

Virtual Clicker

<https://pollev.com/dannycaballe980>

Notes for today

[http://dannycaballero.info/phy482msu\\_s2020/notes/30-slides.html](http://dannycaballero.info/phy482msu_s2020/notes/30-slides.html)

Two major results of special relativity are Time Dilation and Lorentz Contraction. Please pick one of the choices below which best describes how well you feel you understand them.

- A. No idea what these effects are
- B. I remember having heard about these, but couldn't define them precisely right now.
- C. I know what these effects are, (but I've forgotten how to derive them)
- D. I know what these effects are, and I even sort of remember the derivation, but it would take me a while to sort it out
- E. I'm confident I could derive these results right now

You are standing next to a conveyer belt that is transporting a baby (don't ask questions) at **1 m/s to the right**. The baby is crawling at **2 m/s to the right**. What is the velocity of the baby in your frame?

- A. 1 m/s to the left
- B. 1 m/s to the right
- C. 3 m/s to the right
- D. 3 m/s to the left
- E. Something else

You are standing next to a conveyer belt that is transporting a baby (don't ask questions) at **1 m/s to the right**. The baby is crawling at **2 m/s to the left**. What is the velocity of the baby in your frame?

- A. 1 m/s to the left
- B. 1 m/s to the right
- C. 3 m/s to the right
- D. 3 m/s to the left
- E. Something else

# DEMO

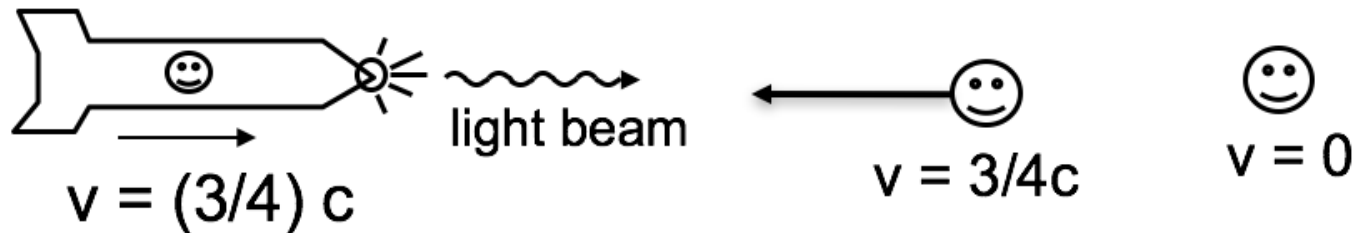
Galilean relativity example courtesy of Jamiroquai

Standing on a moving walkway in the airport that is moving at  $1 \text{ m/s}$  to the right, you toss a ball into the air. You observe the ball moving straight up and down.

I'm sitting on a bench watching your shenanigans. What do I have to do to make my physics match yours? That is, what do I have to do to reproduce all your measurements?

- A. Add  $1 \text{ m/s}$  to the left
- B. Add  $1 \text{ m/s}$  to the right
- C. Subtract  $1 \text{ m/s}$  to the right
- D. Subtract  $1 \text{ m/s}$  to the left
- E. None or more than one of these

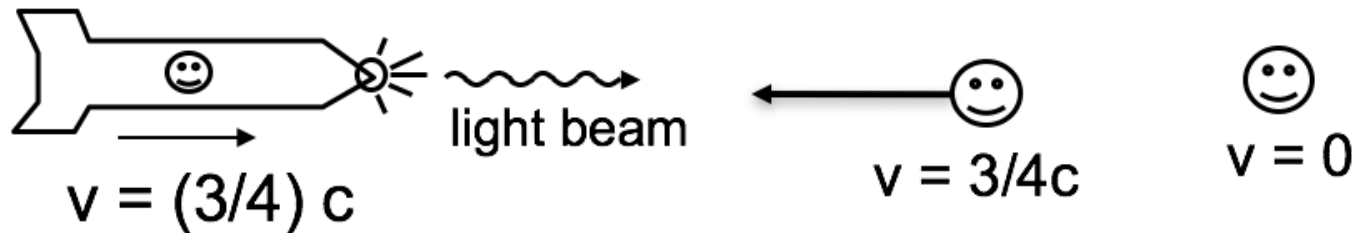
A rocket is moving to the right at speed  $v = (3/4)c$ , relative to Earth. On the front of the rocket is a headlight which emits a flash of light.



In the reference frame of a passenger on the rocket, the speed of the light flash is

- A.  $c$
- B.  $7/4 c$
- C.  $1/4 c$
- D. None of these

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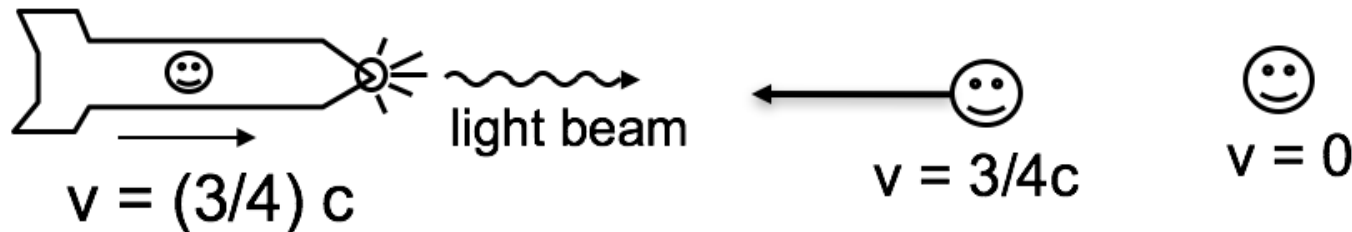


According to a person at rest on the earth, the speed of the light flash is

- A.  $c$
- B.  $7/4 c$
- C.  $1/4 c$
- D. None of these



A rocket is moving to the right at speed  $v = (3/4)c$ , relative to Earth. On the front of the rocket is a headlight which emits a flash of light.



According to a person moving toward the rocket at speed  $(3/4)c$ , relative to earth, the speed of the light flash is

- A.  $c$
- B.  $7/4 c$
- C.  $1/4 c$
- D. None of these