Name_____

Honors Physics 1.3 - Scientific Measurement

I. Systems of Measurement

- Measurements require both a _____ and a _____ to be meaningful.
- The International System of Units (SI) is the standard used in science worldwide.
- **The Seven Base SI Units**
    - Length: _____ (m)
    - Mass: _____ (kg)
    - Time: _____ (s)
    - Temperature: Kelvin (K)
    - Electric Current: ampere (A)
    - Amount of Substance: mole (mol)
    - Luminous Intensity: candela (cd)

II. Accuracy and Precision

- **Accuracy:** How close a measurement is to the _____ or accepted value.
- **Precision:** How close a series of measurements are to _____ _____. It reflects reproducibility.
- A measurement can be precise without being accurate if there is a _____ error.

III. Significant Figures

- A way of communicating the _____ of a measurement. It includes all digits that are known for certain, plus one final _____ digit.
- **Rules for Counting Significant Figures**
    - _____ digits are always significant.
    - Zeros _____ non-zero digits are significant (e.g., 101).
    - _____ zeros (before non-zero digits) are not significant (e.g., 0.05).
    - Trailing zeros are significant only if the number contains a _____ _____ (e.g., 100.0).
- **Rules for Calculations**
    - **Multiplication/Division:** The result has the same number of significant figures as the measurement with the _____ significant figures.

- **Addition/Subtraction:** The result is rounded to the same number of _____ _____ as the measurement with the fewest.

Worked Examples (Fill-in)

Ex 1 — How many significant figures are in the measurement 0.00720 m?

1. **Non-zero digits:** The '7' and '2' are _____.
2. **Leading zeros:** The three zeros before the '7' are _____ significant.
3. **Trailing zeros:** The zero after the '2' is _____ because the number has a decimal point.
4. **Conclusion:** There are a total of _____ significant figures.

Ex 2 — Calculate the area of a rectangle with a length of 4.5 cm and a width of 2.33 cm.

1. **Formula:** Area = Length × Width
2. **Raw Calculation:** 4.5 cm × 2.33 cm = _____ cm^2
3. **Identify Significant Figures:**
   - 4.5 cm has _____ significant figures.
   - 2.33 cm has _____ significant figures.
4. **Apply Rule:** The answer must be rounded to _____ significant figures.
5. **Final Answer:** _____ cm^2