Name: _____ **Date:** _____

Answer Key: The Metric Expedition: Navigating SI Units for College Science

Bridge the gap between lab theory and industrial standards by identifying the fundamental building blocks of the International System of Units.

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1. During a chemical synthesis, a researcher needs to measure the fundamental 'amount of substance' rather than its weight. Which SI base unit should they record?

Answer: B) Mole (mol)

The mole is the SI base unit specifically defined to measure the amount of a chemical substance, whereas grams are a measure of mass.

2. In the SI system, the Kelvin (K) is the base unit for thermodynamic temperature, and it does not use the degree symbol (°).

Answer: A) True

Kelvin is an absolute scale and is an SI base unit; unlike Celsius or Fahrenheit, it is written as a standalone value without the degree symbol.

3. When measuring the flow of electrons through a superconducting wire in a physics lab, the standard SI unit used is the _____.

Answer: C) Ampere

The ampere (A) is the SI base unit for electric current, representing the flow of one coulomb of charge per second.

4. A laboratory technician reports that a scale consistently provides the same weight for a sample over five trials, but the weight is 2 grams off from the actual standard. This scale is:

Answer: B) Precise but not accurate

Precision refers to the repeatability of results, while accuracy refers to how close a measurement is to the true value.

5. If a biological sample is 0.005 meters long, a researcher converting this to millimeters would record the length as ___ millimeters.

Answer: D) 5

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There are 1,000 millimeters in 1 meter; therefore, 0.005 multiplied by 1,000 equals 5.

6. The kilogram is the only SI base unit that includes a physical prefix (kilo-) in its standard name.

Answer: A) True

Despite being a base unit, the kilogram is unique because its name contains the 'kilo' prefix, unlike the meter, second, or mole.

7. Expressed in SI base units, which of the following is used to measure the intensity of light as perceived by the human eye?

Answer: C) Candela

The candela (cd) is the SI base unit for luminous intensity, which measures power emitted by a light source in a particular direction.

8. An environmental scientist finds that a sensor is miscalibrated and consistently reads 5% high. This type of consistent, repeatable error is known as a _____ error.

Answer: B) Systematic

Systematic errors are consistent, repeatable errors associated with faulty equipment or a flawed experiment design.

9. The second (s) is the SI base unit for time and is currently defined by the vibrations of a cesium-133 atom.

Answer: A) True

Modern SI definitions rely on physical constants; the second is defined by the fixed numerical value of the cesium frequency.

10. In a peer-reviewed paper, a distance is listed as 1.5 Megameters (Mm). What is this distance in the base unit of meters?

Answer: C) 1,500,000 m

The prefix 'Mega-' represents a factor of 10 to the power of 6 (one million). Therefore, 1.5 Mm is 1,500,000 meters.