

HSS 409/537: Kinesiology/Biomechanics

Quiz 1 ANSWER KEY: CORRECT ANSWERS IN RED; EXPLANATIONS IN PARENTHESES

NOTE: THERE ARE THREE VERSIONS OF THIS QUIZ. THE ONLY DIFFERENCES ARE ORDER OF ITEMS AND/OR ORDER OF RESPONSES BETWEEN ITEMS.

Name _____

For each item, please circle the correct response(s). There may be 0-4 correct responses for each.

1. During a typical world class 100m sprinting event:
 - a. Acceleration can be constant throughout (NOT ACCORDING TO LAB 1 WHERE YOU SHOWED IT COULD NOT BE)
 - b. Initial velocity is zero (P.279, VERBATIM)
 - c. Velocity becomes negative at about the 60-70 yd mark (LAB 1; ACCELERATION BECOMES NEGATIVE, NOT VELOCITY)
 - d. The overall average velocity can be as high as 11 m/s (P.279 AND LAB 1: AVERAGE VELOCITY = s/t , OR , FOR THE MEN'S WORLD RECORD: $100 \text{ m}/9.58 \text{ sec} = 10.44 \text{ m/sec}$. CAN'T BE AS HIGH AS 11 m/sec.)

2. You hit a baseball out of the park from a height of 1m. It flies over the 50' outfield wall and lands in the parking lot which is 6m below the field level. Considering flight of the ball from bat to parking lot, the following are true:
 - a. Initial velocity in the x direction could be zero (CAN'T BE; IF IT WERE, THE BALL WOULD GO ZERO METERS IN THE X-DIRECTION)
 - b. Initial angle must be 45° to maximize range in the x-direction (P.286; IF OBJECT LANDS BELOW RELEASE HEIGHT, INITIAL ANGLE SHOULD BE LESS THAN 45° TO OPTIMIZE RANGE)
 - c. Velocity at impact must be greater than initial velocity (YES; CLASS NOTES, V_{ox} STAYS THE SAME BUT V_{ty} MUST BE MORE THAN V_{oy} SO THE RESULTANT OF V_t MUST BE GREATER THAN V_o)
 - d. V_t at peak must equal V_{ox} (YES; SINCE $V_{ty} = 0$ AT PEAK, THEN ALL THE VELOCITY MUST BE IN THE X DIRECTION AT PEAK, SO $V_t = V_{tx} = V_{ox}$.)

3. Acceleration for the ball in problem 2. above:
 - a. In the y direction at peak, equals zero (P.283; IT IS A CONSTANT 9.8 M/SEC^2 IN THE Y-DIRECTION)
 - b. In the x direction at peak, equals 0 (P.284; HORIZONTAL VELOCITY IN X-DIRECTION REMAINS CONSTANT – WHICH MEANS THAT ACCELERATION (THE CHANGE IN VELOCITY) MUST BE ZERO)
 - c. In the y-direction at landing, is greater than that at take-off (P.283; IT IS A CONSTANT 9.8 M/SEC^2 IN THE Y-DIRECTION)

- d. In the x-direction at landing, is greater than that at take-off (P.284; HORIZONTAL VELOCITY IN X-DIRECTION REMAINS CONSTANT – WHICH MEANS THAT ACCELERATION (THE CHANGE IN VELOCITY) MUST BE ZERO AT BOTH TAKE-OFF AND LANDING)