Projectile Motion in 2 Dimensions

*Instructions: Answer each of the following questions*

1. A base ball is thrown with an initial speed of 20 m/s at an angle of 100 above the horizontal. Determine:
   1. How long it is in the air for. *(t = 0.71s)*
   2. What its maximum height will be. *(0.61 m)*
   3. How the range (horizontal displacement) is. *(14 m)*
2. Mike the mighty projectile man fires himself out of a circus canon at angle of 380 above the horizontal with an initial velocity of 35 m/s.
   1. How long is Mike in the air for? *(4.4 s)*
   2. How far does Mike travel? *(121 m)*
   3. What are the x and y components of his velocity after 1.0s? *(vx=28 m/s; vy=12m/s)*
3. An artillery shell is launched at an unknown angle. It it strikes the ground (at the height that it was fired) 250 m away and has a maximum height of 100 m. Determine:
   1. The time the shell is in the air. *(9.03 s)*
   2. The horizontal velocity. *(27.7 m/s)*
   3. The initial vertical velocity. *(44.3 m/s)*
   4. The initial speed. *(52.2 m/s)*
   5. The angle the projectile was launched at. *(58.0o)*
4. An archer fires an arrow from the top of a 15 m high castle wall. If the arrow is fired at 300 to the horizontal with an initial speed of 50 m/s find
   1. The horizontal velocity. *(43 m/s)*
   2. The initial vertical velocity. *(25 m/s)*
   3. Maximum height of the arrow. *(47 m)*
   4. Time to reach the maximum height. *(2.5 s)*
   5. Time to fall from the maximum height. *(3.1 s)*
   6. How far from the base of the castle wall the arrow will be when it strikes the ground. *(2.4 x 102 m)*
5. A tennis ball is hit at 200 to the horizontal with an initial speed of 25 m/s. Find
   1. Its height after 1 s *(3.6 m).*
   2. How long it will take for the projectile to first have a height of 3.0 m. *(0.49 s)*