Edgenuity

Warm-Up | Experimental Design Principles

Lesson Question

Lesson Goals

Analyze _____ designs.

Differentiate between _____ and repetition.

Write _____ in standard form and scientific notation.

Distinguish accuracy from _____ .

Evaluate data for _____ and reproducibility.

Words to Know

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

	the act of performing a task several times
	to be based in fact
	the ability of a process to be repeated in the same manner by another individual

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Science

Among the many elements of science is that it:

- relies on a _____ process.
- involves observation and _____.
- involves the _____ of information.
- is _____ by evidence.
- is updated as new _____ are made.

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Scientific Design

- Different scientific designs follow a _____.
- Scientists communicate their results in a particular _____.
- Other scientists can _____ experiments and _____ results.
- Good design and repeatability ensure _____ results.

Repetition

_____ is the act of performing a task _____.

It is used in science because it:

- reduces _____.
- Increases _____ in the results.

Replication

_____ is the ability of a process to be repeated in the _____ manner by another individual.

The repeated process should produce the _____ results.

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Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

____ data	A. the closeness of measured values to other measured values
____ scientific notation	B. the information obtained through a scientific investigation
____ precision	C. the closeness of measured values to accepted values
____ reproducibility	D. a simplified way to write numbers that are very large or very small
____ accuracy	E. the ability of data to be duplicated

Results of Scientific Investigation

[ ] are the information obtained through a scientific investigation.

- Can be used as [ ] to answer a question or support a conclusion
- Must be [ ] and [ ]

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Accuracy vs. Precision

[ ] is the closeness of measured values to the [ ] value.

[ ] is the closeness of measured values to [ ] values.

		
Accurate [ ] precise	Precise [ ] accurate	[ ] accurate [ ] precise

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Accuracy and Precision: Example

Accuracy	
Correct Value: 10	
9, 11	_____ accurate
7, 15	_____ accurate

Precision	
Correct Value: 10	
9, 10, 10, 11, 12	_____ precise
5, 7, 19, 15, 10	_____ precise

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Reproducibility

_____ is the ability of data to be duplicated.

- The _____ results are expected to recur.
- Experimental conditions may _____ to some degree.

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Scientific Notation

_____ is a _____ way to write numbers that are very large or very small.

Scientific notation is written as a product of a number between 1 and 10 and a _____ .

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Large Numbers in Scientific Notation: Example

How is the number 7,200,000,000 expressed in scientific notation?

- Count the _____ needed to move the _____ to get a number between 1 and 10.
- Place the decimal point in the space, and _____ by the appropriate power of 10.
  - The power of 10 is equal to the number of spaces the _____ was moved.

Write 7,200,000,000 in scientific notation: _____

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Small Numbers in Scientific Notation: Example

How is the number 0.000063 expressed in scientific notation?

- Count the _____ needed to move the _____ to get a number between 1 and 10.
- Place the _____ in the space, and _____ by the appropriate power of 10.
  - The power of 10 will be _____.

Write 0.000063 in scientific notation: _____

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Scientific Notation to Standard Notation: Example

If the power of 10 is [ ]:

- Move the decimal to the [ ].
- Add the appropriate number of [ ].
  - Write 8.1×10^3 in standard notation. [ ]

If the power of 10 is [ ]:

- Move the decimal to the [ ].
- Add the [ ] number of zeroes.
  - Write 4.7×10^{-8} in standard notation. [ ]

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Lesson Question

How are data evaluated?

Answer

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Review: Key Concept

GOOD SCIENTIFIC DESIGN

Good scientific designs allow for _____ to ensure valid results.

- _____ is the act of _____ several times.
  - Reduces mistakes and increases _____ in results
- _____ is the ability of a process _____ in the same manner by another individual.
  - Should produce the _____ results
- Accuracy is the closeness of measured values to the _____ value.
- Precision is the closeness of measured values to other _____ values.
- _____ is the ability of data to be duplicated.

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Review: Key Concept Scientific Notation

SCIENTIFIC NOTATION

Scientific notation is a _____ way to write _____ that are very large or very small.

- Written as the _____ of a number between _____ and _____ and a _____ of 10.
- Examples
  - $75{,}200 = 7.52 \times 10^{4}$
  - $0.000063 = 6.3 \times 10^{-5}$

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