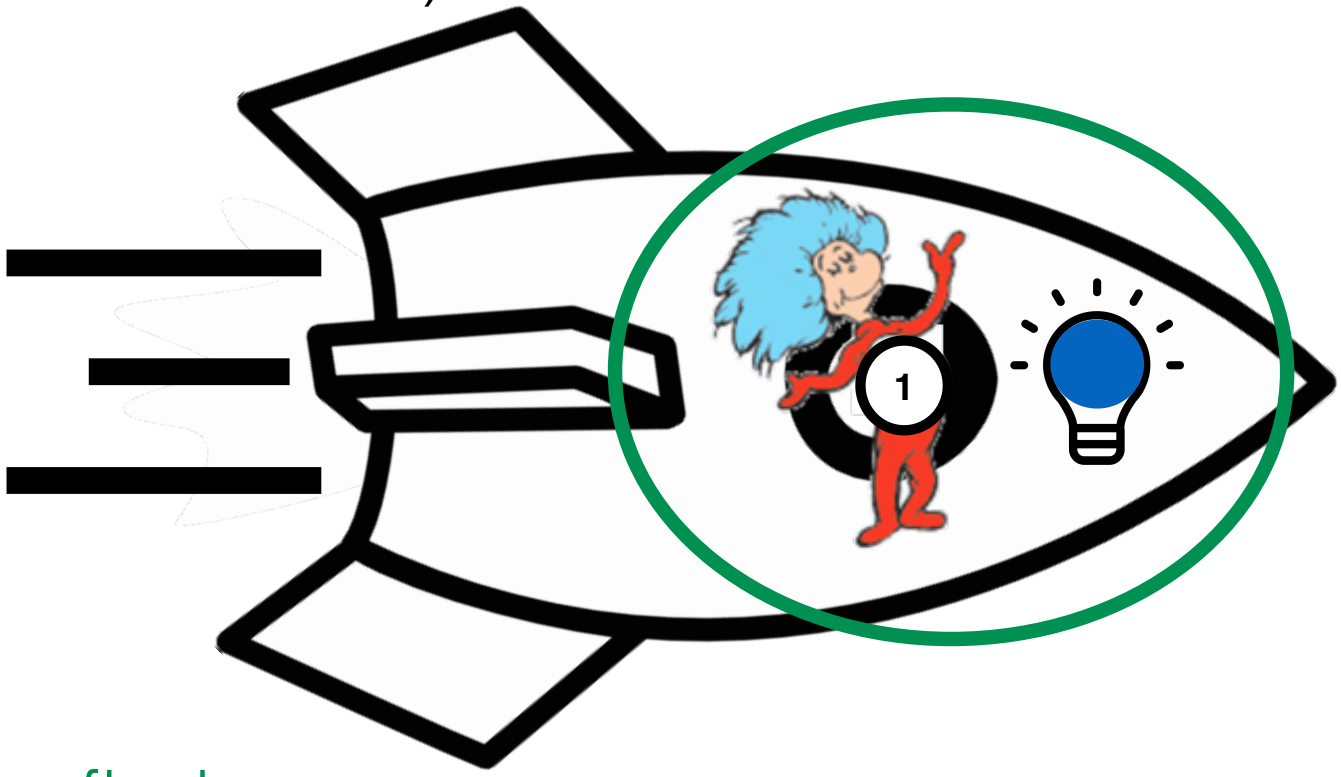
Imagine a light that flashes alternating red and blue light every second (in its own frame)

Who measures proper time of the flashes?



Thing 1 because the flashes happen at the spatial coordinate of each flash is the same for Thing 1.

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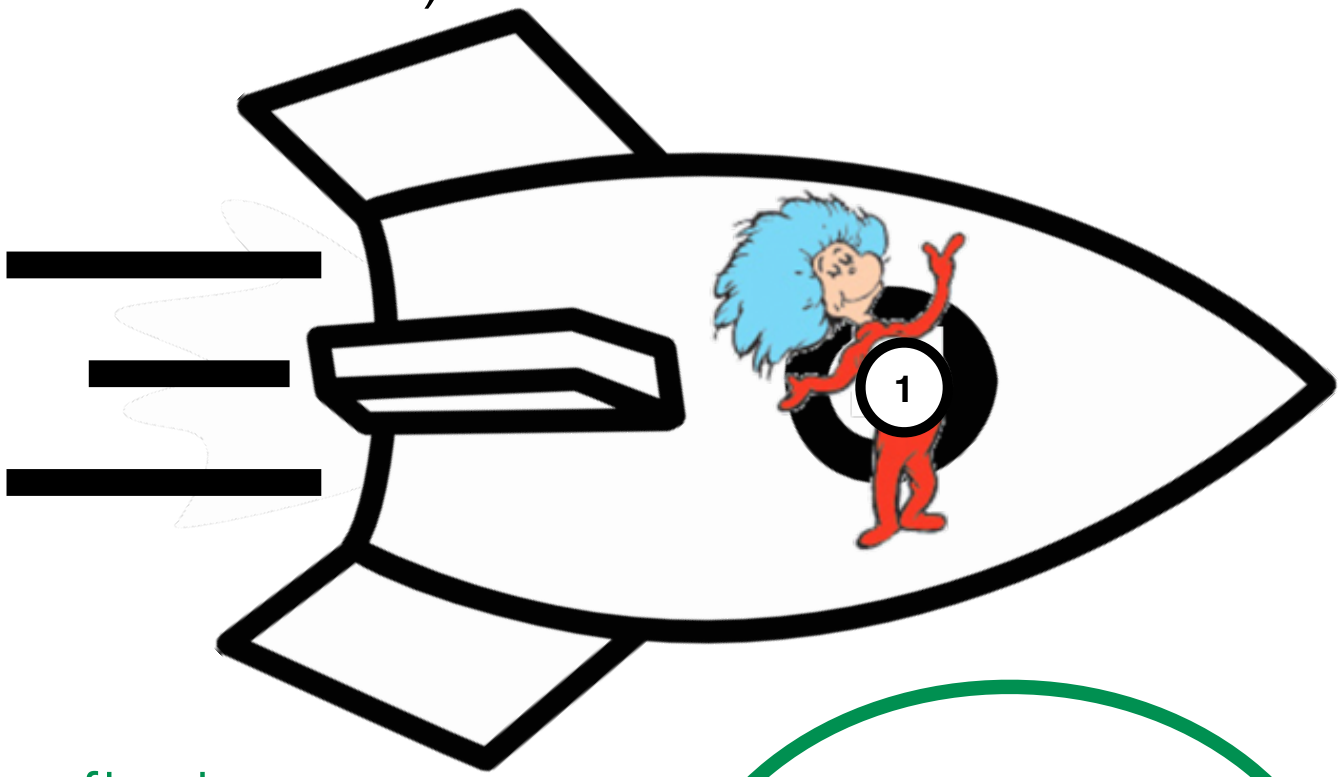
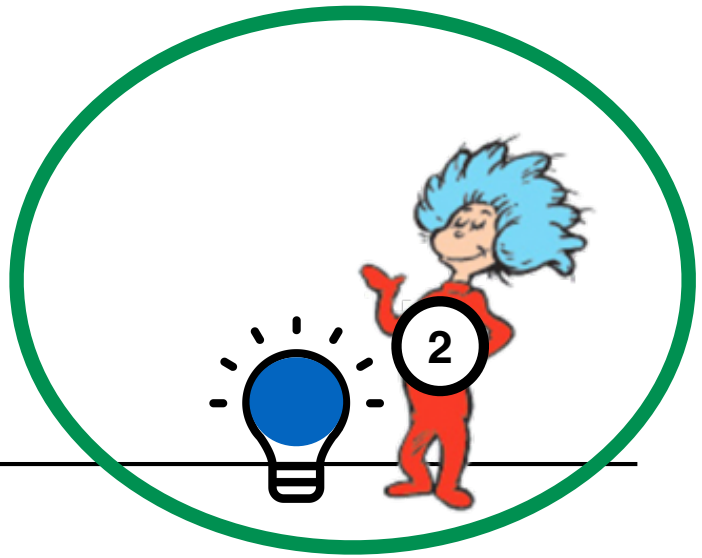
Who measures proper time of the flashes?



Thing 2 because the flashes happen at the spatial coordinate of each flash is the same for Thing 2.



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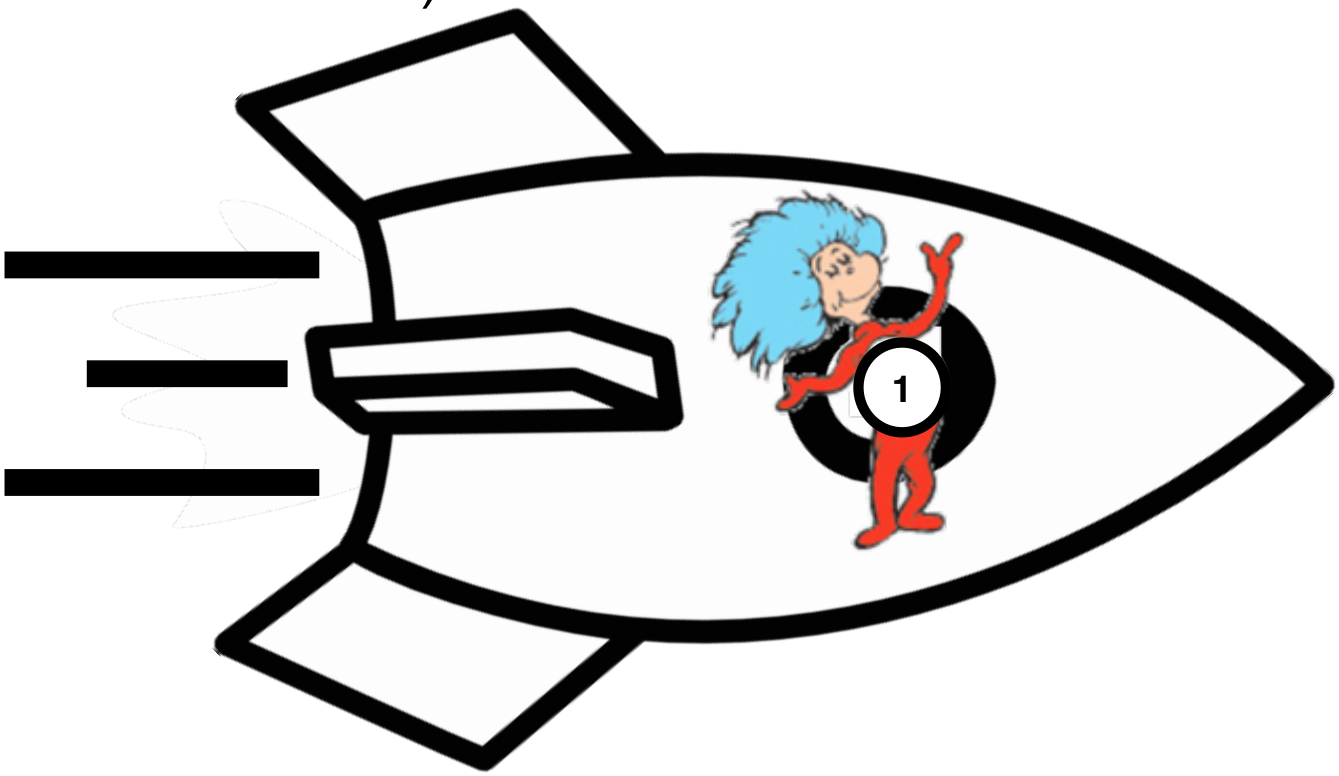
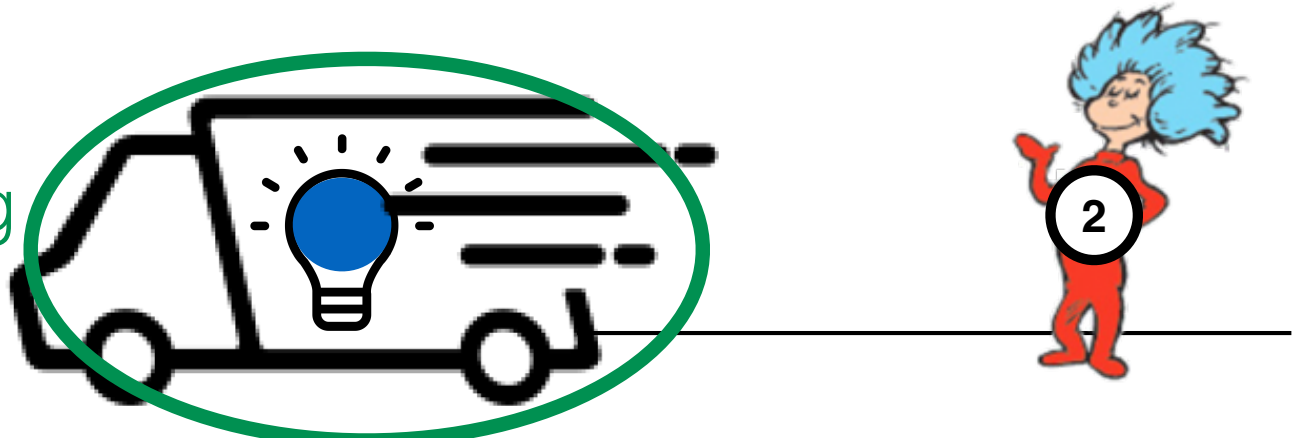


Neither because the spatial coordinates change for each flash for both Thing 1 and Thing 2.



Lois Lane is standing on the streets of Metropolis and observes that a little girl jumping rope and measures that the time between jumps is 0.5 seconds.

Superman carefully flies by at a really high speed and observes that the time between the little girls' jumps is 1 second.

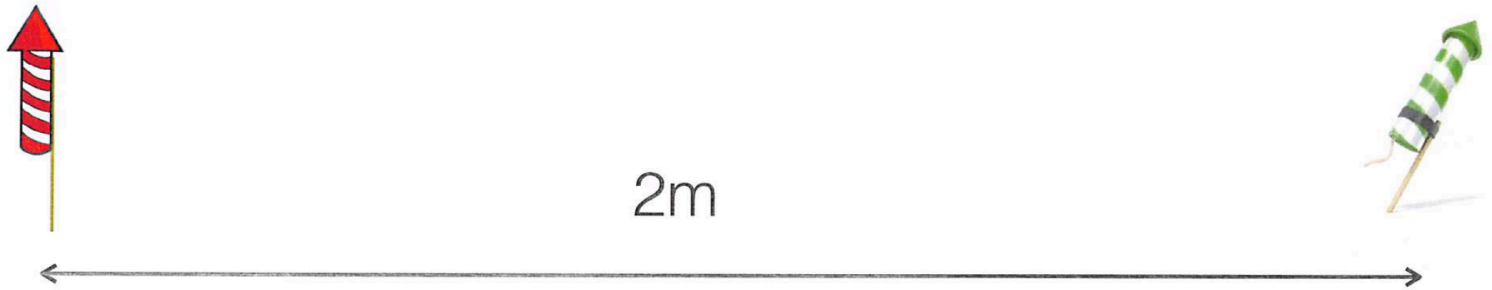
Who is correct?

Lois Lane measures proper time, but both Lois Lane and Superman measure the "correct" time between jumps for their respective reference frames.

A person sitting on the ground sees two fire crackers that are two meters apart. They see the red fire crackers explode first and then 1 second later, the green fire cracker explodes.

In what frame would an observer measure the proper time interval of the explosions?

An observer moving to the right at 2 m/s, because the x-coordinate for the explosions will be the same for that observer.



An asteroid passes the earth at 25 km/s.

A probe has landed on the Earth-side of the asteroid to perform tests. In one test, the probe shines a very bright light for 27 seconds according to its own clock.

To an Earth-based scientist, how long does the light shine?

$$\beta = \frac{v}{c} = \frac{25000}{300000000}$$

$$\gamma = \frac{1}{\sqrt{1-\beta^2}} = 1.0014$$

$$\Delta t_{Earth} = \gamma \Delta t_{probe}$$

$$= (1.0014)(27s)$$

$$\Delta t_{Earth} = 27.039s$$