Projectile Notes

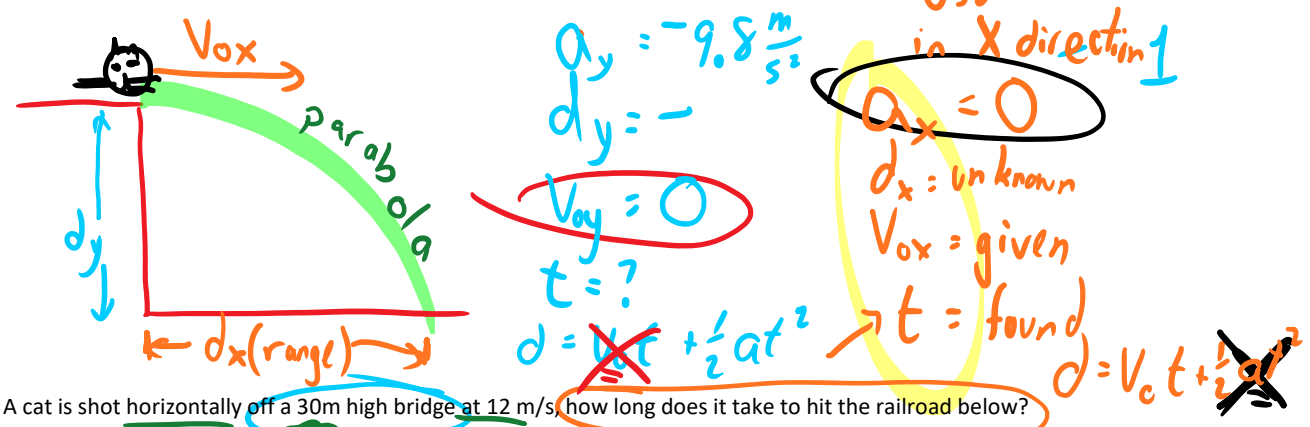
Friday, November 12, 2010 10:00 AM

Projectiles combine the kinematic formulas with vectors.
A projectile is any object launched into the air regardless of direction or initial velocity.
It accelerates downward at - 9.8 m/s^2 due to gravity.
Note that object dropped and objects fired HORIZONTALLY from the same height strike the ground at the same time.

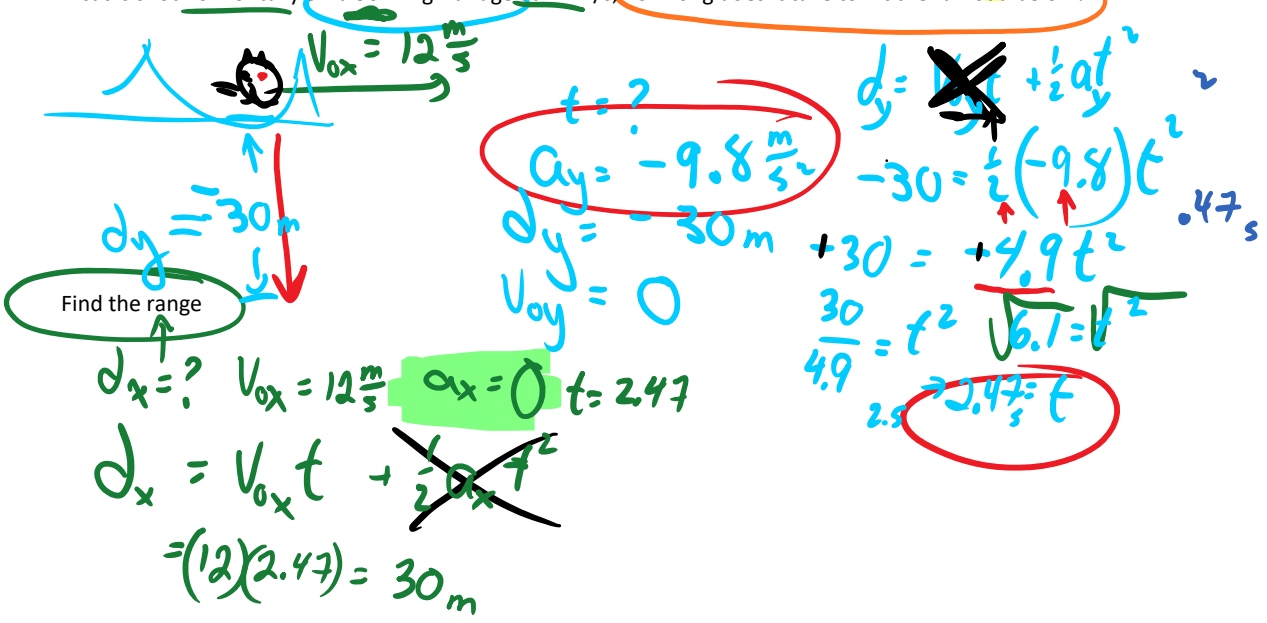
I promise not to mix X's & Y's

The motion in the Y-direction is independent of the motion in the X-direction.

Both directions follow the kinematic equations (most commonly used is $d = v_o t + 1/2\ at^2$)
DO NOT MIX THE X AND Y VALUES!
Type I projectiles: always shot horizontally, always raised some height off a lower surface



A cat is shot horizontally off a 30m high bridge at 12 m/s, how long does it take to hit the railroad below?



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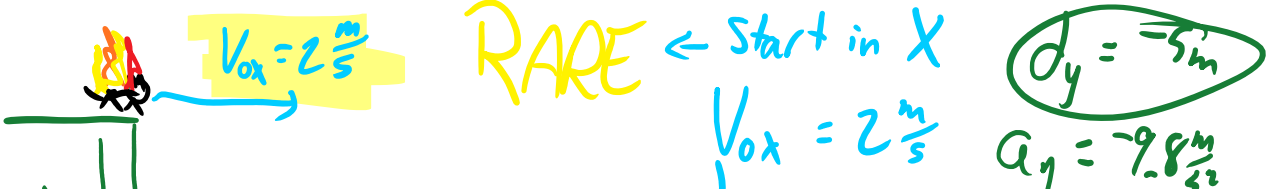
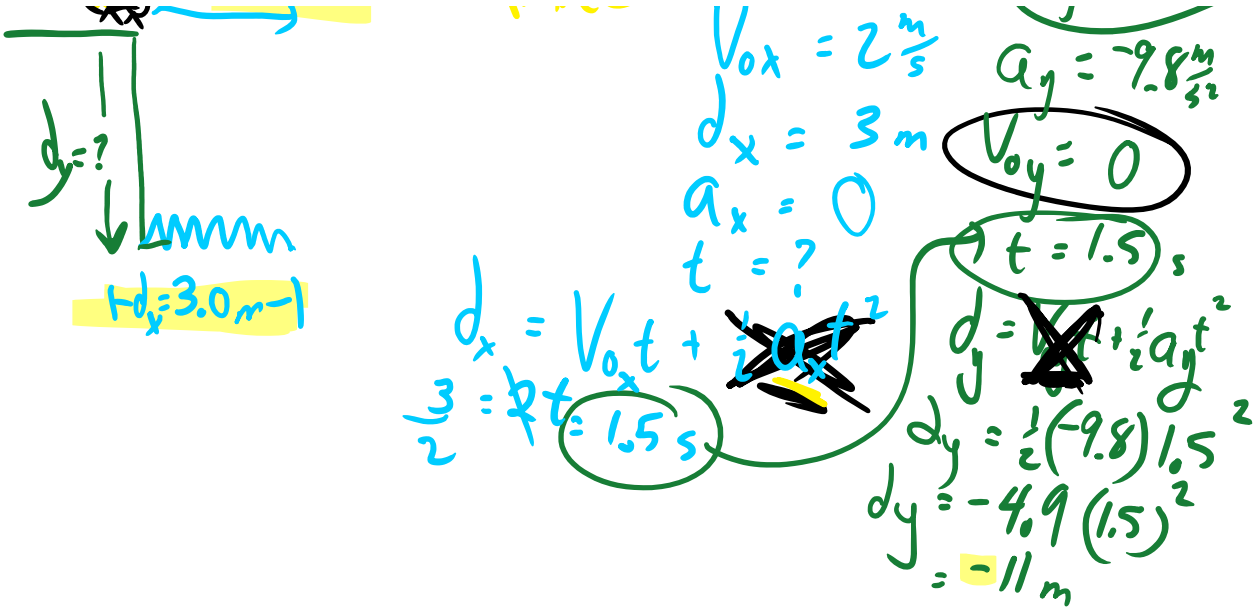
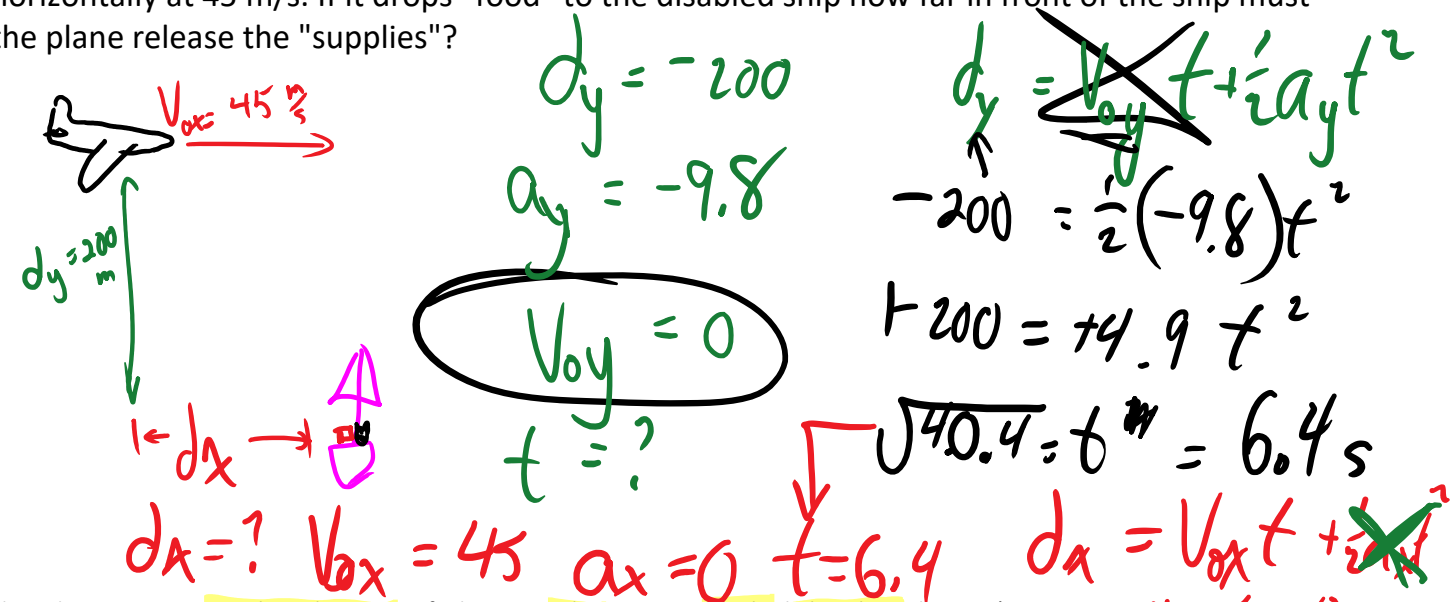
A cat on fire runs 2.0 m/s off a cliff that is unknown height if rock extend from the base 3.0 m outward will the cat clear the rocks making a perfect dive into the lake or suffer a debilitating neck injury while burning?





A bomber aircraft flying at height 200 m above the deck of a cruise ship full of cats is moving horizontally at 45 m/s. If it drops "food" to the disabled ship how far in front of the ship must the plane release the "supplies"?



The only time you can use the X-direction to find time t is when you are given both d_x and v_{ox}. Then you're usually asked to find the height of the projectile...

A cat is thrown horizontally at 4.0 m/s off a building into a flaming barrel which is 18.0 m from the base of the building, how high was the building?