A. [18 pts.] At the initial instant two cars, an Acura (A) and a Pontiac (B) are seen 150 m apart. The Acura is proceeding to the right at 32.0 m/s while the Pontiac is proceeding to the right at 20.0 m/s. How long does it take for the Acura (A) to catch up to the Pontiac? Relative to where A starts, what is the location of the place A catches up to B?

AT MONT B A CATCHES IS

\[ x_A = x_B \]

\[ v_A t = 150 + x_{b0} t \]

\[ t = \frac{150m}{(v_A - v_B)} = \frac{150m}{12m/s} \]

\[ t = 12.5s \]

\[ x_A = x_B = v_A t = (32m/s)(12.5s) \]

\[ x_A = x_B = 410m \]

B. [18 pts.] At the initial instant, two cars, a Chevrolet (C) and a Dodge (D) are at the same position. The Chevrolet is moving to the right with a constant speed of 32.0 m/s, and the Dodge starts from rest and moves with a constant acceleration of 3.60 m/s². See figure. How far from the starting position will both cars be when the Dodge catches up to the Chevrolet? What is the speed of the Dodge when the Dodge catches the Chevrolet?

AT INSTANT T WHEN D CATCHES C

\[ x_C = x_D \]

\[ v_{C0} t = \frac{1}{2} a_D t^2 \]

\[ t \left(1.8m/s^2 t - 32m/s \right) = 0 \]

\[ t = 0 \text{ or } t = 17.85s \]

\[ x_C = x_D = v_{C0} t = (32m/s)(17.85s) \]

\[ x_C = x_D = 569m \]

\[ v_D = v_{D0} + a_D t = (3.6m/s^2)(17.85s) \]

\[ v_D = 64.0m/s \]