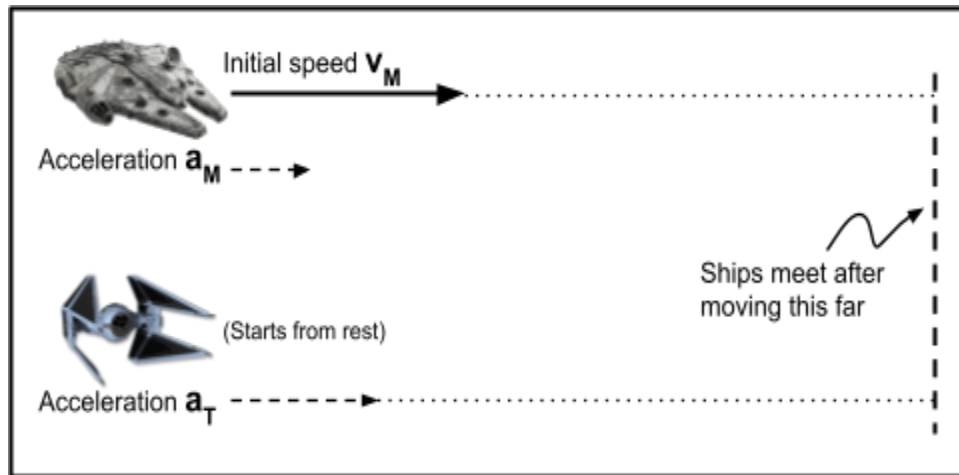


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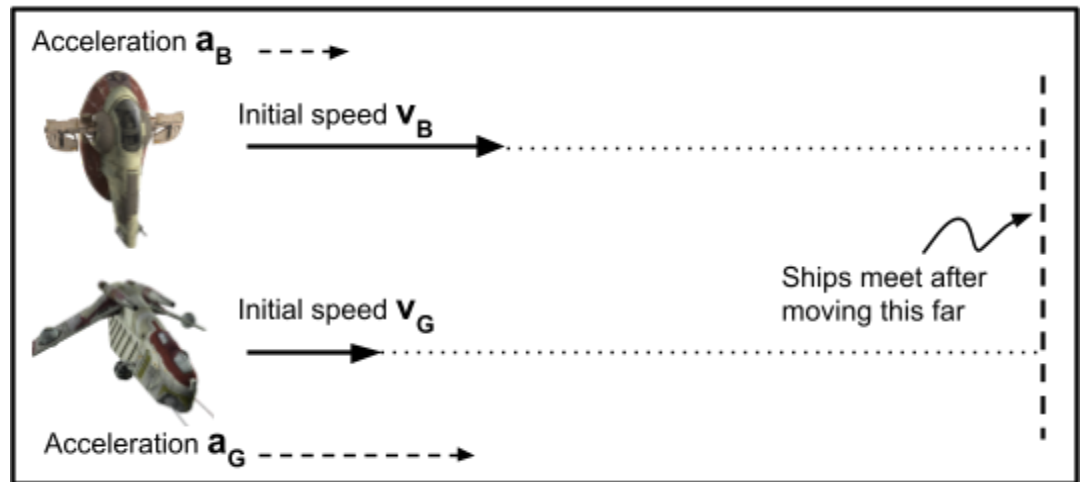
1. The Millennium Falcon (top ship) is moving with an initial speed  $v_M$  and maintains a constant acceleration  $a_M$  as it flies past a Tie fighter (bottom ship) that is at rest. As soon as the Millennium Falcon passes the Tie fighter, the Tie fighter starts accelerating to pursue the Millennium Falcon with a constant acceleration  $a_T$  and eventually catches up to the Millennium Falcon. Both ships travel in straight lines horizontally.



- Derive a symbolic expression for how long it takes the Tie fighter to catch up to the Millennium Falcon in terms of  $v_M$ ,  $a_M$ ,  $a_T$ , and fundamental constants.
- Derive a symbolic expression for how far the ships fly, from the start of the pursuit until they catch up to each other in terms of  $v_M$ ,  $a_M$ ,  $a_T$ , and fundamental constants.
- Graph the motion (position  $x$ , velocity  $v$ , acceleration  $a$ ) of each ship on the graphs below for the entire time of the pursuit, labeling the curves either **M** or **T** for each ship.



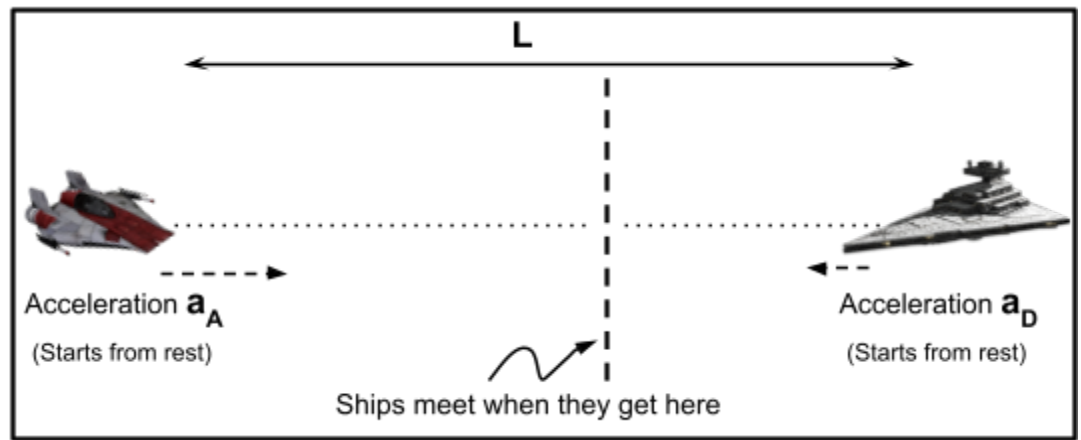
2. Boba Fett (top ship) is moving with an initial speed  $v_B$  and maintains a constant acceleration  $a_B$  as it flies past a Republic Gunship (bottom ship) that is moving with an initial speed  $v_G$  and maintains a constant acceleration  $a_G$ . Both ships travel in straight lines horizontally.



- Derive a symbolic expression for how long it takes the Gunship to catch up to Boba Fett in terms of  $v_B$ ,  $a_B$ ,  $v_G$ ,  $a_G$ , and fundamental constants.
- Derive a symbolic expression for how far the ships fly before they catch up to each other in terms of  $v_B$ ,  $a_B$ ,  $v_G$ ,  $a_G$ , and fundamental constants.
- Graph the motion (position  $x$ , velocity  $v$ , acceleration  $a$ ) of each ship on the graphs below for the entire time of the pursuit, labeling the curves either **B** or **G** for each ship.



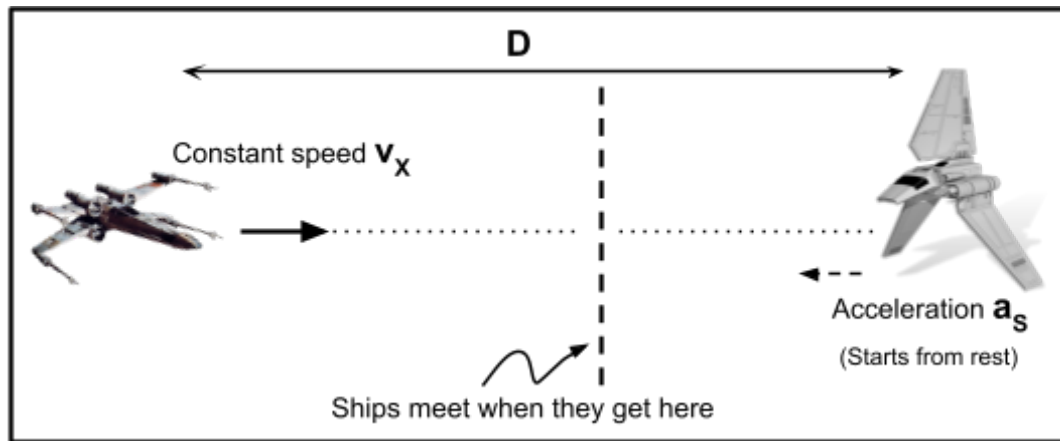
3. An A-wing (left ship) starts at rest and moves to the right with a constant acceleration  $a_A$  as it flies toward a Star Destroyer (right ship) that starts at rest and begins to fly toward the A-wing with a constant acceleration of magnitude  $a_D$ . When the ships start to accelerate they are a distance  $L$  apart.



- Derive a symbolic expression for how long it takes for the ships to reach each other in terms of  $a_A$ ,  $a_D$ ,  $L$ , and fundamental constants.
- Derive a symbolic expression for how far the A-wing flies until it reaches the Star Destroyer in terms of  $a_A$ ,  $a_D$ ,  $L$ , and fundamental constants.
- Graph the motion (position  $x$ , velocity  $v$ , acceleration  $a$ ) of each ship on the graphs below for the entire time of the pursuit, labeling the curves either **A** or **D** for each ship.



4. An X-wing (left ship) is moving with a constant speed  $v_x$  as it flies toward an Imperial Shuttle (right ship) that starts at rest but begins to fly toward the X-wing with a constant acceleration of magnitude  $a_s$ . When the imperial shuttle starts to accelerate, it is a distance  $D$  from the X-wing.



- Derive a symbolic expression for how long it takes for the ships to reach each other in terms of  $v_x$ ,  $a_s$ ,  $D$  and fundamental constants. (You do not need to simplify the expression)
- Derive a symbolic expression for how far the X-wing flies until it reaches the Imperial Shuttle in terms of  $v_x$ ,  $a_s$ ,  $D$  and fundamental constants.
- Graph the motion (position  $x$ , velocity  $v$ , acceleration  $a$ ) of each ship on the graphs below for the entire time of the pursuit, labeling the curves either **X** or **S** for each ship.

