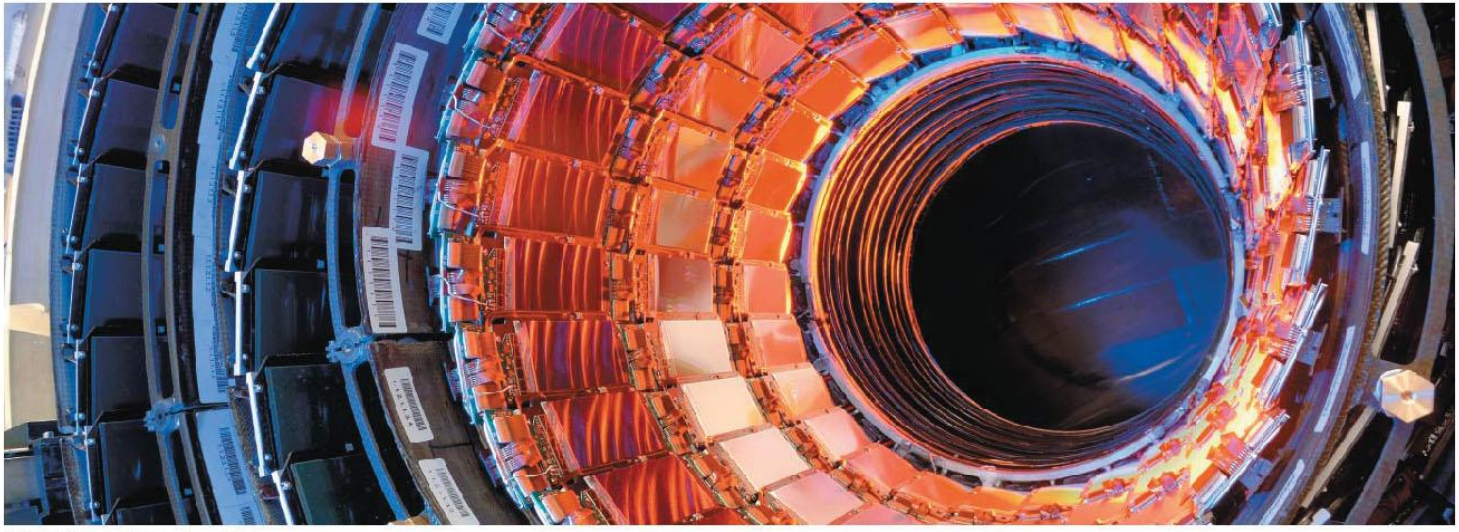
Chapter 36 – Relativity

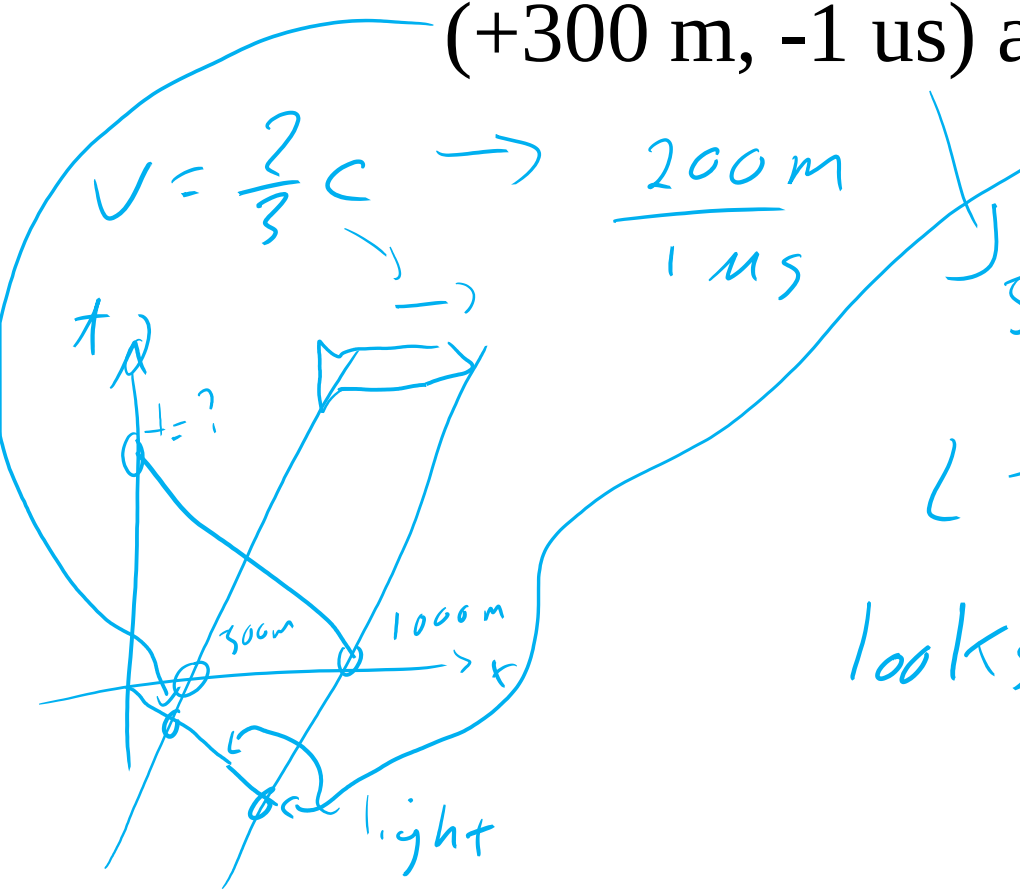
- Reference frames, events, measurements, space-time diagrams
- Postulates of special relativity, impact on simultaneity
- Time dilation, space contraction, and Lorentz transformations
- Relativistic momentum and energy



Last time's Team Up questions
(+300 m, -1 us) and (+600 m, -2 us)

$c = \frac{300\ m}{1\ \mu s}$

$v = \frac{2}{3}c \rightarrow \frac{200\ m}{1\ \mu s}$



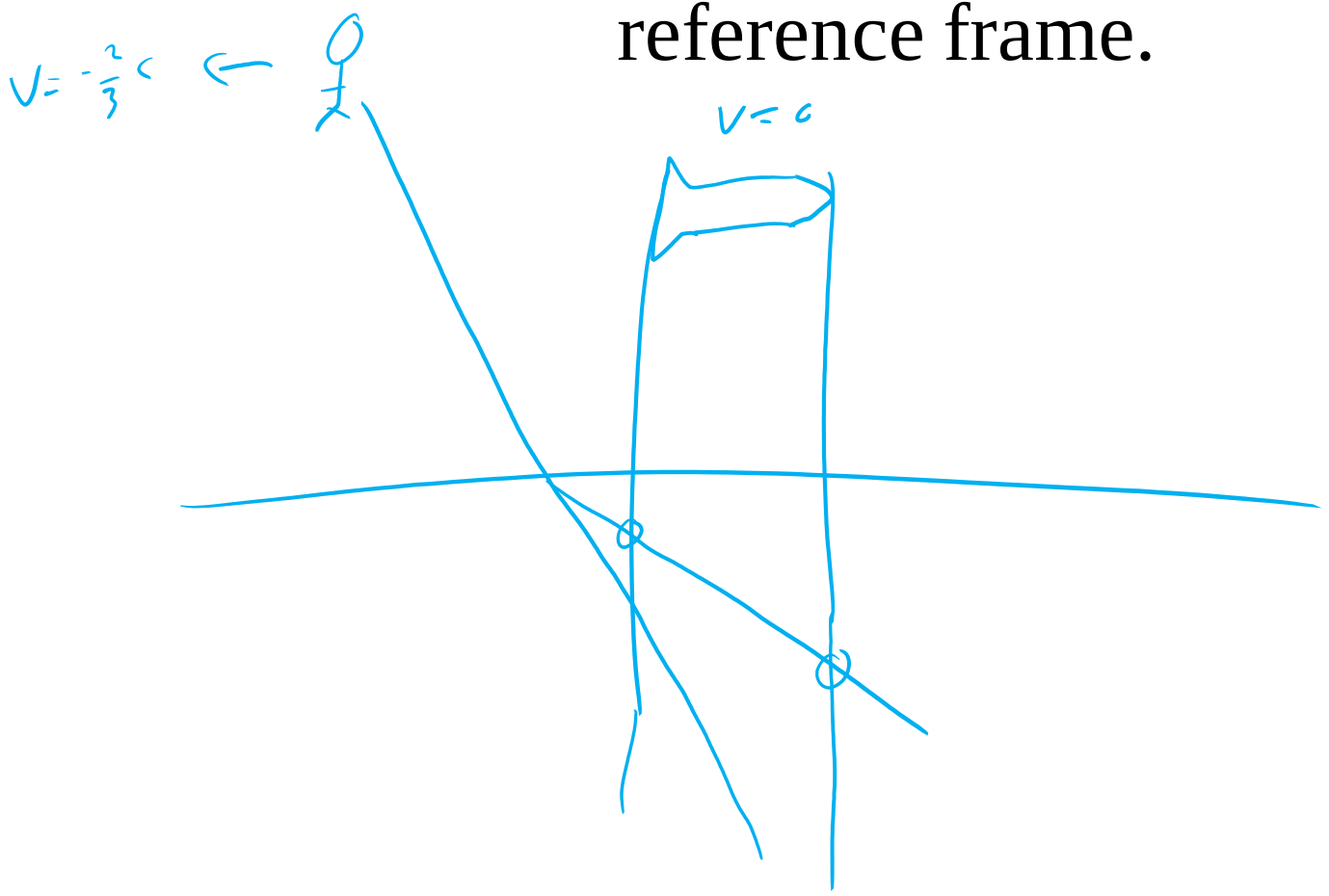
500m "now"

1000m "now"

L = 500m "actually"

looks 300m

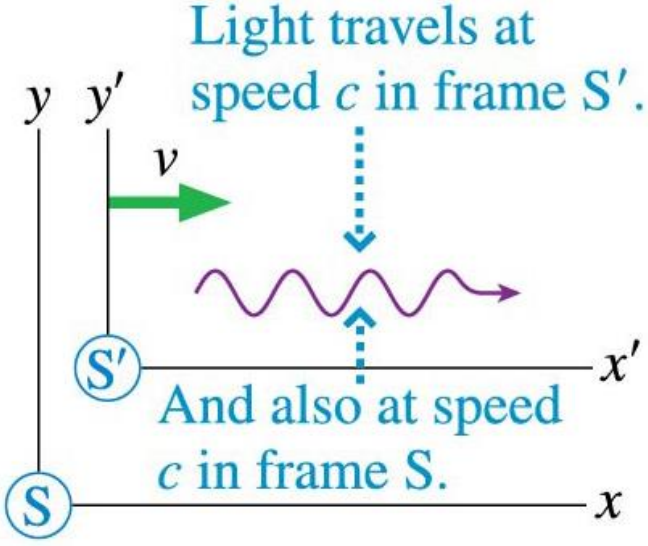
Now examine the Team Up questions from the rocket's reference frame.



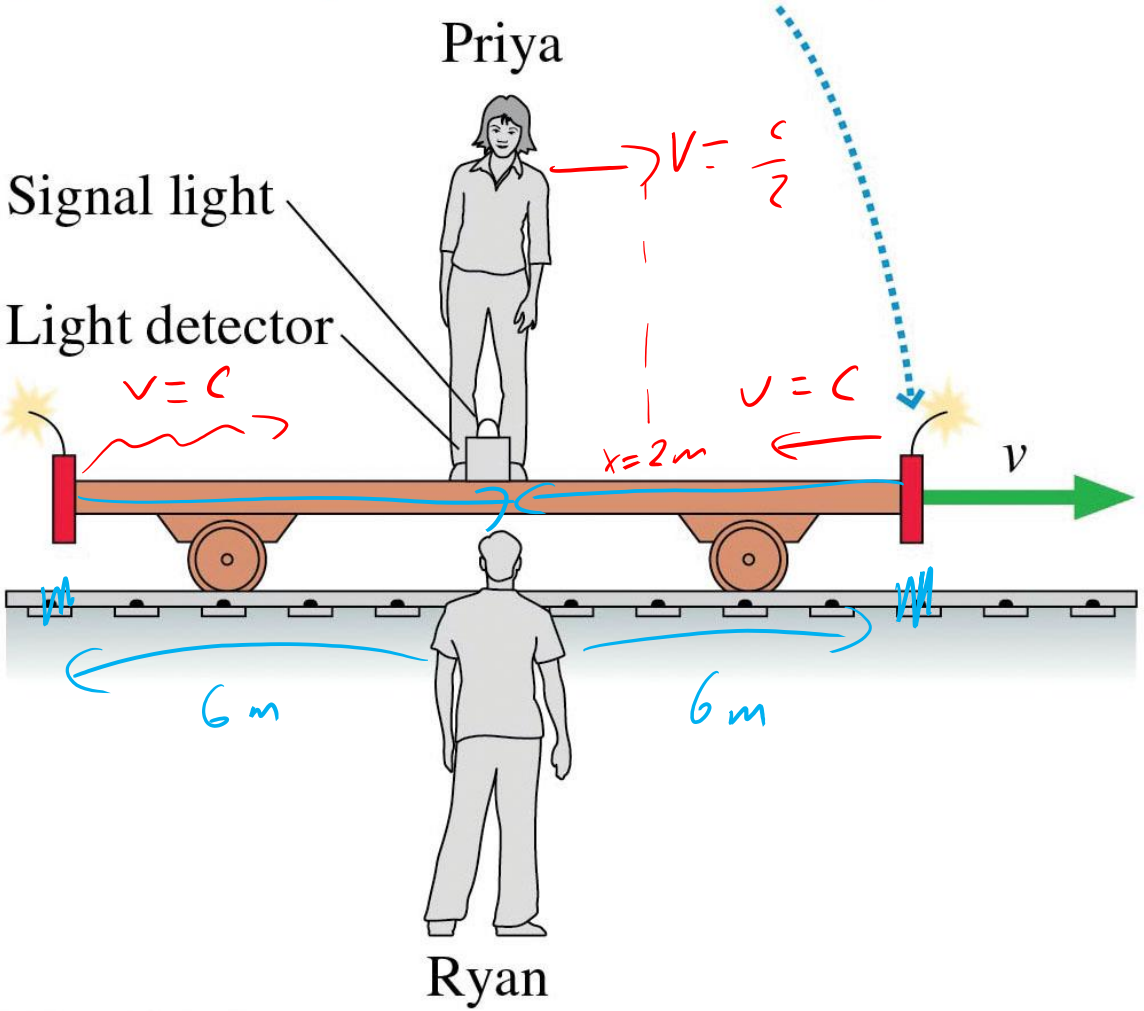
What is relativity about?

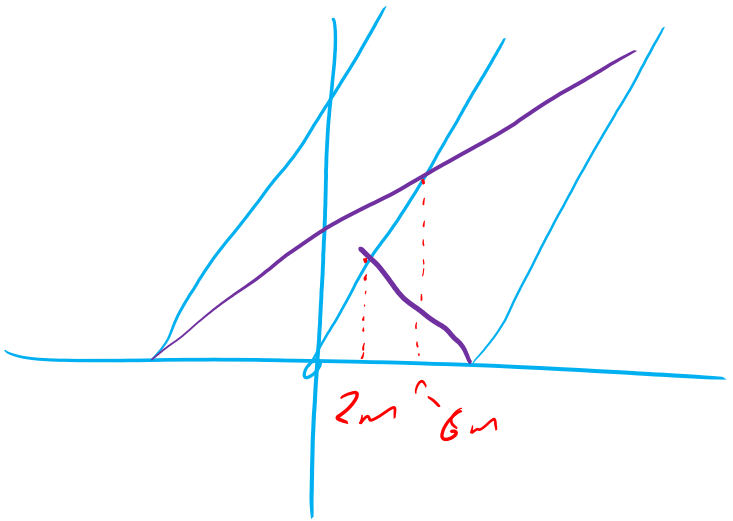
Einstein's **theory of relativity** is based on a simple-sounding principle: The laws of physics are the same in all inertial reference frames. This leads to these conclusions:

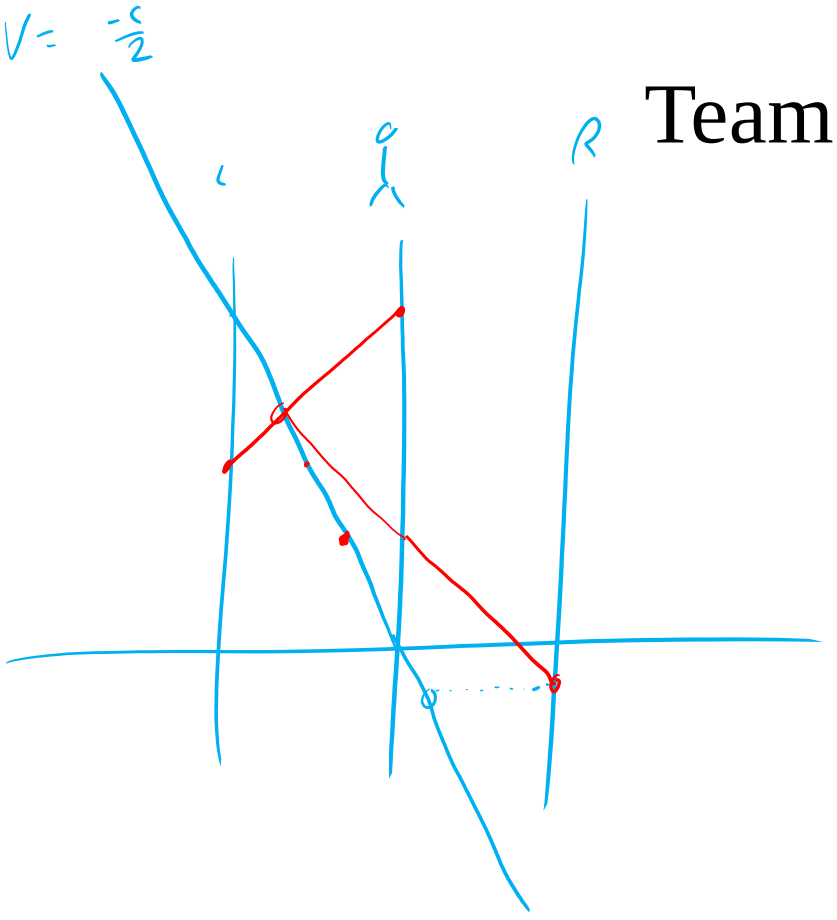
- **Light travels at the same speed** c in all inertial reference frames.
- No object or information can travel faster than the speed of light.



The firecrackers will make burn marks on the ground at the positions where they explode.

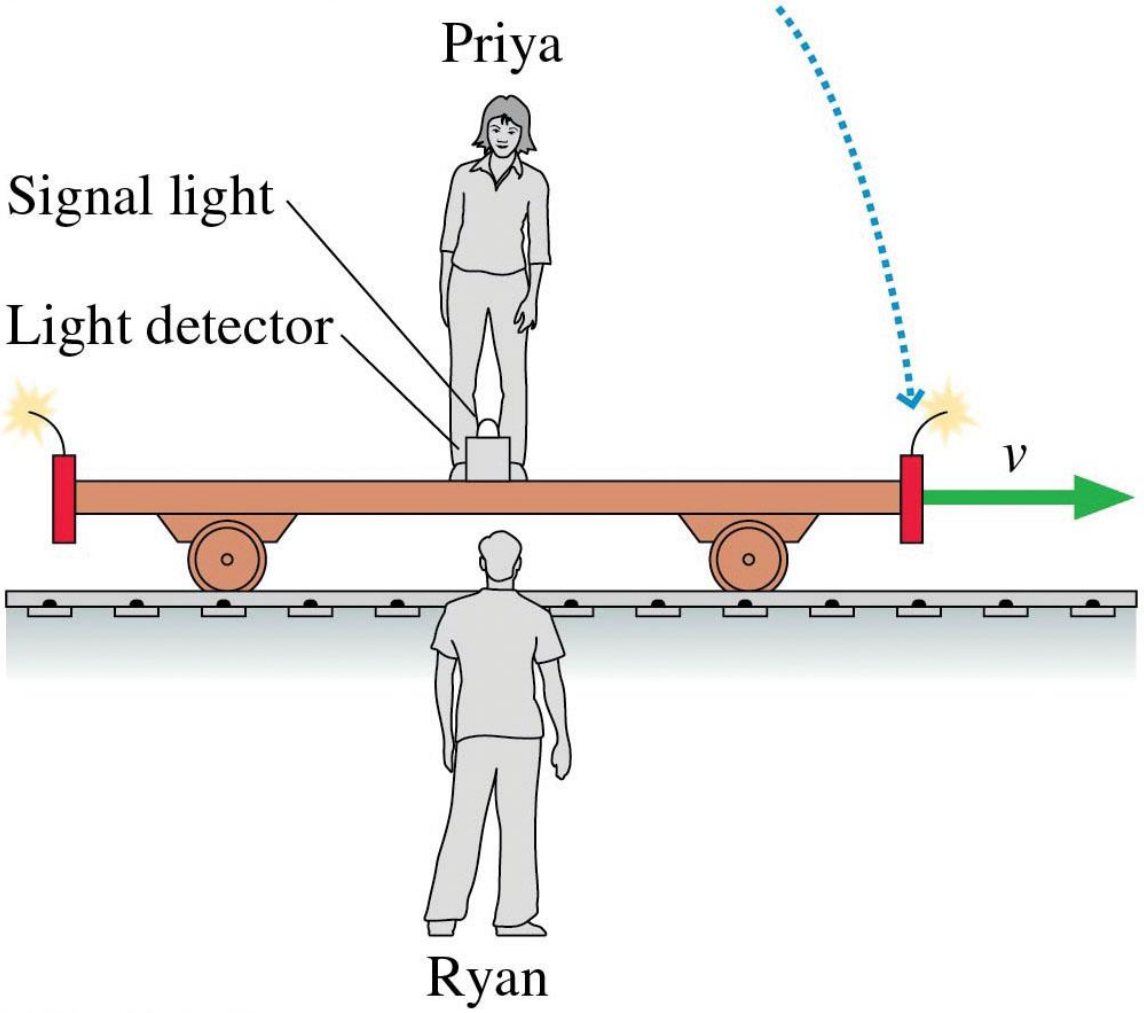




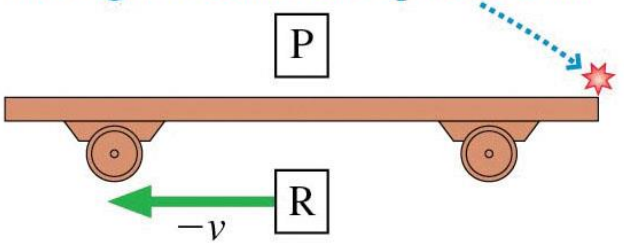


Team Up questions

The firecrackers will make burn marks on the ground at the positions where they explode.

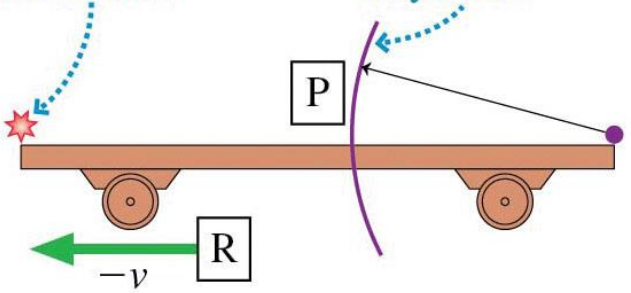


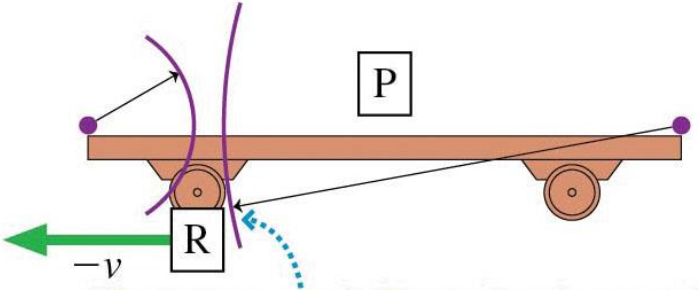
The right firecracker explodes first.



The left firecracker explodes later.

The right wave reaches Priya first.





The waves reach Ryan simultaneously.
The left wave has not reached Priya.