Chapter 4: Questions

2D Kinematics – HW#2

Name: _____

Date: _____ Period: _____

1. You are to launch a rocket, from just above the ground, with one of the following initial conditions:

(1) $v_{0x} = 20\ \text{m/s},\ \ v_{0y} = 70\ \text{m/s}$

(2) $v_{0x} = -20\ \text{m/s},\ \ v_{0y} = 70\ \text{m/s}$

(3) $v_{0x} = 20\ \text{m/s},\ \ v_{0y} = -70\ \text{m/s}$

(4) $v_{0x} = -20\ \text{m/s},\ \ v_{0y} = -70\ \text{m/s}.$

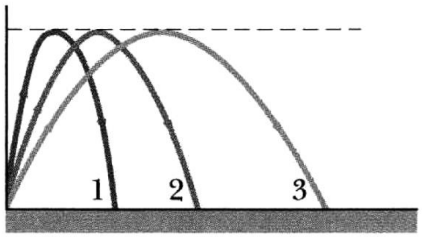
In your coordinate system, x runs along level ground and y increases upward.

(a) Rank the vectors according to the launch speed of the projectile, greatest first. Justify your answer.

(b) Rank the vectors according to the time of flight of the projectile, greatest first. Justify your answer.

2. The figure shows three paths for a football kicked from ground level. Ignore air resistance and rank the paths, greatest first, according to the following and justify each of your answers.

(a) maximum height



(b) initial vertical velocity components

(c) initial horizontal velocity components

(d) time of flight

(e) initial speed

3. The figure below shows three situations in which identical projectiles are launched (at the same level) at identical initial speeds and angles. The projectiles do not land on the same terrain, however.

Rank the situations according to the final speeds of the projectiles just before they land, greatest first. Justify your answer.

4. An airplane flying horizontally at a constant speed of 350 km/h over level ground releases a bundle of food supplies. Ignore air resistance and justify all of your answers, what are the bundle's initial

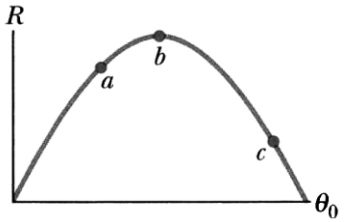
(a) vertical component of velocity

(b) horizontal component of velocity

(c) What is its horizontal component of velocity just before hitting the ground?

(d) If the airplane's speed were, instead, 450 km/h, would the time of fall be longer, shorter, or the same? Justify your answer.

5. A ball is shot from ground level over level ground at a certain initial speed. The graph to the right gives the range R of the ball versus its launch angle θ_0. Rank the three lettered points on the plot, greatest first, according to the following and justify all of you answers.



(a) the total flight time of the ball

(b) the ball's speed at maximum height