

PRETEST: MEASUREMENT

Name _____

1. A straight runway is 100 m long. A small explosion occurs at the east end of the runway; 10 seconds later, a small explosion occurs at the west end of the runway. An airplane moves from west to east with speed 25 m/s relative to the runway.

How far apart in space are the locations of the explosions:

- in the frame of the runway? Explain.

- in the frame of the airplane? Explain.

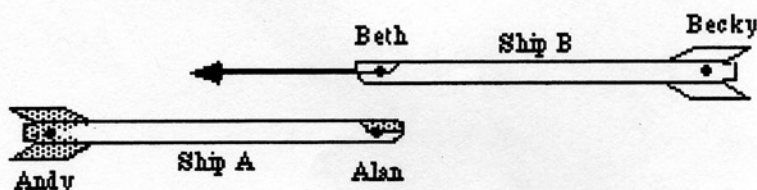
2. Two spaceships, A and B, pass very close to each other. Alan is in the front of ship A and Beth is in the front of ship B. Andy and Becky are at rest at the backs of ships A and B respectively. In Alan's frame, ship B moves with speed $v = 3$ m/s and ships A and B each have length 12 m.

Define events 1, 2, and 3 as follows:

Event 1: Alan and Beth are adjacent

Event 2: Andy and Beth are adjacent

Event 3: Alan and Becky are adjacent



The diagram at right represents the ships at the instant of event 1 in Alan's frame.

Determine numerical values for the following ratios, in which the subscripts refer to the events defined above. Use the notation $\delta x_{12}^{(A)} = x_2^{(A)} - x_1^{(A)}$ = the (signed) distance between the locations of events 1 and 2 in Alan's frame. Explain your reasoning.

- $\delta x_{12}^{(B)} / \delta x_{12}^{(A)}$

- $\delta x_{13}^{(A)} / \delta x_{13}^{(B)}$