Please do all of your work on a separate piece of paper.

Symmetrical Projectile Motion

7. `Mike Easter threw a javelin at 57 m/s and at an angle of 25 degrees with the ground. Neglect the height of the javelin when it was thrown. So it lands at the same height it is thrown from.
    a. How high did the javelin travel?
    b. How long was it in the air?
    c. How far along the ground did the javelin travel?
    d. How fast, (direction and magnitude), was it traveling when it hit the ground?
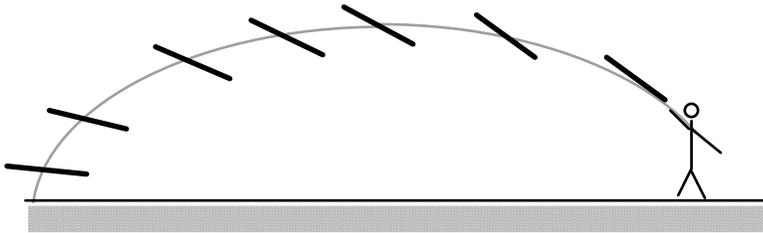
8. An arrow is shot up at a 37° angle with the horizontal. The Arrow leaves the bow traveling 68 m/s. Eventually it lands on the ground.
    a. How high above the ground did the arrow travel? Neglect the height of the bow from the ground when shot.
    b. How long was it in the air?
    c. How far across the ground did it travel?

9. The motorcycle dare-devil Evil Kinevil is about to make a world record distance jump. He leaves the jump ramp at 45m/s. The ramp is at a 22° angle with the ground. He lands at the same height he took off from.
    a. How high does he travel?
    b. How long is he in the air?
    c. What is the distance of his jump?
    d. what is his velocity when he lands?

10. Robbie Knievel is about to make another world record distance jump. He leaves the jump ramp at 45m/s. The ramp is at a 68° (90°-22°) angle with the ground. He lands at the same height he took off from.
    a. How high does he travel?
    b. How long is he in the air?
    c. What is the distance of his jump?
    d. what is his velocity when he lands?

11.   A spear is thrown with velocity of 30 m/s at a 34° angle with the ground? Neglect the initial height the spear was thrown from.
    a   How far did the spear travel?
    b   How long was the spear in the air?
    c   How high did the spear travel?

12.   A dare devil stunt man travels off a jump with velocity of 50 m/s at a 20° angle with the ground? The stunt man lands at the same height he took off from.
    a   How far away should the landing ramp be placed?
    b   How long was the motorcycle dare devil in the air?
    c   How high did the motorcycle dare devil travel?

13.   A baseball player bats a ball with a velocity of 60 m/s at an angle of 80° with the ground.
    a   How far did the ball travel?
    b   How long was the ball in the air?
    c   How high did the ball travel?
    d   A baseball player from the opposing team is standing 30 m from where the ball is going to land. What average speed does the player have to run to catch the ball?

14.   Typically an assault rifle shoots a bullet at 1000 m/s. The rifle is aimed at 10.0° and the bullet lands on the ground. Neglect the height the bullet was shot from.
    a   How far did the bullet travel?
    b   How long was the bullet in the air?
    c   How high did the bullet travel?

15. Not knowing any better, Tom hit Jerry with a tennis racquet. Jerry left the racquet with a velocity of 60 m/s at a 75° angle.

Please do all of your work on a separate piece of paper.

    a. How much time passes before Jerry hits the ground?
    b. How high does Jerry travel?
    c. How far along the ground does Jerry travel?
    d. How fast is Jerry traveling when he hits the ground?
    e. How far along the ground will Jerry travel if he is launched at a 15° angle with the ground at 60 m/s?
    f. What is the relationship between 75° and 15°?
    g. Who are Tom and Jerry?

16.   In a football game, a quarterback throws a ball to a receiver. The quarterback takes the hike from the center. 3.0 seconds later he passes the ball with a velocity of 20 m/s at a 30° angle with the ground.
    a   How high did the ball travel?
    b   How long was the ball in the air?
    c   How far down the field did the ball travel?
    d   What speed will the ball hit the ground with and at what angle?
    e With what average velocity will the receiver have to run with in order to catch the ball the moment it gets to the ground?

17.   While traveling down the road, a driver loses control of his car the bounces off a curb at a 8.5° angle with the ground. The car lands at the same height is takes of from. The car was traveling 40.0 m/s when it bounced at 8.5°.
    a   How long was the car in the air?
    b   How far did the car travel?
    c   What velocity did the car impact the ground with? (magnitude _AND_ direction)

18. Waldo Walenda, one of The Flying Walenda's, was swinging on a trapeze. He let go of the trapeze when it was traveling 20.0 m/s at a 40.0° angle with the vertical. Waldo is to catch another trapeze that is *at the same height* as the one he left . When he catches the other trapeze it is to be at the end of its swinging motion. Try to recreate the situation using these questions as a guide.
    a. How long was Waldo in the air?
    b. How high above the trapeze did Waldo travel?
    c. How far from the trapeze was the waiting trapeze (Horizontal distance)?
    • d. If the waiting trapeze has a length of 6 meters, at what time -relative to the moment when Waldo lets go of the trapeze- does the waiting trapeze need to be released?