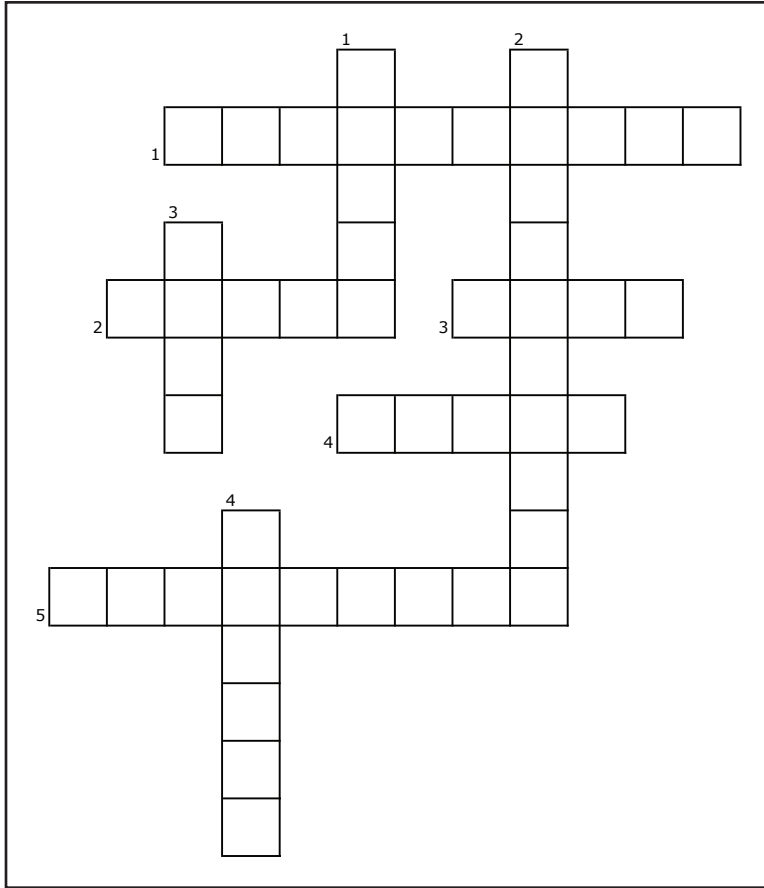
Exploring the Life Sciences



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Life-Science Crossword Puzzle

Fill in the missing words in the sentences below. Write the answer in the spaces that match the numbers (across and down).



Across

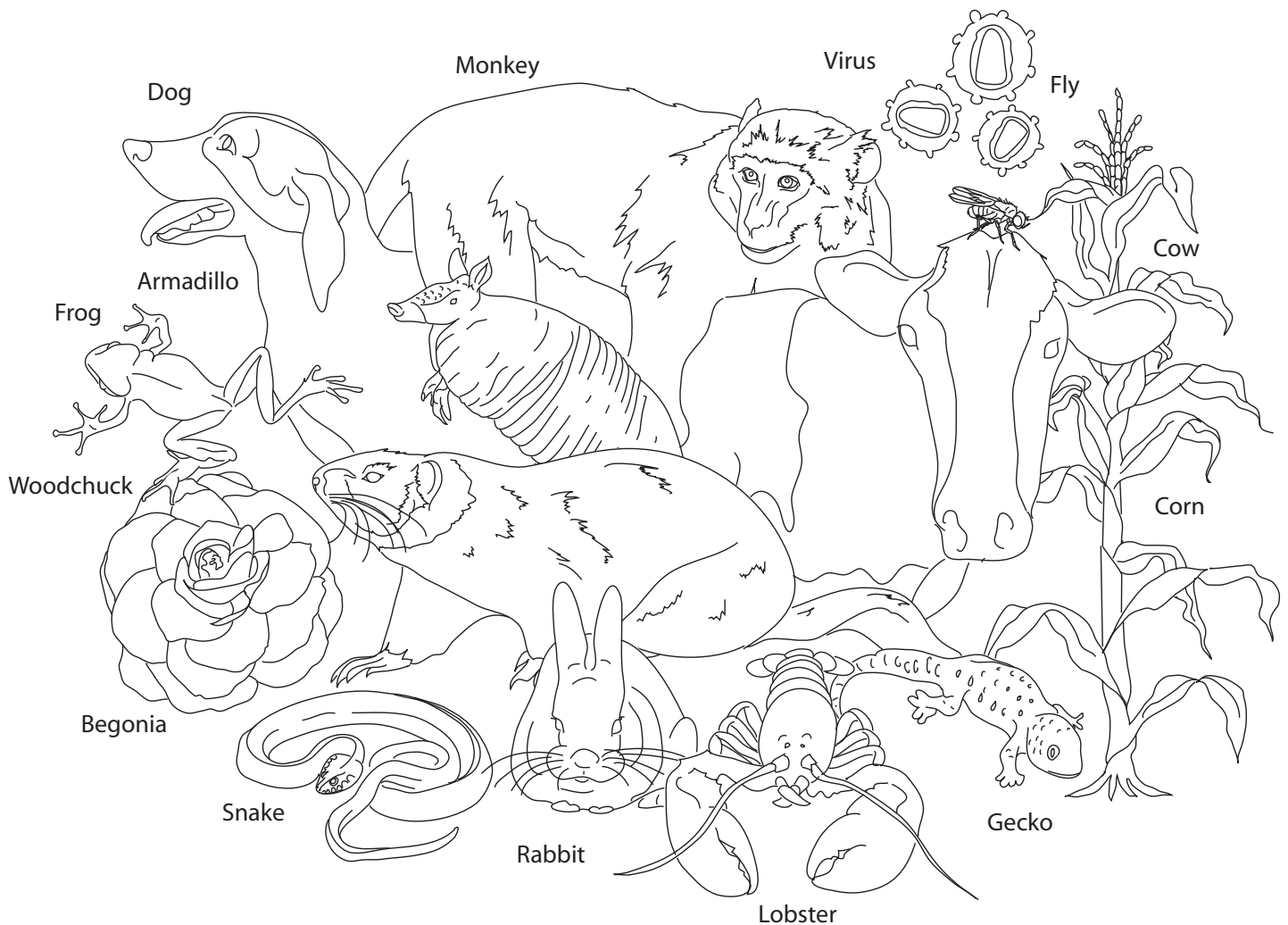
1. People who study biology, animals, plants, and the human body are called life _____.
2. Infectious diseases are caused by bacteria or by a _____.
3. Humans need _____ and water in order to survive.
4. There are five senses: Sight, Hearing, Smell, _____, and Taste.
5. The course of developmental changes through which an organism passes is called a _____.

Down

1. Trillions of _____ make up the human body.
2. Scientists look through a _____ to see very small things.
3. Scientists doing medical research use _____ in some research projects because their bodies are very similar to humans.
4. Scientists discover new things by using a process that involves the recognition of a problem, the collection of data through observation and experiment, and the testing of hypotheses. This is called the Scientific _____.

What is Life Science?

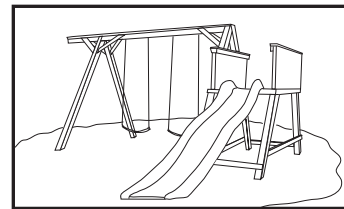
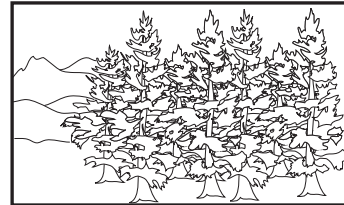
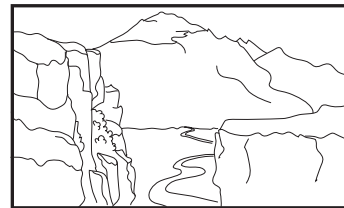
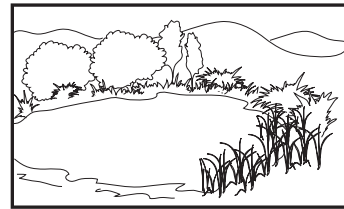
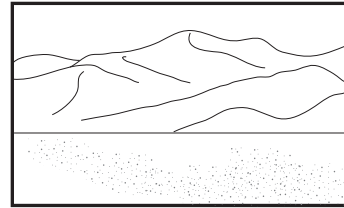
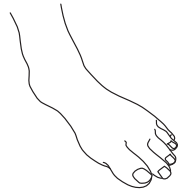
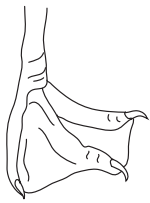
Life Science is the science of living things, like animals or plants, or even people. Life scientists study how living things are made, how they grow, how they behave, and how they act with other living things or their environment.



Different types of plants and animals inhabit the earth and they meet their needs in different ways

Living things share many of the same parts or characteristics, like eyes, noses, and ears, or leaves, roots, and seeds. Because living things do not all live in the same place or environment, they also have important differences to help them meet their needs in the places where they live.

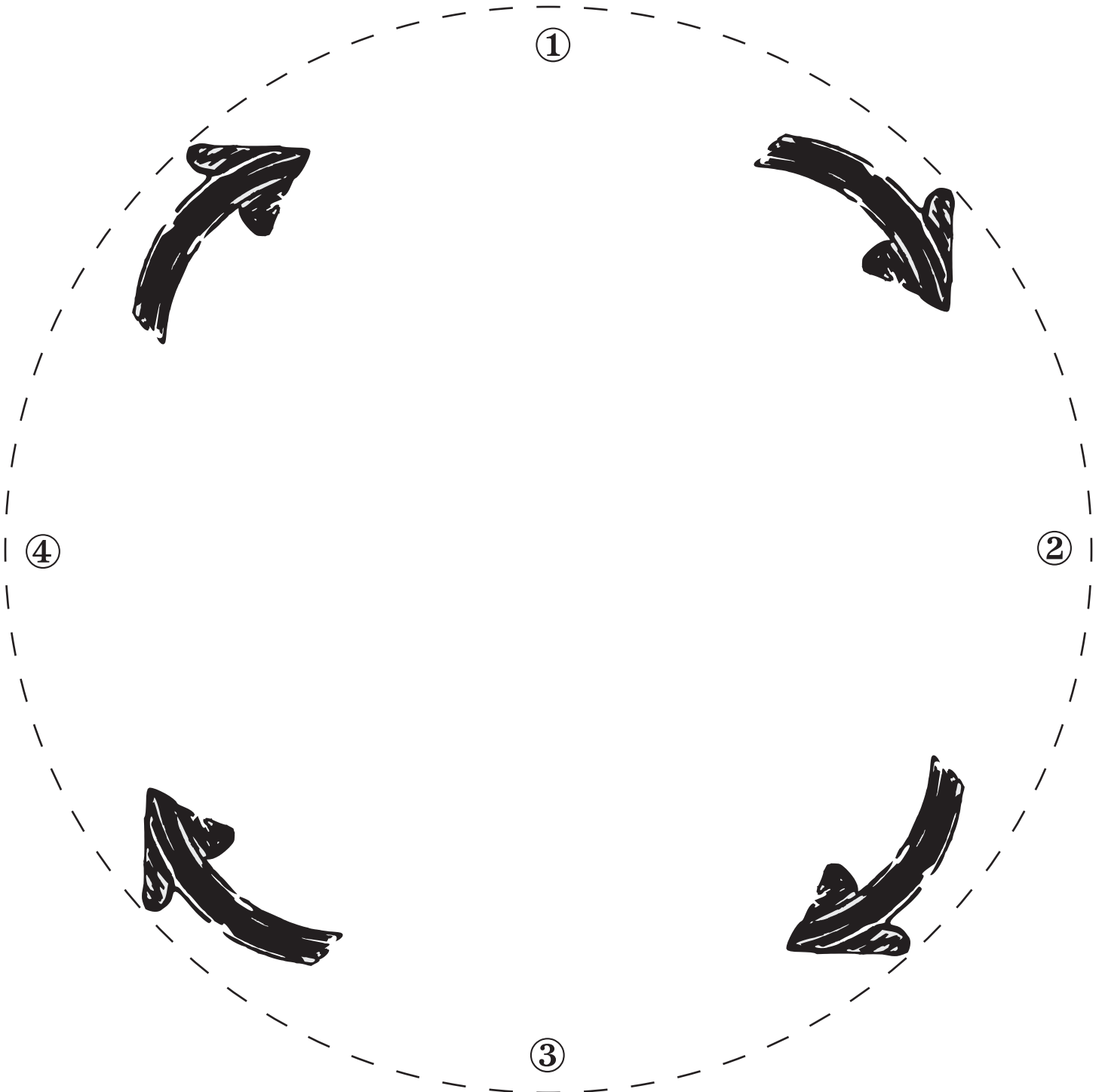
Feet are a really good example of this. Some feet work better than others on a particular kind of ground or surface. Can you connect the different feet below to the correct environment?



Plants and animals have predictable life cycles

Pick an animal like a frog, a butterfly, or a human. Now draw in each stage of its life cycle in the spaces below. Can you draw the life cycle of a tree too?

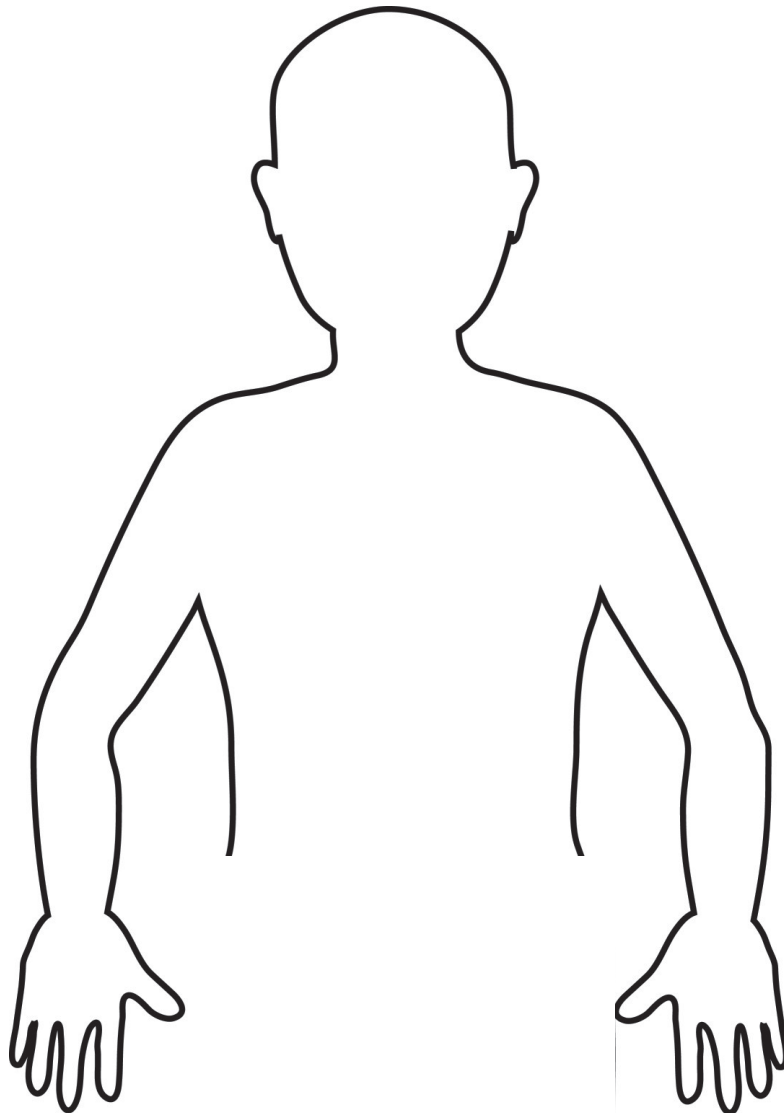
Why is it important for scientists to understand the life cycles of animals and plants?



Plants and animals reproduce offspring of their own kind

You look the way you do because of the genes you got (inherited) from your parents.

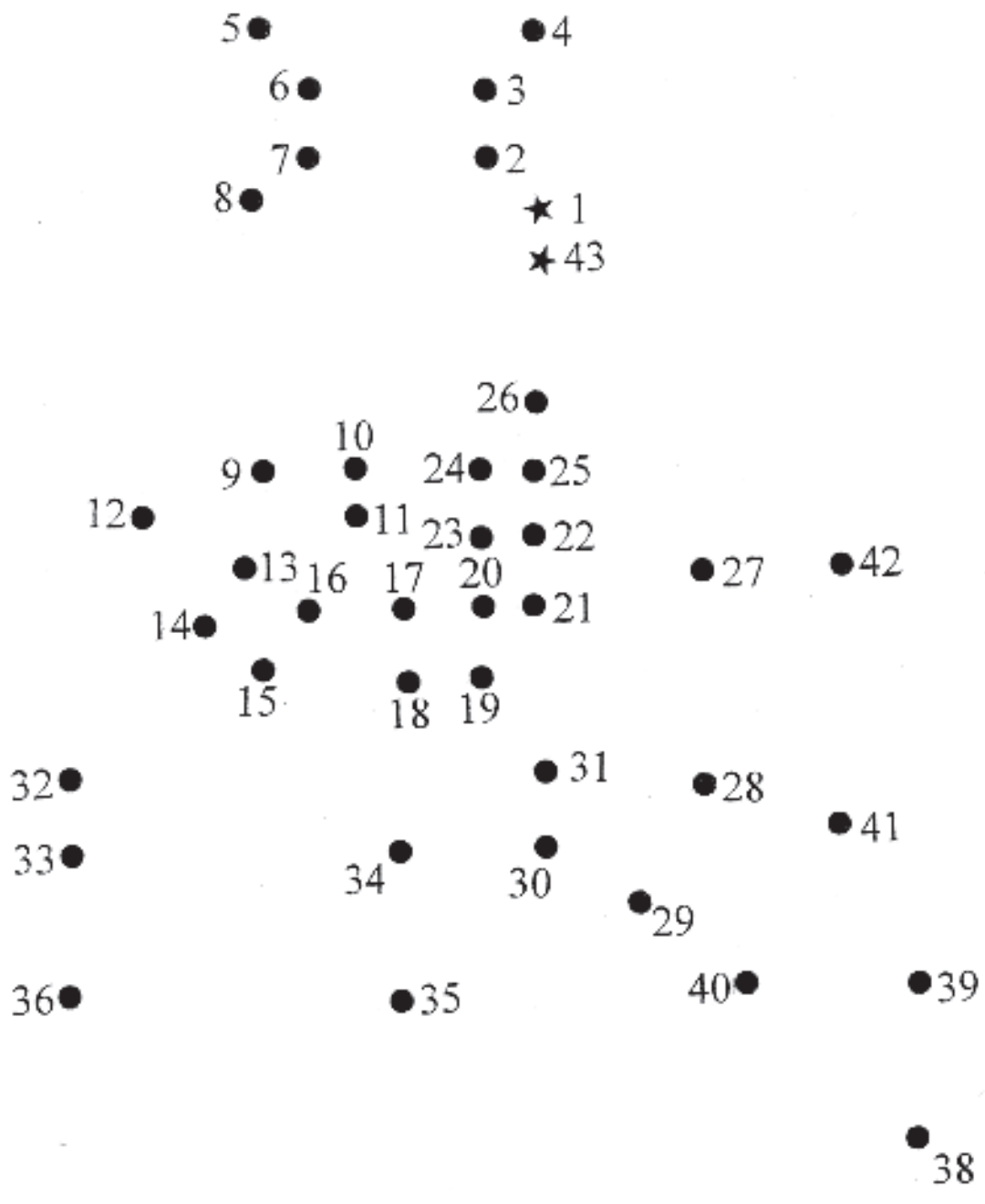
Draw a picture of how YOUR genes makes you look. Now look at your parents. Record your observations of how they look, and predict which genes you got from your mother, and which from your father.



The Life Science Laboratory

All work has special tools – construction workers use hammers and cranes, firefighters have trucks and hoses, and researchers use laboratories, test tubes, and computers.

Connect the dots to find out what tool life scientists use to see very small things, like cells, bacteria, and viruses.



Living organisms depend on one another and on their environment for survival

Sometimes this can be helpful and sometimes harmful. For example, the bacteria in your stomach need you to live, and in return it helps you digest your food. Other kinds of bacteria and viruses might need you to live, but they make you sick in the process. We usually call these kinds of microorganisms, germs. Most germs are spread by coughing or sneezing on someone, by drinking from a cup used by someone who is sick, or by not washing your hands. Scientists study germs so they can make medicines to keep you from getting sick (vaccines) or to help cure you if you do get sick (drugs).

Let's Investigate and Experiment!

- 1) Do you know how to really wash your hands to get rid of all the germs? Do some research, and look on the Internet for "Hand-Washing". Do certain soaps work better? For how long should you wash your hands? When?
- 2) Let's watch the life cycle of a microorganism on a piece of food. With the permission of an adult, leave a piece of bread, or a tomato, or slice of cheese out in the open. Put it where nothing will disturb it and it can't be eaten by anyone or another animal. Watch it for several days—maybe more than a week—and observe as something starts to grow on it. It could be white in color, it could be hairy, and it could be kind of smelly! Record your observations. These are microorganisms showing their way of life. When you are finished studying the process, throw the food in the trash, and be sure to wash your hands!
- 3) How many vaccines have you received? Which diseases do they protect you from? Ask your mom, your teacher, your grandfather, or others what kinds of vaccines they got when they were kids. Have you had more than they had? Why? Is this a good thing?

Investigation and Experimentation

Scientific progress is made by asking meaningful questions and conducting careful investigations. All scientists approach research in the same way. They use the **Scientific Method**.

The scientific method starts when you ask a question like How? What? Which? Why? or Where? It works like this.

1. Ask a question.
2. Do research on your question. Look at books, ask your teacher, and look on the Internet and find out what someone else has learned before.
3. Decide what YOU think might be the answer to your question. This is your hypothesis. Now test your hypothesis by doing an experiment.
4. Make observations. Collect data. Write down what you observe using words and numbers.
5. Study your data. What happened because of the experiment?
6. Make a conclusion. What's your decision about the experiment? Was your hypothesis right?
7. Communicate your results. Tell someone what you learned.

Let's try an experiment!

Here is your question: "How do different surfaces affect the speed at which mealworms travel?" Maybe you think they might travel faster on smooth surfaces. That is a hypothesis and now you need to test it.

1. Collect a variety of materials (sandpaper, cloth, cardboard, wood, wax paper, aluminum foil, etc.). The pieces have to be large enough (about 12 inches by 12 inches) so the mealworms can move about. Mark the middle of each piece with a small "x".
2. Create a chart so you can record how far each worm traveled, on what kind of surface, in two minutes. For example:

Worm	Surface	Distance
Dr. Blue	Wood	4 1/4 inches

3. Using markers, make a little spot in different colors on each mealworm to identify them.
4. Put one mealworm on the "x" of a surface and start timing. Whenever the mealworm changes the direction it is going, put a dot on the surface at that point. After two minutes, take away the mealworm. Draw a line connecting all the dots and then measure the total distance (the length of all the lines combined) the mealworm has traveled.
5. Now record your observations. Write the time and the color of the mealworm and the surface type – all your data -- down on a chart. Do this for each surface. Look at the data and then answer: What surface let the mealworms travel farther? Did all mealworms test the same on the same surface? Was your hypothesis correct? Communicate your results!

Investigation and Experimentation in Medical Research

Everyday doctors and veterinarians use medicines that were discovered using the Scientific Method to make people and animals better.

There are many different ways to investigate & test a hypothesis in medical research. Laboratory animals are an important part of this process.



Seek and Find

Medical research, the study of diseases and the search for cures, is a field of the life sciences. Can you search for these research words below?

EXPERIMENT	COMPUTER	BACTERIA	INVESTIGATE
TEST TUBE	DOCTOR	MEDICINE	LAB
RESEARCH	GENES	MICE	VIRUS
ANTIBIOTIC	CURES	VACCINE	CELL

R F O C V Y N G B E R M
E X P E R I M E N T R J
S U K L W F H N B F G E
E D H L M A D E A X L T
A N Q W M E V S C H V I
R A N T I B I O T I C N
C T F E C A R R E D O C
H E S S E G U H R S M U
D O C T O R S T I A P R
L Q Z T J S X F A Y U E
S B Q U R D U M J B T S
X G E B V A C C I N E H
W C M E D I C I N E R Q
F Q Z V S D V A L G H L
I N V E S T I G A T E O
B A N M R D E C B Q D S

Careers in the Life Sciences

You can work in the life sciences when you grow-up! There are so many different kinds of jobs where you do very different things. Here are some examples.

Biochemists study the chemical composition of a particular living system or biological substances, and the chemical processes occurring in living organisms.

Biologists study living organisms, including their structure, functioning, evolution, distribution, and interrelationships.

Biomedical Researchers study the biological processes and the causes of disease, and look for ways to prevent or cure diseases that cause illness and death in people and in animals.

Botanists study plants, and their structure, tissue, cells, genes, and chemical components. They also study the relationship between plants and the surrounding environment and the various plant ecology systems around the world.

Cell Biologists study cell composition, structure, and function to understand how the molecules that make up cells work together to produce functional cells, and how cells work together to make tissues and organs.

Geneticists study heredity, genes, and DNA. Stem cells and genetically modified organisms are areas of such research. Genetic Counselors work with people to understand inherited diseases.

Microbiologists study the causes of disease such as viruses, bacteria, fungi, and parasites.

Molecular Biologists study the formation, structure, and function of macromolecules essential to life, such as nucleic acids and proteins, and especially with their role in cell replication and the transmission of genetic information.

Physiologists study how organs in humans and animals work and how physical and chemical events affect living tissue.

Zoologists research the health and behavior of animals in aquariums, zoos, or in the wild, and develop mechanisms to help save endangered species.