

Name: _____ Date: _____

Standardized or Sus: 9th Grade Measurement Mayhem

Can you spot the difference between precision and accuracy in the lab? Analyze experimental data, apply SI prefixes, and solve complex dimensional analysis problems.

1. A chemist synthesized a new compound and determined its density to be 4.54 g/cm^3 , 4.55 g/cm^3 , and 4.56 g/cm^3 in three trials. The actual density is 5.80 g/cm^3 . How would you describe this data set?

- A. High accuracy and high precision
- B. High accuracy but low precision
- C. Low accuracy but high precision
- D. Low accuracy and low precision

2. An oceanographer measures the pressure at the bottom of the Mariana Trench as 1.10×10^8 pascals. If they wanted to express this value in megapascals (MPa), the numerical value would be ____.

- A. 1.10
- B. 11.0
- C. 110
- D. 1100

3. Unlike the Celsius scale, the Kelvin scale is an absolute thermodynamic scale where 0 K represents the point at which all molecular motion ceases.

- A. True
- B. False

4. If an astrophysicist is calculating the distance between two galaxies, which derived SI unit would be most appropriate for measuring the 'luminosity' or total power output?

- A. Watts ($\text{kg}\cdot\text{m}^2/\text{s}^3$)
- B. Newtons ($\text{kg}\cdot\text{m}/\text{s}^2$)
- C. Joules ($\text{kg}\cdot\text{m}^2/\text{s}^2$)
- D. Pascals ($\text{kg}/\text{m}\cdot\text{s}^2$)

5. A biotechnologist needs to dilute a 5.0 mL sample of DNA. To communicate this volume in SI base units without prefixes, the value should be written as ____ meters cubed (m^3).

- A. 0.005
- B. 0.000005
- C. 5.0×10^{-3}
- D. 5.0×10^{-6}

6. In the SI system, the 'mole' is used specifically to measure the volume of a gas at Standard Temperature and Pressure (STP).

- A. True

Name: _____ Date: _____

B. False

7. Which of the following scenarios best demonstrates a failure of 'calibration' rather than human observational error?

- A. A student misreads the bottom of the meniscus in a graduated cylinder.
- B. An electronic balance consistently displays 0.05g even when the pan is empty.
- C. A researcher rounds their calculation to two significant figures instead of three.
- D. A lab assistant accidentally uses a beaker instead of a volumetric flask.

8. A fiber optic cable transmits data using light pulses. The intensity of the light source is 500 millicandela (mcd). In standard SI base units, this value is equal to ____ candela (cd).

- A. 5.0
- B. 0.5
- C. 0.05
- D. 500,000

9. When converting 15 meters per second (m/s) to kilometers per hour (km/h), which conversion factor setup is correct?

- A. $(15 \text{ m/s}) * (1 \text{ km} / 1000 \text{ m}) * (1 \text{ hr} / 3600 \text{ s})$
- B. $(15 \text{ m/s}) * (1000 \text{ m} / 1 \text{ km}) * (3600 \text{ s} / 1 \text{ hr})$
- C. $(15 \text{ m/s}) * (1 \text{ km} / 1000 \text{ m}) * (3600 \text{ s} / 1 \text{ hr})$
- D. $(15 \text{ m/s}) * (1000 \text{ m} / 1 \text{ km}) * (1 \text{ hr} / 3600 \text{ s})$

10. The ampere (A) is considered an SI base unit, even though it describes the flow of electric charge over time.

- A. True
- B. False