Relative Velocities & Special Relativity

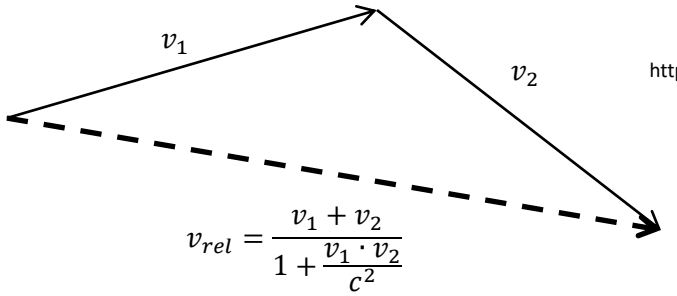
Name: _____ Date: _____

How do velocities add and what is the cosmic speed limit?

Common Physics Misconceptions

http://www.youtube.com/watch?v=IM630Z8lho8

Equation for Relativity Velocities incorporating special relativity…



http://math.ucr.edu/home/baez/physics/Relativity/SR/velocity.html

The **cosmic speed limit** is the speed of light: $c = 3 \times 10^8 m/s$

1. A car is travelling forward at 30 m/s. The driver throws a ball out the front of the car (in a vacuum) at 10 m/s. Calculate the speed of the ball relative to an observer on the ground. Calculate the speed of the ball relative to the driver of the car (assume the speed of the car is zero relative to the driver).

2. The car in question 1 is still travelling at 30 m/s, but now throws the ball backwards at 10 m/s. Calculate the speed of the ball relative to an observer on the ground. Calculate the speed of the ball relative to the driver of the car. (make on direction positive)

3. A car is travelling forward at 30 m/s. The driver turns the headlights on. Calculate the speed of the light relative to an observer on the ground. Calculate the speed of the light relative to the driver of the car (assume the speed of the car is zero relative to the driver).

4. A car is travelling forward at *0.5c*. The driver turns the headlights on. Calculate the speed of the light relative to an observer on the ground. Calculate the speed of the light relative to the driver of the car (assume the speed of the car is zero relative to the driver).

5. A car is travelling forward at *c*. The driver turns the headlights on. Calculate the speed of the light relative to an observer on the ground. Calculate the speed of the light relative to the driver of the car (assume the speed of the car is zero relative to the driver).