Advanced Physics I Chapter 3 Problem Set

1. Vector A lies in the xy-plane. When are the components both positive? When are the components both negative? When are they opposite?

2. A projectile is fired on Earth with some velocity. Another projectile is fired on the moon with the same velocity. Which one will travel the greater distance?

3. A ten pound bowling ball is dropped at the same instant a bullet is fired horizontally from the same height, which has the greatest x velocity and which has the greatest y-velocity as it hits the ground?

4. A ball is thrown straight up into the air by a person standing on a flatbed train car moving 45 miles per hour, describe what the person on the train sees and a person standing along the tracks.

5. A car is traveling through the mountains of West Virginia. The car goes 5.0miles south at $35°$ above the horizontal and then goes 10.0miles south $40.0°$ below the horizontal. Graphically solve for the displacement of the car.

6. A dog takes a walk 3.50 miles south and 15.0 miles west. What is the displacement of the dog? (distance and direction)

7. A papergirl's route takes her 3.00 blocks west, 4.00 blocks north and 6.00 blocks east. What is her displacement?

8. Mr. K's motor boat sets out at 3.30mi/hr heading straight north across a .505mile wide river that flows west to east at 1.25mi/hr. How long does it take the boat to cross and where does it end up?

9. It is rabbit season (duck season) in Illinois. Mr. L fires 12 gauge slug with a mass of 1ounce mass perfectly horizontal with muzzle velocity of 300m/s at a rabbit 1.50m up in a tree and 100m away. The rabbit doesn't move. Where does the slug hit? Is the rabbit stew?

10. Mr. K fires a cannonball at Dr. H at 55.0^o with an initial velocity of 1.70×10^3m/s. If Dr. H is standing 311m away, how long does he have to calculate if it is going to hit him? Does it?

11. Mr. L is playing baseball and hits a homerun in such a way that the ball just clears a 21m high fence, located 130m from home plate. The ball is initially struck 1.0m high and at an angle of 35_o from the ground. Find initial velocity, time to reach the wall, the x and y components at the wall, and their resultant.

12. Dr. H pitches baseball at 100.8mi/hr. The distance to home plate from the pitching rubber is 60ft 6in. How long does a batter have before the ball reaches the plate? If he releases at a height of 5ft8in and parallel to the ground, how high will the ball be at the plate?

13. Mr. K is planning on jumping his Honda Fit over a pit of hungry kittens 10.0m wide and 10.0m deep. If his take off ramp is at a 25.0^o angle, what must his initial speed be?

14. Mr. L having no luck with rabbit hunting decides to hunt rhinoceros with his compound bow. What angle must Mr. L aim his bow if the initial velocity of his arrow is 95.0m/s and the rhino is 125m away.