Electromagnetism (PHYS 295)

(1) Two volcanoes, Mt. Doom and Mt. Boom, are 500 km apart in their rest frame. Suppose that each erupts in a burst of light. An observer in a lab halfway between the two volcanoes receives the light from the two blasts at the same time. The observer's assistant is near the base of Mt. Doom and between Mt. Doom and the observer. The above objects (mountains, observer, and assistant) are at rest with respect to each other. According to the observer does the eruption at Mt. Doom *occur* before, at the same time, or after the eruption at Mt. Boom?
  (a) before
  (b) at the same time
  (c) after
  (d) cannot be determined from the information given

(2) Now according to the assistant, does the *light* from the eruption at Mt. Doom arrive before, at the same time, or after the *light* from Mt. Boom?
   (a) before
   (b) at the same time
   (c) after

(3) Two volcanoes, Mt. Doom and Mt. Boom, are 500 km apart in their rest frame. Suppose that each erupts in a burst of light. An observer in a lab halfway between the two volcanoes receives the light from the two blasts at the same time. The observer's assistant is at the base of Mt. Doom. The above objects (mountains, observer, and assistant) are at rest with respect to each other. According to the assistant does the eruption at Mt. Doom occur before, at the same time, or after the eruption at Mt. Boom?

  (a) before

  (b) at the same time

  (c) after

  (d) the answer depends on unstated assumptions

(4) Two volcanoes, Mt. Doom (on the left) and Mt. Boom (on the right), are 500 km apart in their rest frame. Suppose that each erupts in a burst of light. An observer in a lab halfway between the two volcanoes receives the light from the two blasts at the same time. These objects (mountains, observer, and assistant) are at rest with respect to each other. A spacecraft flying by at 80 % of the speed of light and directed from Mt. Doom to Mt. Boom is directly over the observer when the flashes of light arrive. According to an observer on the spacecraft does the eruption at Mt. Doom occur before, at the same time, or after the eruption at Mt. Boom?

(a) before

(b) at the same time

(c) after

(d) the answer depends on unstated assumptions

(5) Let's call the horizontal distance between the assistant and the Mt. Doom peak d and the distance between the two peaks D. In this same scenario how far away is the assistant from Mt. Boom?

(a) D

(b) $2D$

(c) $D - d$

(d) $D + d$

(e) d