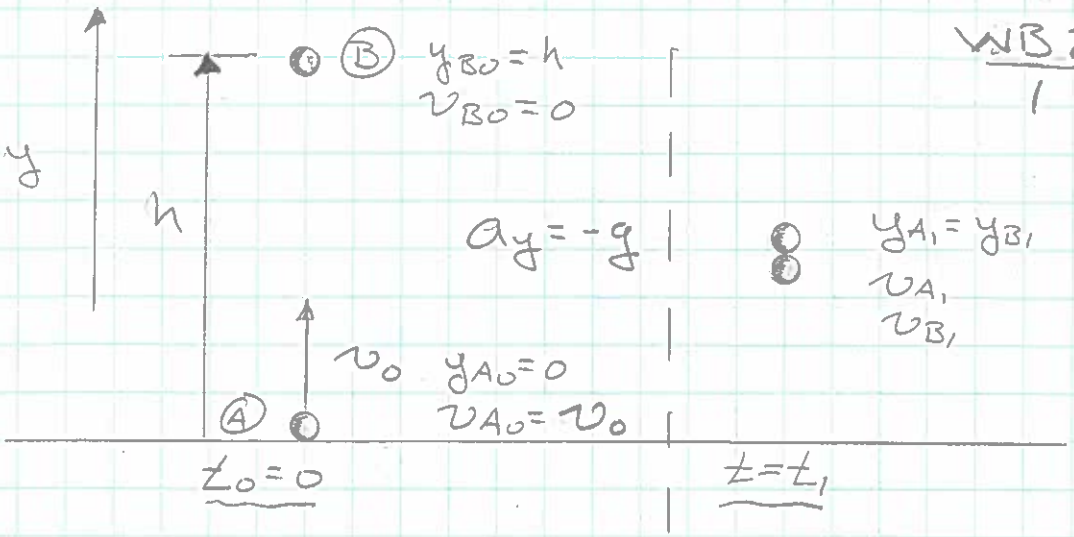

a.) For ball A:

$$y_{A1} = y_{A0} + v_{A0}\Delta t + \frac{1}{2} a_y \Delta t^2 \qquad \Delta t = t_1 - t_0$$

$$y_{A1} = v_0 t_1 - \frac{1}{2} g t_1^2$$

For ball B:

$$y_{B1} = y_{B0} + v_{B0}\Delta t + \frac{1}{2} a_y \Delta t^2 \qquad \Delta t = t_1 - t_0$$

$$y_{B1} = h - \frac{1}{2} g t_1^2$$

When the balls collide, $y_{A1} = y_{B1}$

$$\therefore \quad v_0 t_1 - \frac{1}{2} g t_1^2 = h - \frac{1}{2} g t_1^2$$

So, $$t_1 = \frac{h}{v_0}$$

Now, subst. this into eqn for y_B:

$$y_{B1} = h - \frac{1}{2} g \left(\frac{h}{v_0}\right)^2$$

$$y_{B1} = h - \frac{g}{2}\left(\frac{h}{v_0}\right)^2$$ y-coordinate of collision