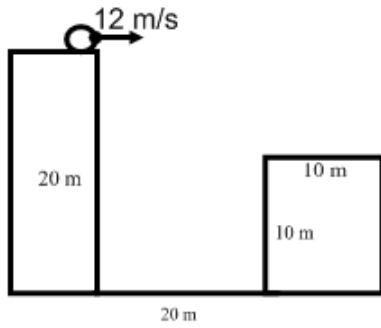
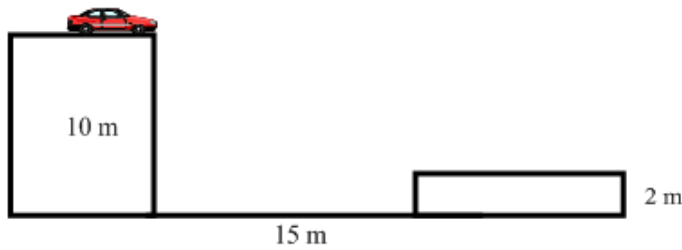


1. The punter on a football team kicks a ball with an initial velocity of  $25.0 \text{ m/s}$  at  $60^\circ$ . The ball leaves his foot at a height of  $0.75 \text{ m}$  above the ground. Find the range of the kick.
2. A tennis player strikes a ball *horizontally* with a velocity of  $28.0 \text{ m/s}$  and it hits the ground  $19.6 \text{ m}$  from him. From what height was the ball struck?
3. While attempting to climb down a chimney, Santa Claus trips, falls and slides down the roof. If the "pitch" of the roof is  $20^\circ$  (angle from horizontal) and Santa reaches the end of the roof with a velocity of  $5.0 \text{ m/s}$ , find the distance he falls if he lands  $4.0 \text{ m}$  from the base of the house.
4. A rock is thrown *horizontally* from the top of a lighthouse and lands in the water  $5.0 \text{ s}$  later. If the rock enters the water at  $45^\circ$  (i.e. the final velocity is at  $45^\circ$  angle to the water), find the height of the lighthouse, the initial velocity and the range of the rock.
5. A golf ball is driven from an elevated tee. If *after* being in the air for  $4.0 \text{ s}$ , the velocity of the ball is  $30.0 \text{ m/s}$  at  $37^\circ$  below horizontal, find:
  - a. the initial velocity
  - b. the range
  - c. the vertical displacement
  - d. draw a picture of the ball's flight showing its position relative to its original position.
6. Flipper sees a bird flying close to the surface of the water and decides to have lunch. If he leaves the water with a velocity of  $8.00 \text{ m/s}$  at  $60^\circ$ , find:
  - a. the total time he is in the air
  - b. his range
  - c. his maximum height
7. An airplane flying with a *horizontal* velocity of  $100 \text{ m/s}$  is carrying Super Dave Osbourne. The airplane is flying at an altitude of  $500 \text{ m}$ . Super wants to jump from the plane and land in an in-ground swimming pool that measures  $50 \text{ m}$  long. If he jumps from the plane when the horizontal distance to the front end of the pool is  $1000 \text{ m}$ , will he land in the pool? (be specific when you answer the question.)
8. Tiger Woods is standing on the seventh tee at Pebble Beach. The length of the hole is  $107 \text{ m}$  and the tee is  $12 \text{ m}$  above the green. If he hits the ball with an initial velocity of  $30 \text{ m/s}$  at  $53^\circ$ , assuming he hits the ball straight, how long will his putt be?
9. While standing on the roof of a bus that is travelling north with a velocity of  $30 \text{ m/s}$ , Super Dave prepares for his next stunt. Suddenly the bus driver slams on the brakes to avoid a cat and Super leaves the roof and lands down the road  $25 \text{ m}$  from the point where the bus applied the brakes. Find the height of the bus.
10. David Ortiz, the DH for the Red Sox, hits a hanging curveball that is  $1.00 \text{ m}$  off the ground. The ball has an initial velocity of  $35 \text{ m/s}$  at  $53^\circ$  when it leaves the bat. The left field fence, affectionately called the Green Monster is  $100 \text{ m}$  from home plate and is  $15.0 \text{ m}$  tall. Does David hit a home run? Be specific i.e. if he does, find by how much the ball clears the fence; if it doesn't where on the wall does the ball hit.
11. A golf ball is launched at an elevation angle of  $60^\circ$  on a level field that measures  $120 \text{ m}$  in length. If it lands  $10.0 \text{ m}$  short of the hole find the initial velocity of the ball.
12. Super Dave is launched from a cannon from the top of a  $20 \text{ m}$  cliff and lands on a tugboat that is  $100 \text{ m}$  from the base of the cliff. Find the initial velocity of Super if the cannon's elevation angle is  $30^\circ$ .
13. A toy rocket is launched on a football field from the goal line with a velocity of  $35 \text{ m/s}$ , find the possible launch angles if the rocket lands on the other goal line. The football field is  $100 \text{ m}$  long.

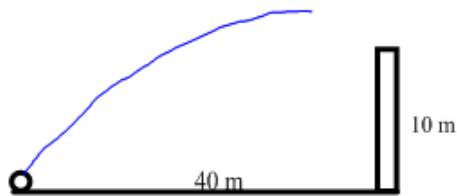
14. In the diagram below find where the ball hits. (Could be either the wall or the other building)



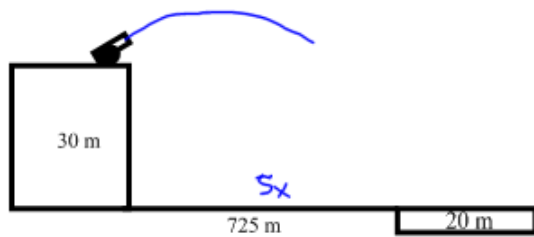
15. For the car in the diagram below, what is the minimum initial velocity that would allow the car to safely land on the other building?



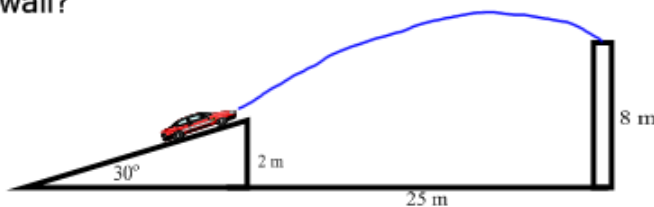
16. In the diagram below, the ball is kicked with an initial velocity of 32 m/s @ 25°. Will the ball clear the wall? Be specific i.e. where does it hit or determine by how much does it clear the wall.



17. In the diagram below, would the cannon ball land on the raft? Be specific. Assume that the initial velocity of the cannon ball is 90 m/s @ 30°



18. For the diagram below what is the minimum initial velocity that the car could have so that it clears the wall?



19. The ski jumper in the diagram below slides down the ramp starting from rest. The acceleration on the ramp is 4.9 m/s<sup>2</sup>. Find the range of the jumper.

