.

of different types

of scientific investigations.

in a scientific

investigation.

.

and

and

**Differentiate**

between the three types of

that can be answered through scientific

investigation.

**Summarize** the

**Distinguish**

between

**Identify**

.

**Describe** the process of

**Lesson Goals**

**Lesson Question**



**?**

**W**

**2K**

**Words to Know**

*Fill in this table as you work through the lesson. You may also use the glossary to help you.*

|  |  |
| --- | --- |
|  | a question that is based on observations and can be  answered through an investigation |
|  | any process used to ask and answer questions  about the natural world |
|  | a possible explanation of or answer to a scientific  question that is based on prior knowledge or research and is testable |



# Science

Science:

* is a way of about the .
* can take place .
* can be practiced by .
* involves making and .

**Slide**

* Is not just for scientists

and

* Uses similar
* Involves different

the natural world.

is any process used to ask and answer questions about

**Scientific Inquiry**

**2**

results.

•

.

* providing

.

* collecting

.

* performing

.

* asking a

**Scientific Inquiry: What It Involves**

Scientific inquiry involves:

**Words to Know**

*Fill in this table as you work through the lesson.*

**Slide**

tested.

, or possible explanation, that can be

* may lead to a

.

in

* addresses a

.

A good scientific question:

* has a

.

answered through an

and can be

is based on

A

**Scientific Questions**

**4**

**7**

|  |  |
| --- | --- |
|  | a group of related objects that interact and form a  complex whole |
|  | the part of an experiment that does not receive the  factor being tested and is used to compare results |
|  | the variable that is measured and affected during the experiment, and is “dependent” on the  independent variable |
|  | the variable that is changed by the researcher |

**Slide**

Scientific question Procedure

Conclusion

, but not

Making

• Include:

•

•

•

form a complex whole

, related objects that interact and

**Descriptive Investigations**

Involve collecting data about a

**7**

* *would not* compare these fossils to other fossils of other organisms.

from the past,

1. In a descriptive investigation of the paleontologist:
   * *would* describe the features of fossils.
2. In a descriptive investigation of information gathered by the

, the scientist:

* + *would* obtain observations and data from the surface of Mars.
  + *would not* compare the observations of Mars to observations of other planets.

**Descriptive Investigations: Real-World Connection**

1. In a descriptive investigation of behavior of male during mating season, the scientist:
   * *would* record their observations about the seal’s behavior.
   * *would not* compare the seals’ behavior to those of other seal species.

**Slide**

measured and affected during the experiment

* Procedure

•

, or the variable that is

researcher, and

, or the variable that is changed by the

**Comparative Investigations**

Involve collecting data for Include:

* Scientific
* Hypothesis

•

**7**

which is close to neutral and can be used in a consumer product.

of various substances to determine

3) A chemist may compare

, at different

2) A volcanologist retrieves samples from

localities and times, to compare the compositions

of suspects to the DNA

1) A forensic scientist can compare the

found at a crime scene.

**Comparative Investigations: Real-World Connection**

**Slide**

**7**

# Experimental Investigations

Involve experiments to gather that supports or refutes a

[hypothesis]

Include:

* Scientific
* Hypothesis
* Independent and dependent
* , or the part of an experiment that does not receive the factor being tested and is used to compare results

•

* Conclusion

**Comparative**

**Experimental**

**Comparison of Types of Scientific Investigations**

*Label each column with the type of scientific investigation being described.*

**Slide**

reach completion. The control group is the same reaction with no catalyst.

it takes for the reaction to

reactions will have an effect on the

3) A chemist wants to determine if adding a catalyst to various chemical

can be determined by taking careful seismic measurements. The control group is measurements taken without the instruments on the Moon’s surface to make

sure the instrument is not detecting false signals.

of Earth’s Moon

2) An astronaut tries to determine if the

**Experimental Investigations: Real-World Connection**

1) A scientist devises an experimental investigation to explore whether the

affects plant growth. The control group is the plant that

has no colored filter.

**7**

**14**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Question** |  |  |  |
| **Hypothesis** |  |  |  |
| **Variables** |  |  |  |
| **Control group** |  |  |  |
| **Procedure** |  |  |  |
| **Conclusion** |  |  |  |

information

control

**16**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Limitations of Scientific Investigations** | | | | |
|  | **Descriptive investigations** | **Comparative investigations** | **Experimental investigations** |  |
| * Cannot show cause- and-effect * Give results that can   over  time   * Are repeatable | * Show a relationship that does not always indicate cause and effect | * Can lack * Can often occur in a   setting |  |

**Slide**

**Benefits of Scientific Investigations**

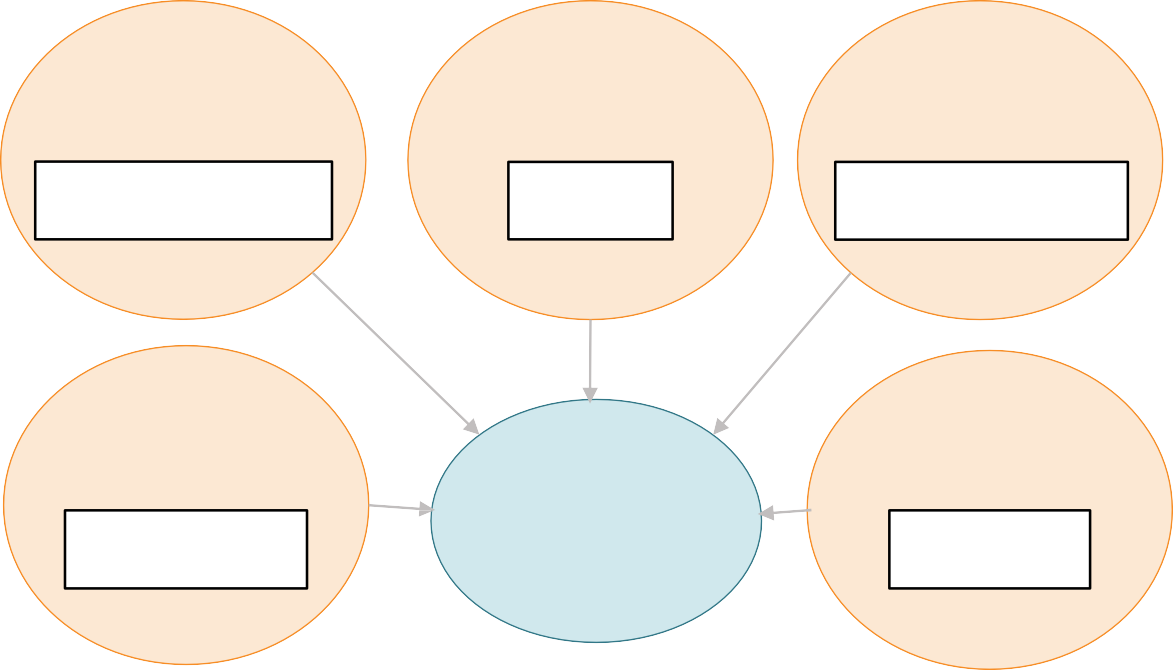
|  |  |  |
| --- | --- | --- |
| **Descriptive investigations** | **Comparative investigations** | **Experimental investigations** |
| * Are   expensive and less   * Provide a large amount of | * Provide large amounts of * Use a wide range of | * Are best for cause- and-effect * Allow for   of variables   * Can be repeated |

How do scientists conduct scientific investigations?

**Lesson Question**

**Slide**

**?**



**Scientific**

**inquiry**

**Communicating**

**Asking**

**Providing**

**Collecting**

**Performing**

**Review: Key Concepts**

*Complete the graphic organizer summarizing the processes and practices of scientific inquiry.*

**Answer**

**2**

**Slide**

supports or refutes a hypothesis

to gather evidence that

not comparisons

* Comparative
  + Collecting data for
* Experimental
  + Performing an

, but

and making

* Collecting

The three types of scientific investigations are:

* Descriptive

**2**

*Use this space to write any questions or thoughts about this lesson.*