

Mock Exam #1 Answer Sheet

Name: Solutions

Section: 9am 10am

Please write all responses (and show all work) on this answer sheet. Nothing you write on the exam itself will be graded.

Multiple Choice Problems are worth 4 points each.

1. a b **(c)** d $\Delta y = -\frac{1}{2}g(\Delta t)^2$
2. a b c d **(e)** free-fall
3. a **(b)** c d e slope = zero
4. a b **(c)** d first stone always traveling faster than second stone
5. a **(b)** c d gravity always points down

Short Answer questions are worth 5 points. Please show all of your work, and clearly designate your answer. Partial credit may be given.

6: Don't Drink and Drive

$$v_{xi} = 21.9 \text{ m/s for both}$$

$$\Delta t_{sober} = 0.33 \text{ s}$$

$$\Delta t_{drunk} = 1.00 \text{ s}$$

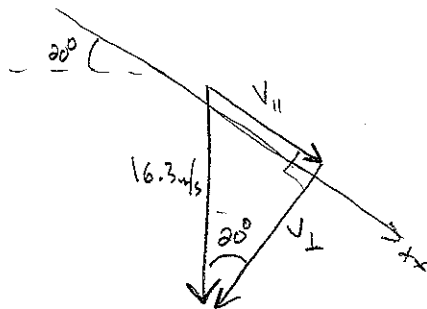
$$\begin{aligned} \Delta x_{sober} &= v_{xi} \Delta t_{sober} \\ &= 7.227 \text{ m} \end{aligned}$$

$$\begin{aligned} \Delta x_{drunk} &= v_{xi} \Delta t_{drunk} \\ &= 21.9 \text{ m} \end{aligned}$$

$$\text{difference: } \Delta x_{drunk} - \Delta x_{sober} = 14.673 \text{ m} \approx \boxed{15 \text{ m}}$$

7: Apple Doesn't Fall Far From the Tree

want component \parallel to slope

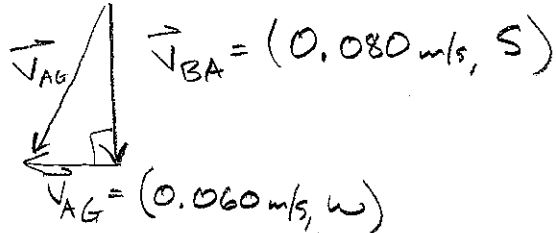


$$\sin 20^\circ = \frac{v_{\parallel}}{16.3 \text{ m/s}}$$

$$\begin{aligned} v_{\parallel} &= (16.3 \text{ m/s}) \sin 20^\circ \\ &= \boxed{5.5 \text{ m/s}} \end{aligned}$$

8: Bee Problem

$$\Delta t = 10.0 \text{ s}$$

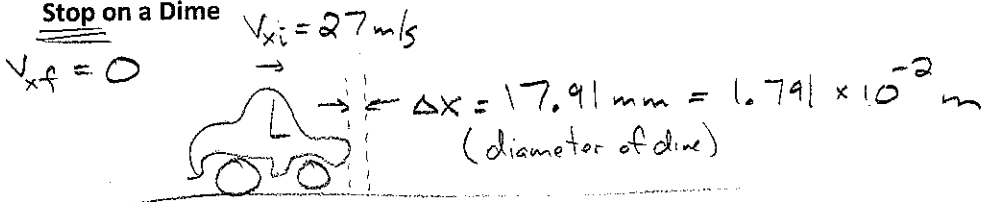


need \vec{v}_{BG} (Bee relative to Ground) to find distance

$$|\vec{v}_{BG}|^2 = |\vec{v}_{AG}|^2 + |\vec{v}_{BA}|^2 \Rightarrow |\vec{v}_{BG}| = 0.100 \text{ m/s} = v_{BG}$$

distance $\Delta x = v_{BG} \Delta t = \boxed{1.00 \text{ m}}$
(very slow bee)

9: Stop on a Dime



Use vel.-disp. eqn.

$$v_{xf}^2 = v_{xi}^2 + 2a_x \Delta x$$

$$v_{xf}^2 - v_{xi}^2 = 2a_x \Delta x$$

$$a_x = \frac{v_{xf}^2 - v_{xi}^2}{2\Delta x} = \frac{(0)^2 - (27 \text{ m/s})^2}{2(1.791 \times 10^{-2} \text{ m})} = 20,351 \text{ m/s}^2$$

$$\approx \boxed{20000 \text{ m/s}^2}$$

or

$$\boxed{2.0 \times 10^4 \text{ m/s}^2}$$

quite large, as it should be.

