Exam I  

Sections 513–516

**Short answers:**
1. Say 5 pennies/day, retire in (65 − 20) = 45 yrs = 1.6 × 10^4 days ⇒ $821
2. Both hit at the same time. Gravity affects both the same, independent of mass and velocity in the x-direction: \( \Delta y = \frac{1}{2}gt^2 \).
3. All are inconsistent: (a) \([\text{kg} \cdot \text{m}^2/\text{s}^2] = [\text{kg} \cdot \text{m}^2/\text{s}^2] + [\text{kg} \cdot \text{m}^2 \cdot \text{m}^{1/2}]\); (b) \([\text{m/s}] = [\text{m/s}] + [\text{m/s}^2]\);
(c) \([\text{kg} \cdot \text{m}/\text{s}^2] = [\text{m}^2/\text{s}^2]\).
4. (a) −8; (b) \(3\hat{i} − 3\hat{j} + 2\hat{k}\).

**Problem 1:** (a) ……… (b) \( \vec{R} = 49.0 \) steps 76.2° South of East (c) \( \langle v \rangle = 1.5 \text{ steps/sec} \) and \( \langle \vec{v} \rangle = 0 \).

**Problem 2:**
(a) \( v_o = 5 \text{ m/s} \) (b) \( a = 1.43 \text{ m/s}^2 \) (c) \( x = 60.7 \text{ m} \)

**Problem 3:**
(a) \( v_o = 17.0 \text{ m/s} \) (b) \( |\vec{v}_f| = 11.6 \text{ m/s} \) (c) \( \theta = -51.5^\circ \)

**Problem 4:**
(a) \( \theta = 14.5^\circ \) (b) \( |\vec{v}_{P/E}| = -310 \text{ km/h} \) \( \hat{i} \) (c) \( \vec{v}_{A/E} \)

Exam I*

**Short answers:**
1. Both hit at the same time. Gravity affects both the same, independent of mass and velocity in the x-direction: \( \Delta y = \frac{1}{2}gt^2 \).
2. (a) −1; (b) \( 4\hat{i} + 5\hat{j} + 6\hat{k} \).
3. All are inconsistent: (same as above)
4. Say 5 pennies/day, retire in (65 − 20) = 45 yrs = 1.6 × 10^4 days ⇒ $821.

**Problem 1:**
(a) Similar sketch as above (b) \( \vec{R} = 47.1 \) steps 83.1° South of East (c) \( \langle v \rangle = 1.5 \text{ steps/sec} \) and \( \langle \vec{v} \rangle = 0 \).

**Problem 2:**
(a) \( v_o = 8 \text{ m/s} \) (b) \( a = 0.57 \text{ m/s}^2 \) (c) \( x = 86.0 \text{ m} \)

**Problem 3:**
(a) \( v_o = 17.9 \text{ m/s} \) (b) \( |\vec{v}_f| = 12.0 \text{ m/s} \) (c) \( \theta = -59.4^\circ \)

**Problem 4:**
(a) \( \theta = 14.9^\circ \) (b) \( |\vec{v}_{P/E}| = -338 \text{ km/h} \) \( \hat{i} \) (c) \( \vec{v}_{A/E} \)