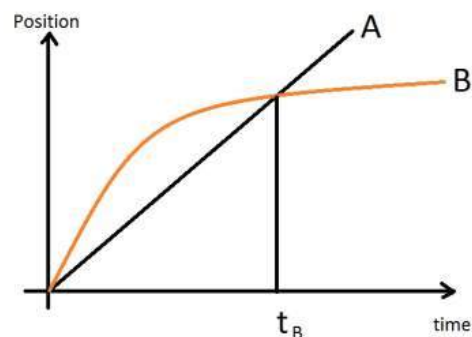


**Example:** The graph shows position as a function of time for two trains running on parallel tracks. Which statement is true?

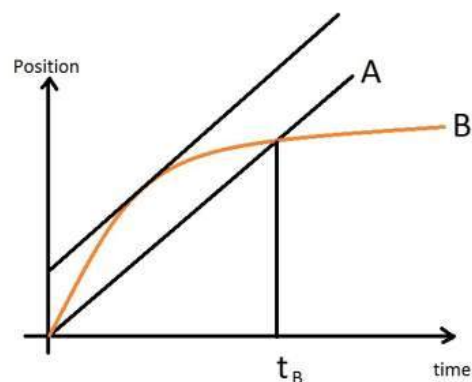


- a) At time  $t_B$  both trains have the same velocity.
- b) Both trains have the same velocity at some time after  $t_B$ .
- c) Both trains have the same velocity at some time before  $t_B$ .
- d) Somewhere on the graph, both trains have the same acceleration.

{ Hint: Depending on the question requirements, we'll have to check all the assertions one by one.

a) In a position time graph, the slope gives velocity. It can be clearly seen that Graph B has a much lower slope than Graph A at time  $t_B$ . So, the assertion is wrong.

b,c) By drawing a line parallel to the line A which is a tangent to Graph B, it can be seen where the two graphs have same slope. It is clear that the graphs have same slope between 0 and  $t_B$  as noted from the figure. So, assertion b is wrong while c is correct.



d) As the Graph A has a constant slope, so the acceleration of body A is zero. Whereas Graph B is constantly turning, so the slope can be assumed to be non-zero throughout. According to some revelations, however it is noted that the figure is not clear enough to show whether Graph B is straight after  $t_B$  or bending. In case it is assumed to be straight, then after  $t_B$  both trains will have same (zero) acceleration. Also at start both have large (infinite) acceleration, in which case the ratio of the two large ( infinite ) values may be calculated if initial conditions are mentioned and is required.

At our level we would assume this assertion to be wrong, however making a note that the image should have been more clearly presented.

Answer: c) is the correct assertion. }