Projectile Motion Review

For each question below, think about each answer. Determine whether or not it correctly describes some aspect of projectile motion.

Which of the following statements are *true* of the *horizontal* motion of projectiles? List all that apply.

a. A projectile does not have a horizontal velocity.

b. A projectile with a rightward component of motion will have a rightward component of acceleration.

c. The horizontal velocity of a projectile changes by 9.8 m/s each second.

d. A projectile with a horizontal component of motion will have a constant horizontal velocity.

e. The horizontal velocity of a projectile is 0 m/s at the peak of its trajectory.

f. The horizontal velocity of a projectile is unaffected by the vertical velocity; these two components of motion are independent of each other.

g. The horizontal displacement of a projectile is dependent upon the time of flight and the initial horizontal velocity.

h. The final horizontal velocity of a projectile is always equal to the initial horizontal velocity.

i. As a projectile rises towards the peak of its trajectory, the horizontal velocity will decrease; as it falls from the peak of its trajectory, its horizontal velocity will decrease.

j. Consider a projectile launched from ground level at a fixed launch speed and a variable angle and landing at ground level. The horizontal displacement (i.e., the *range*) of the projectile will always increase as the angle of launch is increased from 0 degrees to 90 degrees.

k. Consider a projectile launched from ground level at a fixed launch angle and a variable launch speed and landing at ground level. The horizontal displacement (i.e., the *range*) of the projectile will always increase as the launch speed is increased.

Which of the following statements are *true* of the *vertical* motion of projectiles? List all that apply.

a. The vertical component of a projectile's velocity is a constant value of 9.8 m/s.

b. The vertical component of a projectile's velocity is constant.

c. The vertical component of a projectile's velocity is changing.

d. The vertical component of a projectile's velocity is changing at a constant rate.

e. A projectile with an upward component of motion will have a upward component of acceleration.

f. A projectile with a downward component of motion will have a downward component of acceleration.

g. The magnitude of the vertical velocity of a projectile changes by 9.8 m/s each second.

h. The vertical velocity of a projectile is 0 m/s at the peak of its trajectory.

i. The vertical velocity of a projectile is unaffected by the horizontal velocity; these two components of motion are independent of each other.

j. The final vertical velocity of a projectile is always equal to the initial vertical velocity.

k. The vertical acceleration of a projectile is 0 m/s/s when it is at the peak of its trajectory.

l. As a projectile rises towards the peak of its trajectory, the vertical acceleration will decrease; as it falls from the peak of its trajectory, its vertical acceleration will decrease.

m. As a projectile rises towards the peak of its trajectory, the vertical acceleration is directed upward; as it falls from the peak of its trajectory, its vertical acceleration is directed downward.

n. The peak height to which a projectile rises above the launch location is dependent upon the initial vertical velocity.

o. As a projectile rises towards the peak of its trajectory, the vertical velocity will decrease; as it falls from the peak of its trajectory, its vertical velocity will decrease.

p. Consider a projectile launched from ground level at a fixed launch speed and a variable angle and landing at ground level. The vertical displacement of the projectile during the first half of its trajectory (i.e., the *peak height*) will always increase as the angle of launch is increased from 0 degrees to 90 degrees.

q. Consider a projectile launched from ground level at a fixed launch angle and a variable launch speed and landing at ground level. The vertical displacement of the projectile during the first half of its trajectory (i.e., the *peak height*) will always increase as the launch speed is increased.

Which of the following statements are *true* of the *time* of flight for a projectile? List all that apply.

a. The time that a projectile is in the air is dependent upon the horizontal component of the initial velocity.

b. The time that a projectile is in the air is dependent upon the vertical component of the initial velocity.

c. For a projectile which lands at the same height that it is projected from, the time to rise to the peak is equal to the time to fall from its peak to the original height.

d. For the same upward launch angles, projectiles will stay in the air longer if the initial velocity is increased.

e. Assume that a kicked ball in football is a projectile. If the ball takes 3 seconds to rise to the peak of its trajectory, then it will take 6 seconds to fall from the peak of its trajectory to the ground

1. A very tall basketball player shoots a jump shot. The launch angle is +75.0°, and the total hang time is 3.0 seconds. Assume that the launch height and hoop height are the same.

What was the launch speed?

What is the range?

2. A bowling ball rolls off of a 1.25 meter tall table. It hits the ground 1.75 meters from the edge of the table.

What was the launch speed?

What was the time in flight?

What was the final velocity?

3. A student is launching marshmallows trying to find a way to get the marshmallow launcher to shoot a mallow into his mouth. The marshmallow launcher is launching at 30.0° with a speed of 25 m/s. Assuming perfect projectile motion (his mouth is the same height as the marshmallow)

What is the range of the marshmallow?

What is the total time in flight?

What is the maximum height?

What is its final velocity?