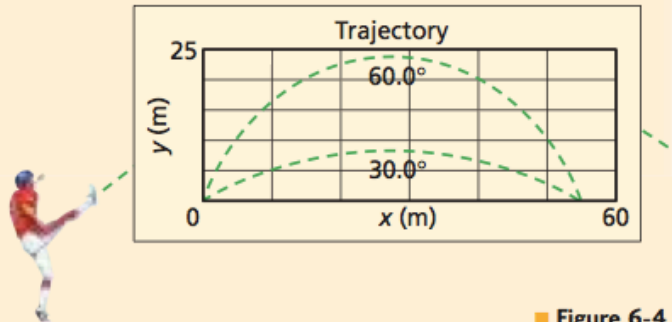


Name \_\_\_\_\_

1. A stone is thrown horizontally at a speed of 5.0 m/s from the top of a cliff that is 78.4 m high.
  - a. How long does it take the stone to reach the bottom of the cliff?
  - b. How far from the base of the cliff does the stone hit the ground?
  - c. What are the horizontal and vertical components of the stone's velocity just before it hits the ground?

4. A player kicks a football from ground level with an initial velocity of 27.0 m/s,  $30.0^\circ$  above the horizontal, as shown in **Figure 6-4**. Find each of the following. Assume that air resistance is negligible.
  - a. the ball's hang time
  - b. the ball's maximum height
  - c. the ball's range



■ Figure 6-4

5. The player in problem 4 then kicks the ball with the same speed, but at  $60.0^\circ$  from the horizontal. What is the ball's hang time, range, and maximum height?
6. A rock is thrown from a 50.0-m-high cliff with an initial velocity of 7.0 m/s at an angle of  $53.0^\circ$  above the horizontal. Find the velocity vector for when it hits the ground below.

7. Florence Griffith-Joyner of the United States set the women's world record for the 200 m run by running with an average speed of 9.37 m/s. Suppose Griffith-Joyner wants to jump over a river. She runs horizontally from the river's higher bank at 9.37 m/s and lands on the edge of the opposite bank. If the difference in height between the two banks is 2.00 m, how wide is the river?
8. The longest shot on a golf tournament was made by Mike Austin in 1974. The ball went a distance of 471 m. Suppose the ball was shot horizontally off a cliff at 80.0 m/s. Calculate the height of the cliff.
9. The world's largest flowerpot is 1.95 m high. If you were to jump horizontally from the top edge of this flowerpot at a speed of 3.0 m/s, what would your landing velocity be?

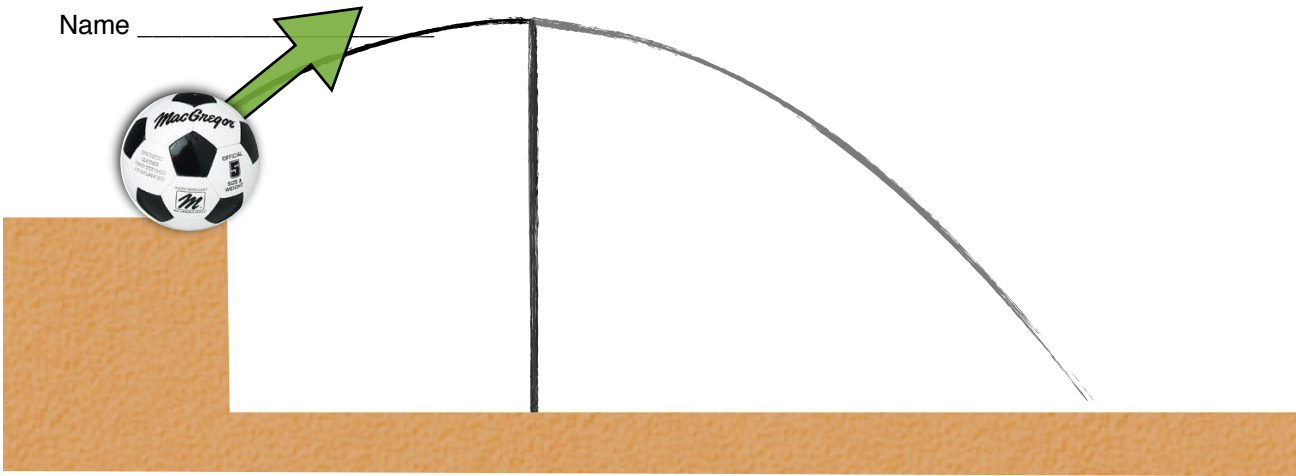
Academic Projectile Assignment

Name \_\_\_\_\_

10. A marble rolls off the edge of a table that is 0.734 m high. The marble is moving at a speed of 0.122 m/s at the moment that it leaves the edge of the table. How far from the table does the marble land?
  
11. A ball is thrown from a roof with a speed of 10.0 m/s and an angle of  $37.0^\circ$  with respect to the horizontal. What are the vertical (y) and horizontal (x) components of the ball's displacement 2.5 s after it is thrown?
  
12. A downed pilot fires a flare from a flare gun. The flare has an initial speed of 250 m/s and is fired at an angle of  $35^\circ$  to the ground. How long does it take for the flare to reach its maximum altitude?
  
13. A tennis ball is thrown toward a vertical wall with a speed of 21.0 m/s at an angle of  $40.0^\circ$  above the horizontal. The horizontal distance between the wall and the point where the tennis ball is released is 23.0 m.
  - a. At what height above the point of release does the tennis ball hit the wall?
  - b. Has the tennis ball already passed the highest point on its trajectory when it hits the wall? Justify your answer.

Academic Projectile Assignment

Name \_\_\_\_\_



14. A soccer ball is kicked from the top of a 180 m cliff with an initial velocity of 57 m/s at  $39^\circ$ .
- a. Find the maximum height
  - b. Find the time to the ground
  - c. Find the final velocity
  - d. Find the range.

Max Height	Total Time	Final Velocity	Range

Name \_\_\_\_\_

e.

- 51.** You accidentally throw your car keys horizontally at 8.0 m/s from a cliff 64-m high. How far from the base of the cliff should you look for the keys?
- 52.** The toy car in **Figure 6-12** runs off the edge of a table that is 1.225-m high. The car lands 0.400 m from the base of the table.
- How long did it take the car to fall?
  - How fast was the car going on the table?



■ Figure 6-12

- 53.** A dart player throws a dart horizontally at 12.4 m/s. The dart hits the board 0.32 m below the height from which it was thrown. How far away is the player from the board?