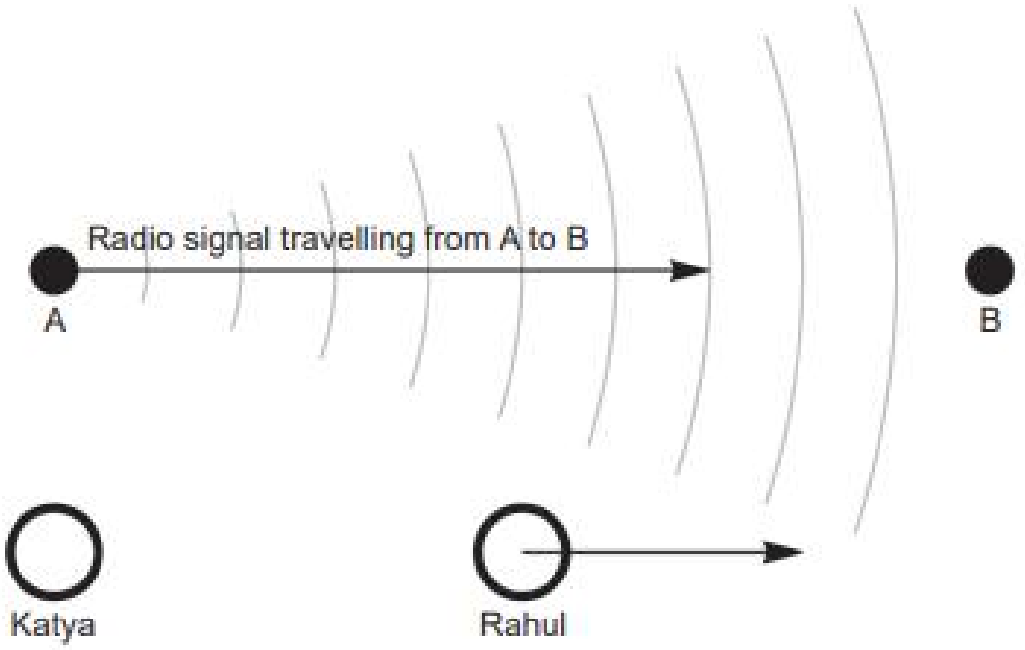
Question 9 **(3 marks)**



A radio signal is emitted from Spaceship 'A' and arrives at Spaceship 'B'. A and B are stationary with respect to Katya. In her frame of reference, A and B are a distance d_1 apart, and the signal takes time t_1 to travel.

Rahul is moving parallel to the radio waves between A and B with constant velocity near the speed of light with respect to Katya and the two spaceships. In his frame of reference, A and B are a distance d_2 apart, and the signal takes time t_2 to travel.

Derive an expression for d_2 in terms of d_1, t_1 and t_2. Show your reasoning and state any assumptions. (Hint: It is not necessary to use length contraction or time dilation.)

Answer: $d_2 =$