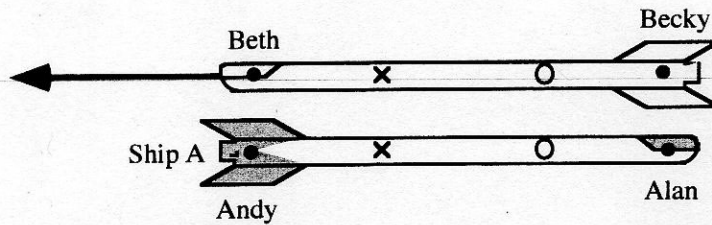


**PRETEST: SIMULTANEITY**

Name \_\_\_\_\_

Two spaceships, A and B, pass very close to each other with relativistic relative speed. Alan is at rest in the front of spaceship A and Beth is at rest in the front of spaceship B. Andy and Becky are at rest in the backs of spaceships A and B respectively.

The diagram below shows the two spaceships in Alan's frame. At the instant shown, two sparks jump between the spaceships and make char marks on both ships. One spark marks an **x**, and the other marks an **O**. When each spark jumps, it emits a flash of light that expands outward in a spherically symmetric pattern. The sparks jump at the same instant in the reference frame of ship A.



Answer each of the following questions for the observers listed.

- (i) Does he or she receive the wavefront from the spark that marks the **x** *before, after, or at exactly the same time* as the wavefront from the spark that marks the **O**?
- (ii) In his or her frame, does the spark that marks the **x** jump *before, after, or at exactly the same time* as the spark that marks the **O**?

Briefly explain your reasoning for each case.

• Alan

(i)

(ii)

• Beth

(i)

(ii)

• Andy

(i)

(ii)

• Becky

(i)

(ii)