

## 8 - Projectile Motion - [2.3]

There is a good organizer on pg. 79 - check it out - it might work for you.

Basically, anything free-falling has motion that can be analyzed in the horizontal & vertical directions. You can analyze the vertical motion separate from the horizontal motion and vice-versa. Vertical tells you about **max. height** and horizontal tells you about '**range**'.

### Free fall

Once a projectile is released, only gravity affects it's motion. And, it affects only the vertical motion ( $v_y$ ) and NOT horizontal motion ( $v_x$ )

Vertical component - acceleration @  $9.8 \text{ m/s}^2$  [down]

Horizontal component - constant motion.

+ve = up      +ve = right

Maximum height = maximum  $\Delta y$

Range = maximum  $\Delta x$

Hint: Often the motion in the 'y' direction determine the time of the flight since once the object hits the ground, the flight is over. This determines time. If you want 'range', you simply plug in the 'time' into  $dx = v_x \cdot t$

**"The trip is over when the trip is over!"**

See pg. 81 for a diagram

Examples 8, 9 are well laid out and show typical problems. Another example will be done in class.

Note: What is the meaning of **negative time**? See sidebar on page 82.