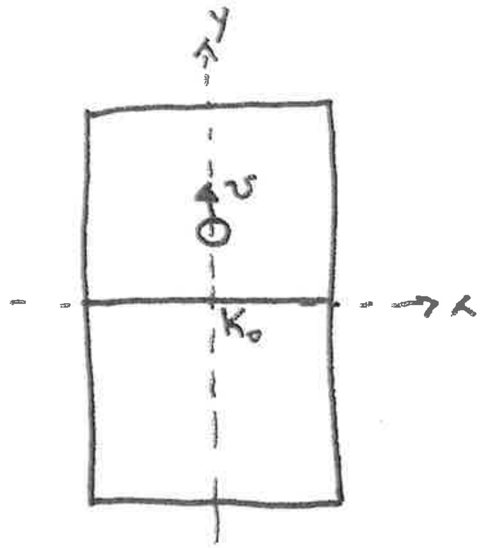
Ex 29.1 Inertial coordinates



$v = 8\,m/s$

a) $x_0(t_0) = 0$
$y_0(t_0) = 8t_0$

This is a equation of a straight line trajectory. The principle of inertia holds from K_0's perspective.

b) $x_1(t_1) = 6t_1$
$y_1(t_1) = 8t_1$

$y_1(x_1) = \frac{4}{3}x_1$

This is still an equation of a straight line. The principle of inertia holds from K_1's perspective.

$v_1 = \sqrt{8^2 + 6^2} = 10\,m/s$

Ex 29.1 (cont'd)

c) $\left.\begin{array}{l} x_2(t_2) = \frac{1}{2} 4 t_2^2 \\ y_2(t_2) = 8 t_2 \end{array}\right\}$ $y_2(t_2) = 8\sqrt{\frac{x_2}{2}}$

$y_2(t_2) = \sqrt{32 x_2}$

This is not an equation for a straight line trajectory. The puck appears to travel in a curved (parabolic) trajectory even without forces acting on it, so the principle of inertia does not hold from K_2's perspective.

d) K_0 and K_1 (but not K_2) are equivalent observers.

e) We have assumed that $\Delta t_0 = \Delta t_1 = \Delta t_2$.

This is not the case if one considers relativistic time dilation.