

A girl escapes from home every weekend days, Saturday and Sunday using the pathways given by $x = \sin\theta + \cos\theta$ and $y = \sin\theta - \cos\theta$ respectively. The boy also escapes from home on the same days to meet his girlfriend; he takes the pathways given by $x = \sec\theta + \tan\theta$ and $y = \sec\theta - \tan\theta$ respectively. These two friends meet at two different places P and Q on a co-ordinate system the parents want to know the locus / pathways their children (girl and boy) take on x-y plane and the exact point where they meet on the two different days so as to intervene.

Task.

As a mathematics learner;

- i) Prove to the parent of the girl that the girl takes the pathway given by $x^2 + y^2 = 2$ on the two days.
- ii) Derive the expression that shows the locus of the boy for the two days.
- iii) Determine the points P and Q where the two friends meet for the two days hence the best point between PQ where the parents should stand so as to

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