Physics Cup 2018 - Problem 2. January 28, 2018

A spaceship travels with a constant acceleration g (as perceived by the passengers) along a straight line. At a certain moment, it launches two missiles in the direction of its motion, one with speed v (comparable to the speed of light c), and another with speed $2v$ (these are speeds in the spaceship's frame). Find the proper time interval in the space ship between catching the first missile and catching the second missile.