Projectile Motion 1

A ball is rolling with a reasonable speed along a horizontal table. Draw a diagram to represent the path of a ball after it rolls off the edge of a table until it hits the floor. Ignore any effects due to air resistance.

Using a motion diagram, determine the direction of the ball's acceleration while in flight (after it leaves the table and before it hits the floor). Do it on the above diagram.

What direction is the acceleration? _____

Draw a free-body diagram of the ball while in flight. Identify the type of force(s) acting on the ball and the two objects involved with each force(s).

What direction is the net force? _____

Now, draw the motion diagram of the horizontal portion of the ball's motion during its flight.

What is the x-component of the acceleration? _____
Now, draw the motion diagram of the vertical portion of the ball's motion during its flight.

What is the y-component of the acceleration? _____

Projectile Motion 2

You are watching a low flying biplane that is flying parallel to the ground. The biplane releases a bowling ball. Draw a diagram to represent the path of a bowling ball after it leaves the biplane until it hits the ground. Ignore any effects due to air resistance.

What direction is the bowling ball's acceleration? _____
Use a motion diagram to determine this.

What direction is the net force acting on the bowling ball while it is falling? _____

Use a freebody diagram to help you identify the type of force(s) acting on the bowling ball and the two objects involved with each force(s).

Now draw a new diagram of the motion of the bowling ball (after release) and the biplane (assuming it continues to fly horizontally at the same speed). Draw about 4 or 5 consecutive frames of their motion.

Projectile Motion 3

In a movie a stuntperson is to drive a car off a 10 m high cliff into the water below. Draw a diagram to represent the path of a car after it leaves the cliff until it hits the water. Ignore any effects due to air resistance.

What direction is the car's acceleration? _____
Use a motion diagram to determine this.

What direction is the net force acting on the car while it is falling? _____
Use a freebody diagram to help you identify the type of force(s) acting on the car and the two objects involved with each force(s).

Now draw a new diagram of the motion of the car (after leaving the cliff) and the stuntperson (who jumps out of the car after it has left the cliff, but before the car hits the water). Draw about 4 or 5 consecutive frames of their motion.

Projectile Motion 4

A homerun is hit by Lance Berkman over the left field fence. Draw a diagram to represent the path of the baseball after it leaves his bat, but before it hits the stands. Ignore any effects due to air resistance.

Using a motion diagram, determine the direction of the ball's acceleration while in flight (after it leaves the bat and before it hits the stands). Do it on the above diagram.

What direction is the acceleration? _____

Draw a free-body diagram of the ball while in flight. Identify the type of force(s) acting on the ball and the two objects involved with each force(s).

What direction is the net force? _____

Now, draw the motion diagram of the horizontal portion of the ball's motion during its flight.

What is the x-component of the acceleration? _____
Now, draw the motion diagram of the vertical portion of the ball's motion during its flight.

What is the y-component of the acceleration? _____

Projectile Motion 5

A plane is diving toward the ground when it releases a water bomb. Draw a diagram to represent the path of the water bomb after it leaves the plane but before it hits the ground. Ignore any effects due to air resistance.

Using a motion diagram, determine the direction of the water bomb's acceleration while in flight (after it leaves the plane and before it hits the ground). Do it on the above diagram.

What direction is the acceleration? _____

Draw a free-body diagram of the water bomb while in flight. Identify the type of force(s) acting on the water bomb and the two objects involved with each force(s).

What direction is the net force? _____

Projectile Motion 6

A quarterback is throwing a long pass to the wide receiver. Draw a diagram to represent the path of the football after it leaves the quarterback's hand until it is caught by the wide receiver. Ignore any effects due to air resistance.

What direction is the football's acceleration? _____
Use a motion diagram to determine this.

What direction is the net force acting on the football while it is in flight? _____

Use a freebody diagram to help you identify the type of force(s) acting on the football and the two objects involved with each force(s).

What is the velocity of the football at its maximum height? _____

What is its x-component of the velocity? _____

What is its y-component of the velocity? _____