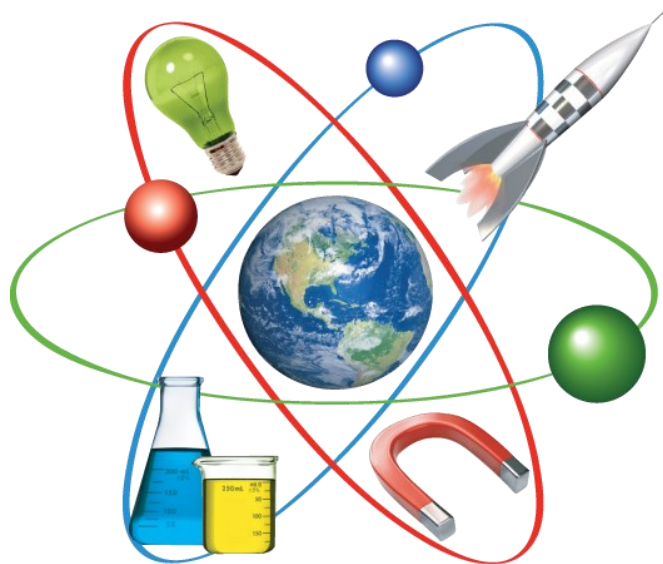


# Science Careers

for  
Students and Teachers

Educational Resource Packet



Brought to you by  
The Woodlands Nature Station

# What is Science?

Science is defined as..



The study of the nature and behavior of natural things and the knowledge that we obtain about them.

How many different science's are there?

There are many different kinds, there is a field of science to study every natural phenomenon.



# Science Careers Matching Game!

Try to match the Science with what they study!

If you need some help, the last page in this booklet has a list of sciences and definitions.

Ornithology



Astronomy



Geology



Botany



Meteorology



Acoustics



Chemistry



Oceanography



Volcanology



Robotics



# The Scientific Method

## How Science works...



There's a method to the madness...

### The Scientific Method!

This is a simple set of guidelines that helps scientists all around the world. Regardless of what field of science your interested in, all of them share this method in common!

#### 1. Ask a Question! (Make observations)

Example: Why isn't the TV remote working?

#### 2. Research your question! (Learn more about it)

Example: When did it stop? Has this happened before? If so, what was wrong with it then?

#### 3. Form a Hypothesis! (Make a prediction)

Example: Maybe the batteries are dead? If I replace the batteries, then the remote will work again.

#### 4. Test your Hypothesis! (Experiment)

Example: Replace the batteries in the TV remote.

#### 5. Analyze your Data! (Look at your results)

Example: The TV remote now works!

Example B: The TV remote Still doesn't work.



#### 6. Draw Conclusions!

Example: The TV remote wasn't working because the batteries were dead and needed replacing.

Example B: The TV remote issue is unrelated to the batteries.

## Activity!



Let's give the Scientific Method a try!

Make sure that you include an adult in all of your planning and experimentation! Safety First!



Step 1. Get an Egg



Step 2. Create some way to protect the egg from a fall!

Get creative! You can utilize nearly any household materials (with parental permission of course!)

Step 3. Make predictions about how your drop will go!

Step 4. With the aid of an adult, drop your egg-periement from a height of at least 8 feet! (Top of a ladder or a porch)

Step 5. Check the results!



Step 6. Make your conclusion!

Fill out the next page to see how your experiment worked!

# The Scientific Method!

You give it a try!

1. Ask a Question! (Make observations)

Is there a safe way to drop an egg? Without it breaking.

2. Research your question! (Learn more about it)

What ways can things be dropped safely? Are there ways to cushion the fall? Or slow the fall?

3. Form a Hypothesis! (Make a prediction)

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4. Test your Hypothesis! (Experiment)

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5. Analyze your Data! (Look at your results)

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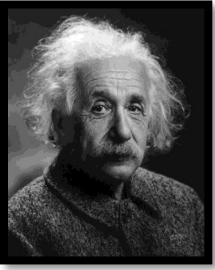
6. Draw Conclusions!

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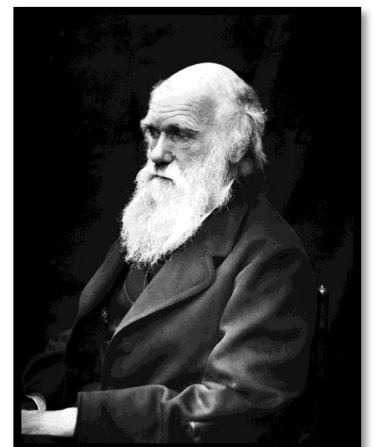


This next section is devoted to some  
**Famous Scientists!**

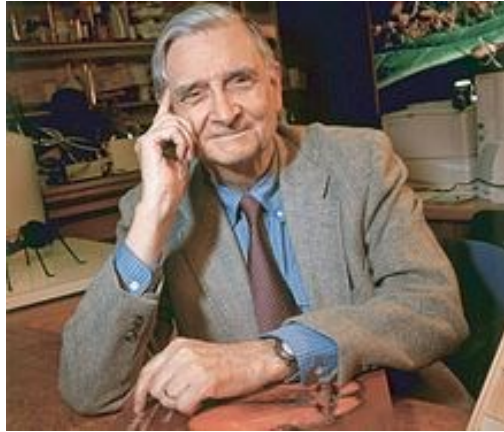
These are only a small selection of scientists, there are thousands more out there whose contributions to science have dramatically increased our knowledge of medicine, Space, and the world.

Along with each notable mention will be a few activities meant to give you the briefest glimpse of the kinds of science and work that these amazing individuals have made careers out of.

As you work through the exercises, if anything you did was particularly enjoyable, then we encourage you to explore that area of science!



# Famous Scientists!



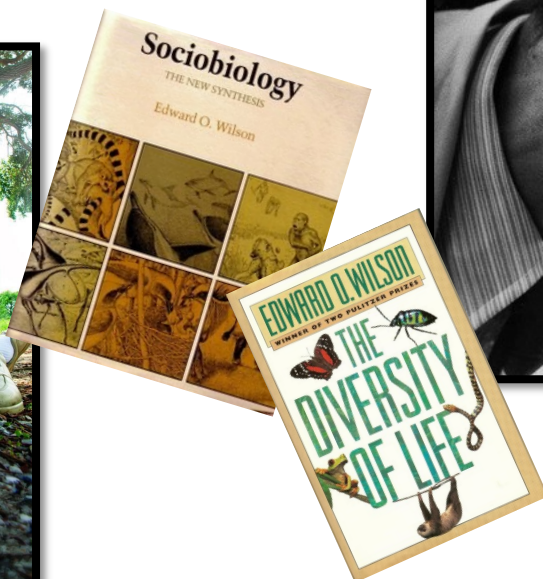
## E.O. Wilson

### Entomologist - Studies insects!

An American biologist, naturalist, and writer. His biological specialty is myrmecology, the study of ants, on which he has been called the world's leading expert.

Among his greatest contributions to ecological theory is the Theory of Island Biogeography, which he developed in collaboration with the mathematical ecologist Robert MacArthur.

This theory served as the foundation of the field of conservation area design, as well as the Unified Neutral Theory of Biodiversity of Stephen Hubbell.





# Activity!

In honor of E.O. Wilson and his study of Ants, lets take a moment to study some Ants in your own backyard!



Try to find an anthill or some ants anywhere around your house or yard.

Where did you find these ants?

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What color were the ants that you found?

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Research time! With the help of an adult, try to figure out what kind of ants you most likely have! (The most common ant in Kentucky and Tennessee is the Carpenter Ant)

Here's a helpful link . <https://ants.com/ultimate-ant-guide/>

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Draw one of these ants below!

# Famous Scientists!



Rachel Carson

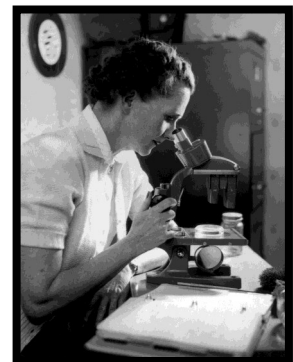
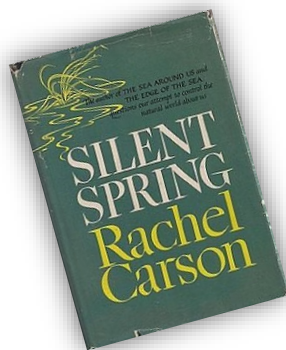
## Marine Biologist - Studied life in the ocean!

An American marine biologist, author, and conservationist whose writings are credited with advancing the global environmental movement.

Her widely praised 1951 *The Sea Around Us*, *The Edge of the Sea*, and *Under the Sea Wind*, were also bestsellers. This sea trilogy explores the whole of ocean life from the shores to the depths.

Late in the 1950s, Carson turned her attention to conservation, especially some problems that she believed were caused by synthetic pesticides. The result was the book *Silent Spring* (1962), which brought environmental concerns to an unprecedented share of the American people.

It inspired a grassroots environmental movement that led to the creation of the U.S. Environmental Protection Agency. Carson was posthumously awarded the Presidential Medal of Freedom by President Jimmy Carter.



# Activity!

In honor of Rachel Carson, let's find a water source in our area and pick up any trash or rubbish left behind.

Find a creek, or a pond, or even just your yard or neighborhood.



With the help of a family member, grab a trash bag and pick up any trash around your selected area. Also, be sure to observe any wildlife you see around that might be affected by trash and pollution.

What area did you choose?

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What kinds of wildlife did you see in this area?

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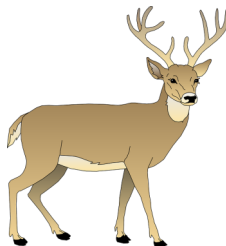
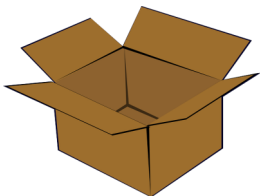
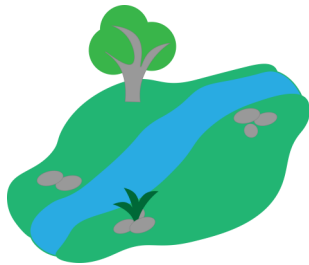
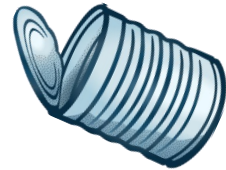
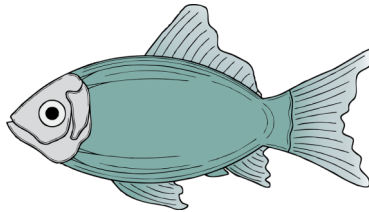
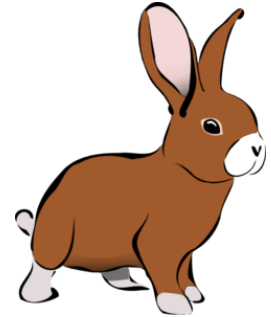
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# Activity

Cross out any trash you see in this ecosystem!



## Famous Scientists!



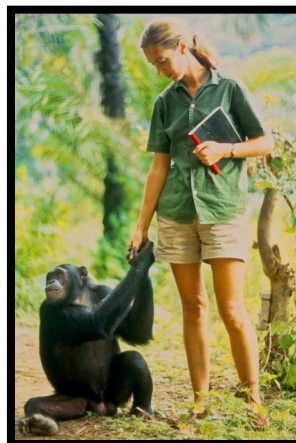
### Dame Jane Goodall

Primatologist - Studies Primates

Anthropologist - Studies cultural development

An English primatologist and anthropologist. Considered to be the world's foremost expert on chimpanzees, Goodall is best known for her 60-year study of social and family interactions of wild chimpanzees since she first went to Gombe Stream National Park in Tanzania in 1960.

She is the founder of the Jane Goodall Institute and the Roots & Shoots program, and she has worked extensively on conservation and animal welfare issues. She has served on the board of the Nonhuman Rights Project since its founding in 1996. In April 2002, she was named a UN Messenger of Peace. Goodall is also honorary member of the World Future Council.





## Activity!

In honor of Jane Goodall, let's take some time to critically observe an animal around us. Choose an animal that you regularly see around your home. Could be a pet, could be a wild animal, as long as it's something you see regularly (like squirrels, or birds, or insects.)

Animal Chosen: \_\_\_\_\_

Spend at least 10 minutes observing this animal.

Minutes	Location	Behavior
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

If you don't have many animals around your home, or if you'd like to keep this as an inside activity, here is a link to an Eagle Webcam, you can check this out and fill out the questions above.

<https://naeaglecam.org/>



## Famous Scientists!



### John James Audubon Ornithologist - Studied birds

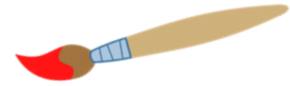
An American ornithologist, naturalist, and painter. He was notable for his extensive studies documenting all types of American birds and for his detailed illustrations that depicted the birds in their natural habitats.

His major work, a color-plate book entitled *The Birds of America* (1827–1839), is considered one of the finest ornithological works ever completed.

Audubon is also known for having identified 25 new species.



# Activity!



In honor of Audubon, lets observe some birds in our own backyard!

Using the resources below, observe birds around your yard!

Backyard bird feeders are an easy way to attract birds to your area!

This link provides pictures and descriptions of all of the common backyard birds for our area!

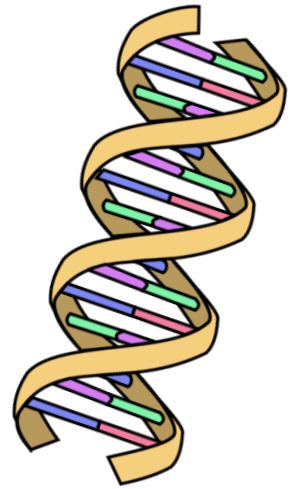
<https://www.whatbirdsareinmybackyard.com/2019/10/what-are-most-common-backyard-birds-in-kentucky.html>

Now that you've observed some birds in your area, and you've learned a bit more about the common birds in your area, pick one and draw it below!

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# Famous Scientists!



**Barbara McClintock**

**Botanist - Studied plants**

**Geneticist - Studied heredity and inherited traits**

An American scientist and cytogeneticist who was awarded the 1983 Nobel Prize in Physiology or Medicine. McClintock received her PhD in botany from Cornell University in 1927. There she started her career as the leader in the development of maize (a cousin of corn) genetics, the focus of her research for the rest of her life.

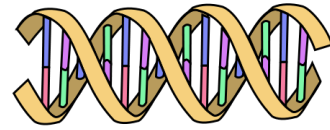
She was recognized as among the best in the field, awarded prestigious fellowships, and elected a member of the National Academy of Sciences in 1944.

McClintock's research became well understood in the 1960s and 1970s, as other scientists confirmed the mechanisms of genetic change and genetic regulation that she had demonstrated in her maize research in the 1940s and 1950s.

Awards and recognition for her contributions to the field followed, including the Nobel Prize in Physiology or Medicine, awarded to her in 1983 for the discovery of genetic transposition; she is the only woman to receive an unshared Nobel Prize in that category.



# Activity!



In honor of Barbara McClintock, we're going to do some of the most basic genetics research using your own family!

Simply answer the questions below!



Attached Earlobes



Detached Earlobes

What kind of ears do you have?

\_\_\_\_\_

What kind does your mom have?    Dad?

\_\_\_\_\_

\_\_\_\_\_

Now that you have all of this information...

Where do you think you got your ear shape from? (circle your answer, it's perfectly okay if you're only guessing)

Mom's side

Dad's side


\_\_\_\_\_



# Activity!

Now lets try a different genetic activity called a Punnett Square.

Let's assign each of the types of ear shapes with some other shapes. These shapes represent the traits that are passed down from Parent to Child. You get one trait (allele) from mom, and one from dad.

Detached earlobes (Square) are considered Dominant. 

Attached earlobes are Recessive (Circle). 

This means that anyone who gets a Square (from either parent) will have Detached earlobes. (Hence why its considered a Dominant trait) whereas only people who get two circles (one from each parent) will have the Recessive trait of attached earlobes.

Detached.   Or  

Attached.  

Fun Fact!

When these sets are the same (two squares, two circles) they're called Homozygous.

When they're different they're called Heterozygous.

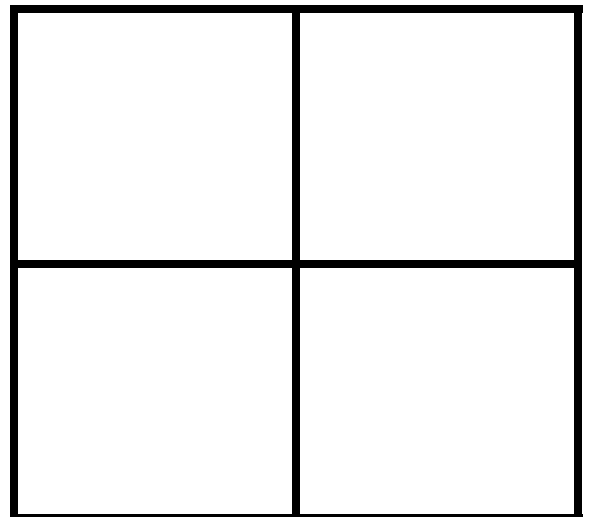
Mom

What shapes would your parents have?

Mom would have...

Dad would have...

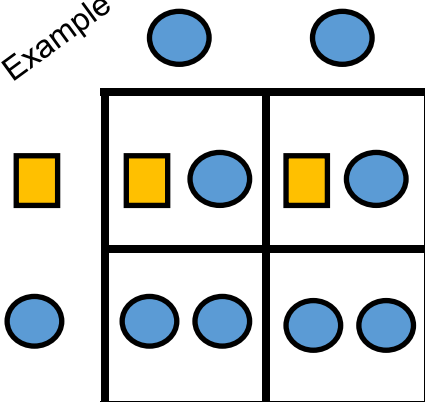
Dad



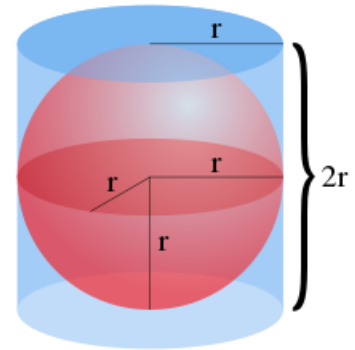
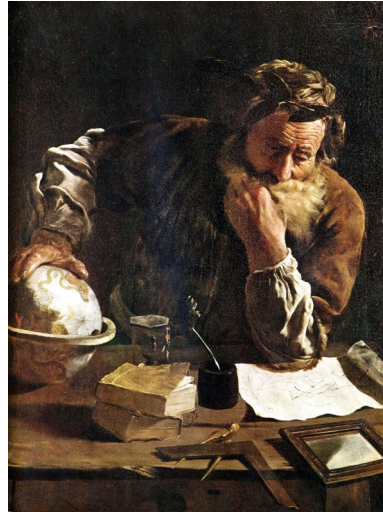
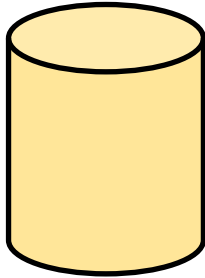
These boxes represent all the possible combinations of traits that these two parents could pass to their child.

One of these boxes represents you!

Example



# Famous Scientists!



Archimedes

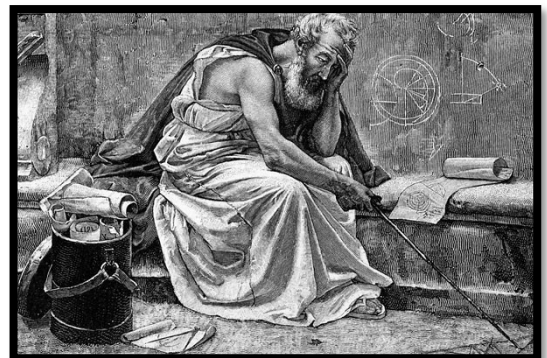
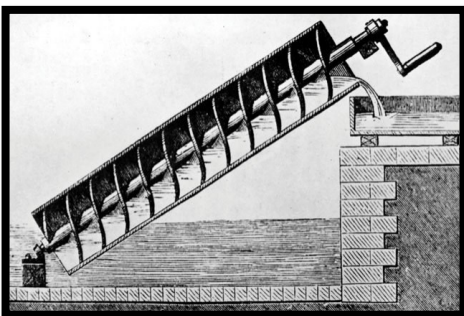
Physicist - Studied matter and Energy

Engineer - Designed machinery and structures

Astronomer - Studied the stars

Was a Greek mathematician, physicist, engineer, inventor, and astronomer. Although few details of his life are known, he is regarded as one of the leading scientists in history. Generally considered as one of the greatest mathematicians of all time, Archimedes anticipated modern calculus and analysis by applying concepts of infinitesimals and the method of exhaustion to derive and rigorously prove a range of geometrical theorems, including the area of a circle, the surface area and volume of a sphere, and the area under a parabola.

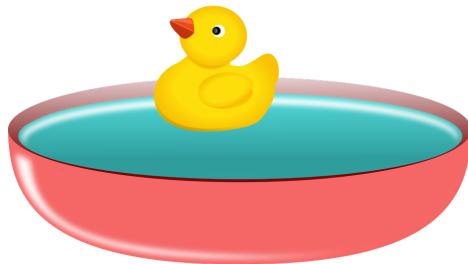
He was also credited with designing innovative machines, such as his screw pump, compound pulleys, and defensive war machines to protect his native Syracuse from invasion.



# Activity!

In honor of Archimedes, lets test some of his principles of floatation!

Find a bowl, fill it with water, then find any number of household items and see if they float! (Jewelry, toys, ice cubes, etc.! Get creative)



Before you test the buoyancy (ability to float) of your items, make a prediction of what you think will happen! (Remember the Scientific Method)

Items Chosen

Prediction (Sink / Float)

Results

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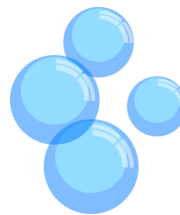
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# There are so many Famous Scientists!

We could not possibly mention every famous scientist in history, so we only chose a few to design a few activities around, but here are a few other notable mentions! We wholeheartedly encourage you to look up these wonderful people and learn about the ways that they added to the world of science!

## Astronomy and Physics

Albert Einstein

Steven Hawking

Neil deGrasse Tyson

## Biology and Conservation

Theodore Roosevelt

Aldo Leopold

Steve Irwin

Sylvia Earle

Dian Fossey

## Chemistry

Marie Curie

Louis Pasteur

George Washington Carver

## Further Exploration!

As you might have noticed, there are so many areas of science to explore and learn about!

Now that you've gotten a glimpse of some of the major careers and types of work that scientists do, we encourage you to continue exploring science!

What are some things that you enjoy? Hobbies, like sports, or cooking, pets, or even games.

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With the help of an adult, we encourage you to google these things you enjoy. Try using searches like "What is the study of...?"

For example, if you enjoy looking at stars.

Try searching for "What is the study of stars?"

Another example, maybe you enjoy sports.

"What is the study of sports?"

Did you know that there is an entire field of science dedicated to sports?

We encourage you to explore the scientific side of whatever you already enjoy doing!



**Acoustics-** The study of sound.

**Aeronautics-** Aircraft design, construction, and navigation.

**Agronomy-** Soil management and crop production

**Anatomy-** The study of organisms and their parts.

**Anthropology-** The study of the origin, behavior, and the physical, social, and cultural development of humans.

**Archaeology-** The study of past human lives by examining remaining material evidence.

**Astronomy-** The study of outer space.

**Astrophysics-** The branch of astronomy that deals with the physics of stellar phenomena.

**Bacteriology-** The study of bacteria, especially in relation to medicine and agriculture.

**Biochemistry-** The study of the chemical substances and processes in living organisms.

**Biology-** The science of life and living organisms

**Botany-** The study of plants.

**Cardiology-** The medical study of the heart.

**Cartography-** The art or technique of making maps or charts.

**Chemistry-** The science of the composition, structure, properties, and reactions of matter.

**Cosmology-** The study of the physical universe considered as a totality of phenomena in time and space.

**Crystallography-** The science of crystal structure and phenomena.

**Ecology-** The study of organisms and their environment.

**Embryology-** The study of the formation, early growth, and development of living organisms.

**Endocrinology-** The study of the glands and hormones of the body.

**Entomology-** The scientific study of insects.

**Enzymology-** The study of the biochemical nature and activity of enzymes.

**Forestry-** The science and art of cultivating, maintaining, and developing forests.

**Gelotology-** The study of laughter.

**Genetics-** The study of heredity and inherited traits.

**Geochemistry-** The chemistry of the composition and alterations of the solid matter of the earth or a celestial body.

**Geodesy-** The geologic science of the size and shape of the earth.

**Geography-** The study of the earth and its features.

**Geology-** The scientific study of the origin, history, and structure of the earth.

**Geophysics-** The physics of the earth and its environment, including the physics of fields such as meteorology, oceanography, and seismology

**Hematology-** The study of the blood and blood-producing organs.

**Herpetology-** The study of reptiles and amphibians.

**Histology-** The study of the microscopic structure of animal and plant tissues.

**Horology-** The science of measuring time and making time pieces

**Hydrology-** The study of the properties and effects of water on earth.

**Ichthyology-** The study of fish.

**Immunology-** The study of the immune system of the body.

**Linguistics-** The study of language and phonetics.

**Mechanics-** Design, construction, and use of machinery or mechanical structures.

**Medicine-** The science of diagnosing and treating disease and damage to the body.

**Meteorology-** The study of weather and atmospheric conditions.

**Metrology-** The science of measurement.

**Microbiology-** The study of microorganisms and their effects on other living organisms.

**Mineralogy-** The study of minerals, including their distribution, identification, and properties.

**Mycology-** The branch of botany that deals with fungi.

**Neurology-** The study of the nervous system and disorders affecting it.

**Nucleonics-** The study of the behavior and characteristics of nucleons or atomic nuclei.

**Nutrition-** The study of food and nourishment.

**Oceanography-** The exploration and study of the ocean.

**Oncology-** The study of the development, diagnosis, treatment, and prevention of tumors.

**Optics-** The study of light and vision.

**Paleontology-** The study of prehistoric life through fossils.

**Pathology-** The study of disease and its causes, processes, development, and consequences.

**Petrology-** The study of the origin, composition, structure, and alteration of rocks.

**Pharmacology-** The science of the composition, use, and effects of drugs.

**Physics-** The science of matter and energy and interactions between the two.

**Physiology-** The study of the functions of living organisms.

**Psychology-** The study of the mental process and behavior.

**Radiology** - The use of radioactive substances in diagnosis and treatment of disease.

**Robotics-** The science of technology to design, fabrication, and application of robots.

**Seismology-** The study of earthquakes.

**Spectroscopy-** The study of radiant light.

**Systematics-** The science of systematic classification.

**Thermodynamics-** The study of relationships and conversions between heat and other forms of energy.

**Toxicology-** The study of poisons and the treatment of poisoning.

**Virology-** The study of viruses and viral diseases.

**Volcanology-** The study of volcanoes and volcanic phenomena.

**Zoology-** the study of the structure, physiology, development, and classification of animals.