**Kinematics 2D: Projectile Motion 2**

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. A projectile is launched with a velocity of 100.0m/s at an angle of 35.0 degrees above the horizontal.

a. What is its horizontal range? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. What is the time of flight of the projectile? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. What is the maximum height reached by the projectile? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. A projectile is launched at a 40.0 degree angle at some velocity.

a. What angle will give the same range at the same velocity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Which angle gives a higher maximum height? Which angle gives a longer time of flight?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Which has a longer range, a projectile launched at 40.0 degrees and 100.0m/s or a projectile launched at 70 degrees and 220m/s? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. An object is launched horizontally off a 100.0m cliff at a velocity of 50.0m/s.

a. How far did it go? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Find the angle at which it strikes the ground. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. A cannon has a velocity of 100m/s.

a. What angle must a cannonball be fired at in order to have a time of flight of 5s?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. What is the horizontal range? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. At what angle should the cannon be aimed at in order to give the greatest range? What would the range be? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. A projectile is launched at 1000m/s at angle of 30 degrees. If the angle is changed to 60 degrees, what must the velocity be in order to have the same time of flight? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. A projectile is propelled horizontally off a cliff. The cliff is 100m high and the projectile lands at an angle of 15 degrees above the horizontal. What was the initial velocity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. A projectile is launched at 45 degrees. It reaches its highest point in 10s. Find its initial velocity.

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9. A projectile is launched horizontally from a cliff. Its final resultant velocity is 100m/s. The cliff is 30m high. What was the initial velocity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. A man walks 50 meters due east, then 50 meters north-east (with an angle of 60˚). Determine the magnitude and direction (angle) of the resultant displacement. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. Use the trigonometric component method to determine the sum of following displacement vectors: A=4.0 m @ 53˚ NE, B=6.0m @ 45˚ NW & C=2.0 m @ 60˚ SW. \_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_

B

N

A

W

E

S

C

