Warm-Up | Scientific Inquiry

Lesson Question

Lesson Goals

Describe the process of _____.

Identify _____ that can be answered through scientific investigation.

Distinguish between _____ and _____ in a scientific investigation.

Differentiate between the three types of _____.

Summarize the _____ and _____ of different types of scientific investigations.

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

Warm-Up | Scientific Inquiry

Science

Science:

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

Instruction | Scientific Inquiry

Slide 2

Scientific Inquiry

[ ] is any process used to ask and answer questions about the natural world.

- Involves different [ ]
- Uses similar [ ] and [ ]
- Is not just for scientists

Scientific Inquiry: What It Involves

Scientific inquiry involves:

- asking a [ ].
- performing [ ].
- collecting [ ].
- providing [ ].
- [ ] results.

Instruction | Scientific Inquiry

Slide 4

Scientific Questions

A _____ is based on _____ and can be answered through an _____.

A good scientific question:

- has a _____.
- addresses a _____ in _____.
- may lead to a _____, or possible explanation, that can be tested.

Slide 7

Words to Know

Fill in this table as you work through the lesson.

	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

Instruction | Scientific Inquiry

Slide 7

Descriptive Investigations

Involve collecting data about a [ ], related objects that interact and form a complex whole

- Making [ ], but not [ ]

Include:

- Scientific question
- Procedure
- Conclusion

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.

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.

3) In a descriptive investigation of [ ] from the past, the paleontologist:
   - *would* describe the features of fossils.
   - *would not* compare these fossils to other fossils of other organisms.

Instruction | Scientific Inquiry

Slide 7

Comparative Investigations

Involve collecting data for _____

Include:

- Scientific _____
- Hypothesis
- _____, or the variable that is changed by the researcher, and _____, or the variable that is measured and affected during the experiment
- Procedure
- _____

Comparative Investigations: Real-World Connection

1) A forensic scientist can compare the _____ of suspects to the DNA found at a crime scene.

2) A volcanologist retrieves samples from _____, at different localities and times, to compare the compositions

3) A chemist may compare _____ of various substances to determine which is close to neutral and can be used in a consumer product.

Instruction | Scientific Inquiry

Slide 7

Experimental Investigations

Involve experiments to gather _____ that supports or refutes a _____

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

Instruction | Scientific Inquiry

Slide 7

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.

2) An astronaut tries to determine if the [ ] of Earth's Moon 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.

3) A chemist wants to determine if adding a catalyst to various chemical reactions will have an effect on the [ ] it takes for the reaction to reach completion. The control group is the same reaction with no catalyst.

14

Comparison of Types of Scientific Investigations

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

	[ ]	[ ]	[ ]
Question	✓	✓	✓
Hypothesis		✓	✓
Variables		✓	✓
Control group			✓
Procedure	✓	✓	✓
Conclusion	✓	✓	✓

Instruction | Scientific Inquiry

Slide 16

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

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

Summary | Scientific Inquiry

Lesson Question

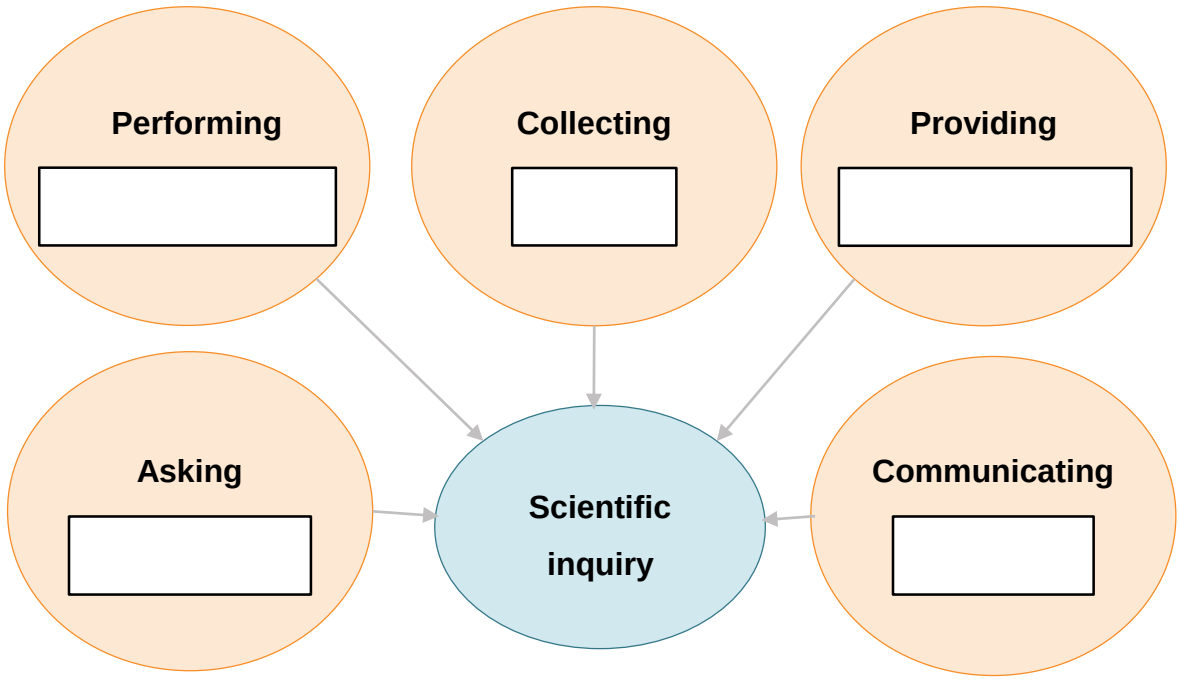
How do scientists conduct scientific investigations?

Answer

Slide 2

Review: Key Concepts

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



Summary | Scientific Inquiry

Slide 2

The three types of scientific investigations are:

- Descriptive
  - Collecting [ ] and making [ ], but not comparisons
- Comparative
  - Collecting data for [ ]
- Experimental
  - Performing an [ ] to gather evidence that supports or refutes a hypothesis

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