Projectile Motion Notes – Projectile’s Launched at an angle

From our notes before, we said that\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_motions create projectile motion.   
We also said that we must think about horizontal and vertical motions \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_from one another.   
This means we need to have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for both horizontal and vertical motions.

Here are the formulas:

|  |  |
| --- | --- |
| Horizontal Motion | Vertical Motion |
| v = x / t  x = vt  t = x / v | dy = Viyt + ½ gt² |
| Vfy = Viy +gt |
| Vfy2 = Viy2 +2gdy |

**Example #1:  
A soccer ball is kicked with an initial velocity of 10 m/s at an angle of 30ᵒ to the horizontal.**

Picture:

**Step 1: Resolve velocity into horizontal and vertical components.**

Picture:

**a.) Find the time of flight of the projectile:**  
In these problems… these objects have a final velocity (vf) of \_\_\_\_\_\_\_\_\_ at the **top of the object’s path** (this is only ½ way though the projectile’s path).  
First: Use vfy = viy + gt -- to find ½ time. Multiply ½ time by 2 to get full time:

**b.) Find the maximum height of the projectile:**   
Use dy = Viyt + ½ gt²

**c.) What is the horizontal distance (range) the ball travels?**

Use dx = vxt

**2. A football is being kicked with a velocity of 15 m/s at a 24ᵒ angle to the horizontal.**

Picture:

**Find the full time the projectile was in the air:**  
Formula:

Plug in numbers:

Answer:

**Find the maximum height the football traveled.**  
Formula:

Plug in numbers:

Answer:

**What is the horizontal distance (range) the football travels?**  
Formula:

Plug in numbers:

Answer: