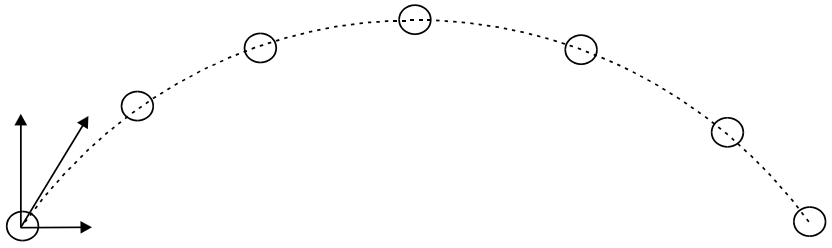
AP Physics – Vectors is Back – 9

/30

Who you is _____Per___

We choose our joys and sorrows long before we experience them. -- Khalil Gibran

1. Draw the velocity vectors (resolved as x and y and appropriate length) onto the balls below:



2. A projectile is launched with an initial speed of 60.0 m/s and an angle of 30.0° above the horizontal. The projectile lands on a hillside 4.00 s later. Neglect air friction. (a) What is the projectile's velocity at the highest point of its trajectory? (b) What is the straight-line distance from where the projectile was launched to where it hits?

3. A gigantic roc (the mythical bird that gave Sinbad a real bad time) picks up a boat and flies off with it. The bird releases the boat. The boat travels 235 m in the horizontal direction before it hits the water. The bird was flying level at a speed of 23.5 m/s. How high was the bird flying when it dropped the boat?

4. A speedy destroyer's 5 inch gun fires a projectile at an angle of 21.0° to the horizontal. If the thing travels a horizontal distance of 23 500 m in 135 s, what was the projectile's initial velocity?

5. A car is parked on a cliff overlooking the ocean on an incline that makes an angle of 24.0° below the horizontal. The negligent driver leaves the car in neutral, and the emergency brakes are defective. The car rolls from rest down the incline with a constant acceleration of 4.00 m/s^2 for a distance of 50.0 m to the edge of the cliff. The cliff is 30.0 m above the ocean. Find (a) the length of time the car is in the air, and (b) the car's position relative to the cliff when the car lands in the ocean.

6. An overpaid (really overpaid) baseball player hits a homerun. The ball is caught by one of the few baseball fans left under the age of 50 in the stands in the cheap seats. It is caught 7.50 m above the point from which it was hit. At the moment it was caught (or an instant before if you prefer) it had a velocity of 36.0 m/s at an angle of 28.0° below the horizontal. Ignoring air resistance, find the initial velocity of the ball when it was hit.

7. A basketball hoop is 3.05 m above the playing surface. A basket is made. The ball reached a maximum height that was 2.00 m above the height of the basket hoop. The basketball was launched from a height of 1.95 m. If the ball traveled a horizontal distance of 5.20 m, what was the initial velocity of the basketball?