Type III Projectiles

In type III projectiles, an object is fired at an angle from <u>or</u> to a given height. It is a combination of type I and II projectiles.

How do we find time?

The vertical component finds time.

We can avoid using a quadratic equation by finding the final vertical velocity and then using it to find the time.

Things to remember about type III projectiles:

➤ The signs **in the equations are vital** because they account for motions in different directions (+ is up, - is down).

➤ The max. height does NOT occur at ½ of the total time.

➤ At the max. height, the vertical velocity changes from + to -.

➤ The maximum range occurs when the projectile is fired at 45°. This gives the best combination of time in the air and horizontal velocity.

<u>ex</u>.
A projectile is shot with a velocity of 27 m/s at an angle of 50° above the horizontal from a height of 40 m. Ignoring air resistance, determine:
a.) the range
b.) the maximum height
c.) the time to the maximum height
d.) the time from the maximum height until it reaches to the ground
e.) the impact velocity