Name_____

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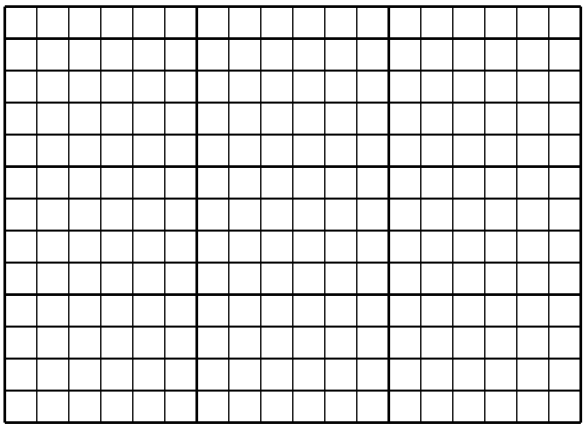
Particle Models in Two Dimensions Worksheet 3:
Projectile Motion Problems

In all the problems below, draw a diagram to represent the situation. Identify the knowns and unknowns and label clearly.

1. The movie "The Gods Must Be Crazy" begins with a pilot dropping a bottle out of an airplane. A surprised native below, who thinks it is a message from the gods, recovers it. If the plane from which the bottle was dropped was flying at a height of 500m, and the bottle lands 400m horizontally from the initial dropping point, how fast was the plane flying when the bottle was released?

b. Draw a 2-dimensional motion map for the velocities and another for the acceleration.

2. Suppose that an airplane flying 60 m/s, at a height of 300m, dropped a sack of flour. How far from the point of release would the sack have traveled when it struck the ground? Where will the plane be in relation to the sack when the sack hits the ground? Illustrate your answer carefully using the grid provided.



3. In many locations, old abandoned stone quarries have become filled with water once excavating has been completed. While standing on a quarry wall, a boy tosses a piece of granite into the water below. If he throws the rock horizontally with a velocity of 3.0 m/s, and it strikes the water 4.5 m away, how high above the water is the wall?

4. Tad drops a cherry pit out the car window 1.0 m above the ground while traveling down the road at 18 m/s. How far, horizontally, from the initial dropping point will the pit hit the ground? If the car continues to travel at the same speed, where will the car be in relation to the pit when it lands?

5. A kickoff sends a football with an initial velocity of 25 m/s at an angle of 50 degrees above horizontal.

   a. Find the x and y-components of the velocity

   b. Find the time the ball is in the air

   c. Find the horizontal distance the ball travels before hitting the ground.

d. Find the maximum height of the ball.

e. Draw a 2-dimensional motion map for the velocities (v_x, v_y, and v) and another for the acceleration.