**Kinematics 2D: Projectile Motion 1**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

I. Solve the following problems. Show your work on a separate piece of paper. Use ±10m/s2 for acceleration due to gravity.

1. An object is launched horizontally from a cliff. The cliff is 80m high and the object has an initial velocity of 50m/s. Find:

a. Initial horizontal velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

b. initial vertical velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

c. final horizontal velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

d. final vertical velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

e. Final resultant velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

f. angle at which the projectile strikes the ground \_\_\_\_\_\_\_\_\_\_\_\_\_

g. How far from the base of the cliff the projectile lands \_\_\_\_\_\_\_\_\_\_\_\_\_

2. A projectile is launched at a velocity of 100m/s at a 30 degree angle. Find:

a. Initial horizontal velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

b. initial vertical velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

c. final horizontal velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

d. final vertical velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

e. Final resultant velocity \_\_\_\_\_\_\_\_\_\_\_\_\_

f. angle at which the projectile strikes the ground \_\_\_\_\_\_\_\_\_\_\_\_\_

g. Total time of flight \_\_\_\_\_\_\_\_\_\_\_\_\_

h. Maximum height reached \_\_\_\_\_\_\_\_\_\_\_\_\_

i) Horizontal range of the projectile \_\_\_\_\_\_\_\_\_\_\_\_\_

3. A pool ball leaves a 0.60‐meter high table with an initial horizontal velocity of 2.4 m/s. Predict:

a. the time required for the pool ball to fall to the ground \_\_\_\_\_\_\_\_\_\_\_\_\_

b. the horizontal distance between the table's edge and the ball's landing location. \_\_\_\_\_\_\_\_\_\_\_\_\_

4. A soccer ball is kicked horizontally off a 22.0‐meter high hill and lands a distance of 35.0 meters from the edge of the hill.

a. Determine the initial horizontal velocity of the soccer ball. \_\_\_\_\_\_\_\_\_\_\_\_\_

5. A football is kicked with an initial velocity of 25 m/s at an angle of 45‐degrees with the horizontal. Determine:

a. the time of flight \_\_\_\_\_\_\_\_\_\_\_\_\_

b. the horizontal distance \_\_\_\_\_\_\_\_\_\_\_\_\_

c. the peak height of the football. \_\_\_\_\_\_\_\_\_\_\_\_\_

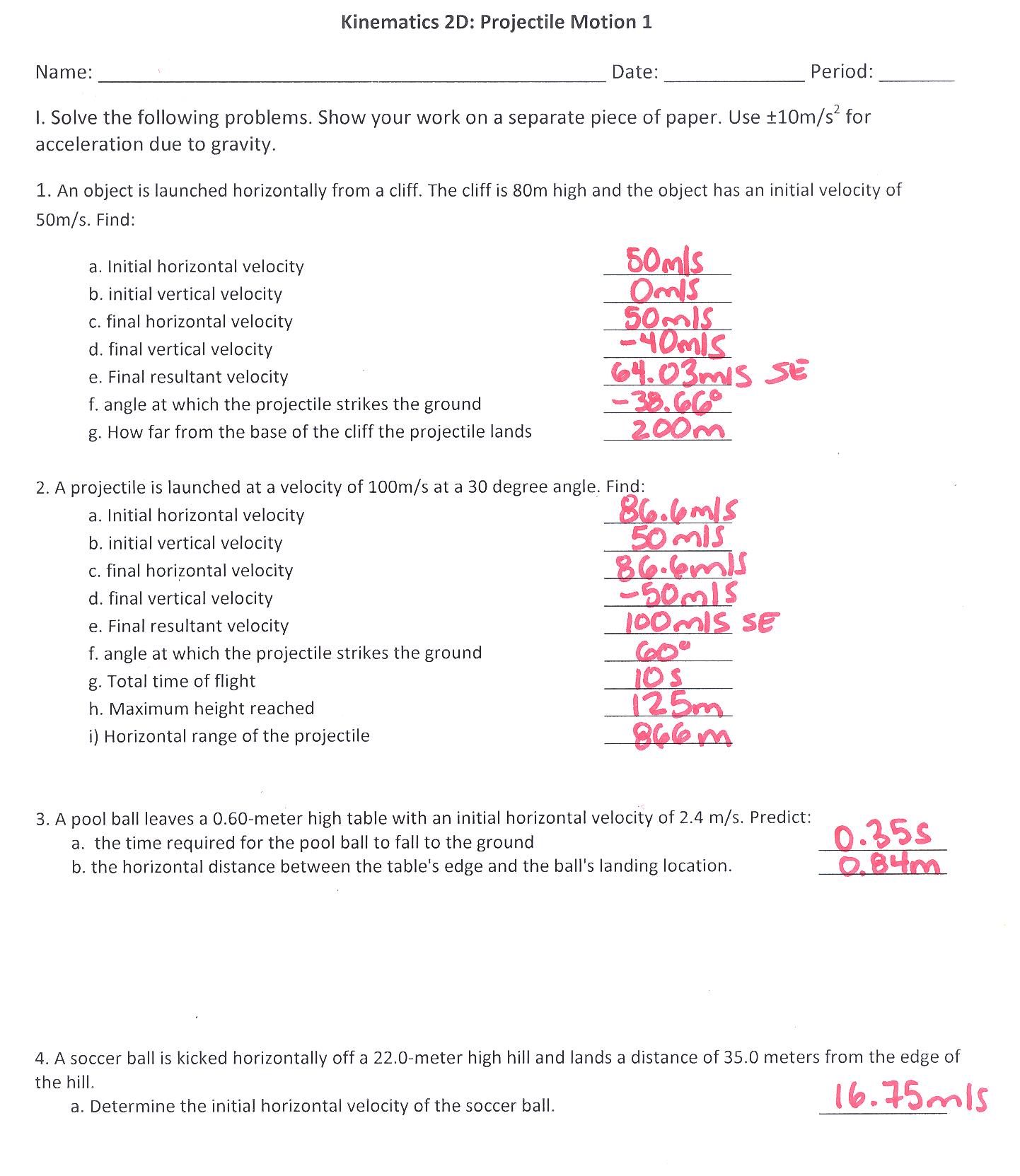
6. A ball is launched into the air at an angle of 32° with an initial speed of 18.0 m/s. Neglecting air resistance, determine how long the ball will be in the air? \_\_\_\_\_\_\_\_\_\_\_\_\_

7. A ball is tossed into the air at a speed of 64.0 m/s at an unknown angle. If the ball is observed to rise to a maximum height of 7.80m, at what angle was the ball thrown relative to the ground? \_\_\_\_\_\_\_\_\_\_\_\_\_

8. An object is launched from the ground into the air at an angle of 38° (above the horizon) towards a vertical brick wall that is 15.0 m horizontally from the launch point. If the ball takes 1.30 seconds to collide with the wall, with what speed was the ball launched? \_\_\_\_\_\_\_\_\_\_\_\_\_

9. A tiger leaps horizontally from a 6.5m high rock with a velocity of 3.5m/s in the horizontal direction. How far from the rock will the tiger land? \_\_\_\_\_\_\_\_\_\_\_\_\_

10. A ball is thrown horizontally from the roof of a building 45.0m tall and it lands 24.0m from the base. What is the ball’s initial velocity? \_\_\_\_\_\_\_\_\_\_\_\_\_

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