Name_____

Honors Physics 1.5 - Resolving Vectors

I. Scalars vs. Vectors

- **Scalar:** A quantity that has only _____ (a numerical value).
  - Examples: speed, distance, _____, time.
- **Vector:** A quantity that has both magnitude and _____.
  - Examples: velocity, _____, force.
- Vectors are represented graphically by _____. The length represents magnitude, and the point indicates direction.

II. Essential Math: Right Triangle Trigonometry

- To work with vectors, we use the trigonometry of _____ triangles.
- **SOH CAH TOA**
  - SOH: Sin(θ) = _____ / _____
  - CAH: Cos(θ) = _____ / _____
  - TOA: Tan(θ) = _____ / _____
- **Using Your Calculator**
  - **IMPORTANT:** Make sure your calculator is in _____ mode.
  - To find a side length, use the `sin`, `cos`, or `tan` buttons.
  - To find an angle, use the _____ trig functions (e.g., $\sin^{-1}$, $\cos^{-1}$).

III. Resolving Vectors into Components

- Any vector can be "resolved" into two perpendicular _____, usually along the x and y axes.
- These components, when added together, are _____ to the original vector.
- We create a right triangle with the vector as the _____.
- **Calculating Components**
  - The **x-component** (adjacent side) is found using _____: $v_x = v * \cos(\theta)$
  - The **y-component** (opposite side) is found using _____: $v_y = v * \sin(\theta)$

Worked Examples (Fill-in)

Ex 1 — A car travels at 25 m/s at an angle of 60° north of east. Find the components.

1. **Identify Magnitude and Angle:**
    - Magnitude (v) = _____ m/s
    - Angle (θ) = _____ °
2. **Calculate x-component (East):**
    - v_x = v * cos(θ) = _____ m/s * cos(_____°)
    - v_x = _____ m/s
3. **Calculate y-component (North):**
    - v_Y = v * sin(θ) = _____ m/s * sin(_____°)
    - v_Y = _____ m/s

Ex 2 — A hiker walks 12.0 km on a path 20° south of west. Find the components.

1. **Determine the angle from the positive x-axis.**
    - West is 180°. 20° south of west is 180° + _____° = _____°.
2. **Calculate x-component (West):**
    - x = d * cos(θ) = 12.0 km * cos(_____°)
    - x = _____ km (The negative sign means West)
3. **Calculate y-component (South):**
    - y = d * sin(θ) = 12.0 km * sin(_____°)
    - y = _____ km (The negative sign means South)