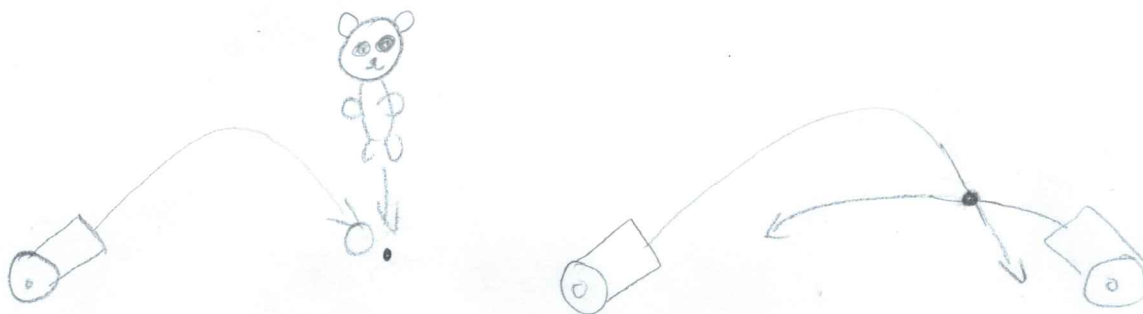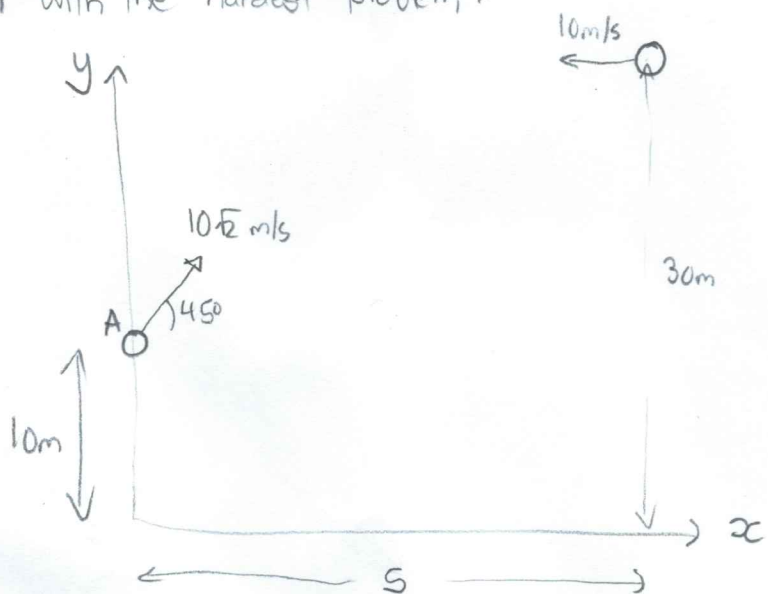# KINEMATICS

Projectile Collisions.

- Collision if same x and y position.

Let's start with the hardest problem:
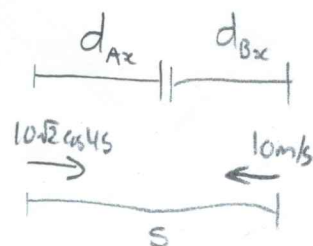

Collision in x:

$$V_{Ax} = 10\sqrt{2}\cos 45° = 10 \qquad V_{Bx} = 10$$

$$d_{Ax} = s - d_{Bx}$$

$$10\Delta t = s - 10\Delta t$$

$$s = 20\Delta t$$

Collision in y:

$$V_{Ay} = 10\sqrt{2}\sin 45 = 10 \qquad V_{By} = 0$$

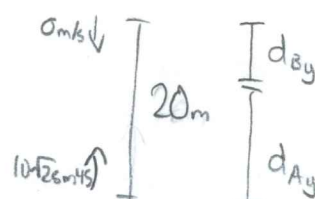$$d_{Ay} = 10\Delta t - 4.9\Delta t^2 \qquad d_{By} = -4.9\Delta t^2$$

$$d_{Ay} = 20 - |d_{By}|$$

$$10\Delta t - 4.9\Delta t^2 = 20 - 4.9\Delta t^2$$

$$10\Delta t = 20$$

$$\Delta t = 2$$

$$\Delta d = v_i\Delta t + \tfrac{1}{2}a\Delta t^2$$

$$s = 20(2) = 40m$$