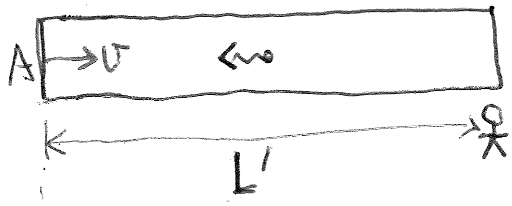
2.4 We always work in the ref. system of observer 2 (on the ground).

Let us look at light bouncing off A:

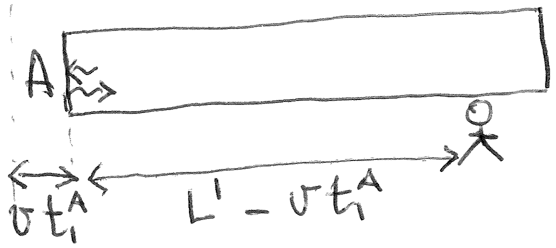
$(L' = \sqrt{1-v^2/c^2}\, L)$

$t_0^A = 0$



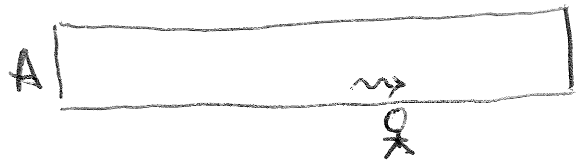
Light is emitted at the midpoint.

$t_1^A = \frac{L'/2}{c+v}$



Light bounces off the mirror A

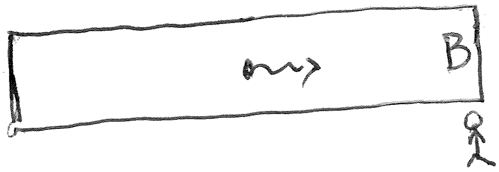
$t_2^A = t_1^A + \frac{L' - v t_1^A}{c}$



Light arrives at observer 2

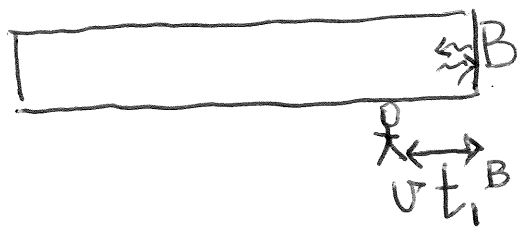
Similarly for light bouncing off B:

$t_0^B = 0$



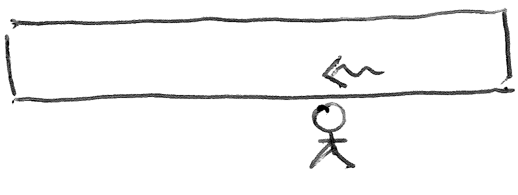
Light is emitted also at $t = 0$.

$t_1^B = \frac{L'/2}{c-v}$



Light bounces off mirror B

$t_2^B = t_1^B + \frac{v t_1^B}{c}$



Light reaches observer 2

Set $t_2^A = t_2^B$ (Both beams arrive at observer 2 at same time)

$$t_1^A + \frac{L' - v t_1^A}{c} = t_1^B + \frac{v t_1^B}{c}$$

$$\cancel{\frac{L'}{2c}} \cdot \frac{3 + v/c}{1 + v/c} = \cancel{\frac{L'}{2c}} \frac{1 + v/c}{1 - v/c}$$

$$\left(3 + \frac{v}{c}\right)\left(1 - \frac{v}{c}\right) = \left(1 + \frac{v}{c}\right)^2$$

$$\frac{v^2}{c^2} + 2\frac{v}{c} - 1 = 0$$

Acceptable solution: $\frac{v}{c} = \sqrt{2} - 1$.

$v \simeq 0{,}41 \cdot c$