

Multiple choice: choose the best answer for each question.

1) Two rockets approach one another. As seen from earth, each has a speed of $0.85c$. Rocket A fires a laser beam towards rocket B. Rocket B sees this laser beam approach with speed:

- A) $0.15c$
- B) $1.7c$
- C) c
- D) zero

2) Firecracker A is 500m from you. Firecracker B is 700m from you. You see (with your eyes) both firecrackers explode at the same time. Define event A to be "firecracker A explodes" and event B to be "firecracker B explodes". Which is true in your reference frame:

- A) Firecracker A explodes at the same time as firecracker B
- B) Firecracker A explodes before firecracker B
- C) Firecracker B explodes before firecracker A
- D) Not enough info to determine the answer

3) Matt stands midway between a pole and a tree. Each is suddenly hit by a separate bolt of lightning. Matt sees the bolts hit each at the exact same time. Nancy is flying by in her rocket at $0.5c$, in the direction from the tree toward the pole. The lightning hits the tree at the exact moment she passes by it.

Define Event 1 to be "lightning strikes tree" and Event 2 to be "lightning strikes pole". In Nancy's reference frame:

- A. Event 1 occurs at the same time as Event 2
- B. Event 1 cannot occur at the same time as Event 2

Define Event 1 to be "light from tree strike reaches Matt" and Event 2 to be "light from pole strike reaches Matt". In Nancy's reference frame:

- A. Event 1 occurs at the same time as Event 2
- B. Event 1 occurs after Event 2
- C. Event 2 occurs before Event 2