Summary Lecture 3

Uniformly Accelerated Motion

- \( a = \text{constant} \)
- **Conventions**
  - \( v_o = \text{velocity at } t = 0 \)
  - \( x_o = \text{position at } t = 0 \)
- **Equations**
  - \( x = x_o + v_o t + a/2 \ t^2 \)
  - \( v = v_o + a t \)
  - \( v^2 = v_o^2 + 2a (x - x_o) \)

Falling Bodies

- In the absence of air resistance all bodies fall with the same uniform acceleration
- \( g = 9.80 \text{ m/s}^2, \text{ downward} \)
  - (\( g \) is not constant, e.g. \( g_{\text{Moon}} \sim 1/6 \ g_{\text{Earth}} \))

Problem Solving

- Make a sketch
- Define your coordinate system
  - **Origin**
  - **(+) Direction**
- Write done the information given
<table>
<thead>
<tr>
<th>Scalars</th>
<th>Vectors</th>
</tr>
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<tbody>
<tr>
<td>Distance</td>
<td>Displacement</td>
</tr>
<tr>
<td>Speed</td>
<td>Velocity</td>
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<tr>
<td>Mass</td>
<td>Acceleration</td>
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<tr>
<td>Time</td>
<td>Force</td>
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- **Vectors have magnitude and direction**
- **Tip-to-Tail Rule**

\[ \vec{A} + \vec{-A} = \vec{0} \]
Vectors, Components and Coordinate Systems

\[ D^2 = D_x^2 + D_y^2 \]
\[ \tan \alpha = \frac{D_y}{D_x} \]

\[ D_x = D \cos \alpha \]
\[ D_y = D \sin \alpha \]

Vector Addition

\[ \vec{C} = \vec{A} + \vec{B} \]
\[ \Rightarrow C_x = A_x + B_x \quad , \quad C_y = A_y + B_y \]