Name_____

Honors Physics 1.4 - Math Tools for Physics

I. Measurement and Uncertainty

- **Scientific Notation**
  - A method for writing very large or very small numbers compactly.
  - Format: A coefficient (between 1 and 10) × 10 raised to a _____.
  - Moving the decimal to the LEFT results in a _____ exponent (e.g., 5,800 becomes 5.8×10^3).
  - Moving the decimal to the RIGHT results in a _____ exponent (e.g., 0.045 becomes 4.5×10^{-2}).
- **Significant Figures**
  - Communicates the _____ of a measurement.
  - Includes all certain digits plus one _____ digit.

II. Physics Equations as Tools

- Equations are tools for _____ and describing the natural world.
- They show the relationships between different physical _____ (variables).
- Example: Speed = _____ / _____ (v = d/t).

III. Graphing Data

- Graphs visualize the relationship between two _____.
- The **independent** variable (what you control) is plotted on the _____-axis.
- The **dependent** variable (what responds) is plotted on the _____-axis.
- **Interpreting Slope**
  - The slope of a line graph represents the _____ between the variables.
  - Slope is calculated as "rise over run" (_____ / _____).
  - For a distance vs. time graph, the slope represents the _____.

IV. Dimensional Analysis (Unit Conversion)

- A technique for converting a measurement from one _____ to another.
- It involves multiplying by one or more _____ _____, which are fractions equal to 1.
- The key is to set up the factor so that the unwanted units _____ out.

Name_____

Worked Examples (Fill-in)

Ex 1 — Convert 365 days into seconds.

1. **Starting Value:** 365 days
2. **Conversion Factors:**
    - _____ hours / 1 day
    - _____ minutes / 1 hour
    - _____ seconds / 1 minute
3. **Dimensional Analysis Setup:**
    - (365 days) × (_____ / 1 day) × (_____ / 1 hr) × (_____ / 1 min)
4. **Final Answer:** _____ s

Ex 2 — A car travels 150 km in 2 hours. Find the slope of its distance-time graph.

1. **Identify Variables:**
    - Independent (x-axis): _____
    - Dependent (y-axis): _____
2. **Identify Points:**
    - Starting point: (0 hr, _____ km)
    - Ending point: (2 hr, _____ km)
3. **Calculate Slope:**
    - Slope = Rise / Run = (_____ km - _____ km) / (_____ hr - _____ hr)
4. **Final Answer & Meaning:**
    - Slope = _____ km/hr. This represents the car's average _____.