

Optimization of travel between points:

Use **graphical method** for this problem and answer the following questions (a) and (b).

- a. Car "A" starts from rest at $x = 0$ on a straight level road and accelerates to a steady speed of 60 mph and after sometime, it brakes to a stop, all within a total distance of exactly 5280 feet. If its maximum forward acceleration is $0.4g$, and maximum braking acceleration is $0.8g$, where $g = 32.2 \text{ ft./s}^2$, determine the **minimum amount of time** required.
- b. Ten seconds after car "A" started, car "B" starts from rest on a parallel lane (from the same starting location as car "A") at $x = 0$ and travels on the same level road. Car "B" can have a maximum acceleration of $0.6g$ and a maximum braking acceleration of $0.85g$. If both the cars "A" and "B" come to stop at the same time and same location, determine **the smallest value of the maximum speed** reached by car "B". Note that g is still equal to 32.2 ft./s^2 .

Maximum acceleration and the maximum permissible speed together give the minimum time for the trip.

