NCERT Class 9 Solutions: Introduction to Euclid's Geometry (Chapter 5) Exercise 5.2

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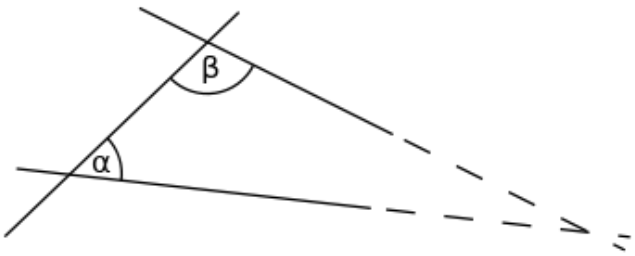
Euclid's 5th postulates

Euclid's fifth postulates states that If the sum of the interior angles α and β is less than 180°, the two straight lines, produced indefinitely, meet on that side

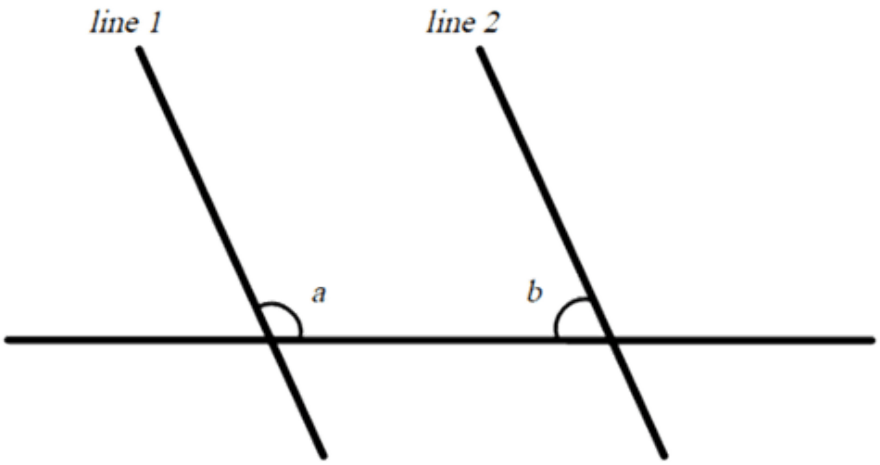
Q-1 How would you rewrite Euclid's fifth postulate so that it would be easier to understand?

Solution:

First lets understand the Euclid's 5th postulate. It is equivalent to what is known as the parallel postulate. In the below figure $\angle\alpha + \angle\beta < 180^\circ$, thus the lines intersect on that side.



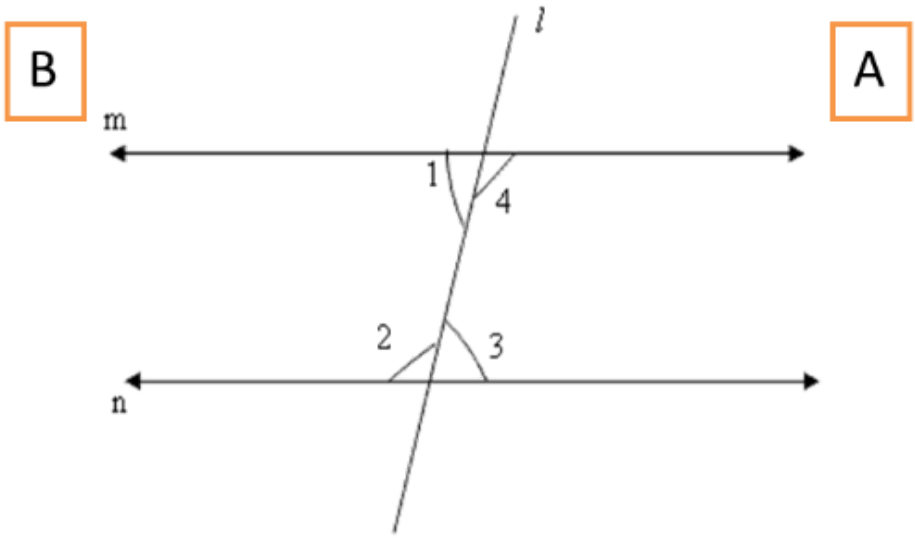
On the other hand:



The two angles *a* and *b* are known as consecutive interior angles. If the sum of these consecutive interior angles is 180° , then the lines do not intersect i.e.. they are parallel. Thus Euclid's 5^{th} postulate can be written as "When two parallel lines intersect a third line, then the consecutive interior angles are supplementary."

Q-2 Does Euclid's fifth postulate implies the existence of parallel lines? Explain.

Solution:



As we understood in the previous question, when the two lines (*m* and *n* above) intersect the third line (*l*) . Then, if the sum of angle 4 and 3 above is less than 180° , then lines will intersect on side A. If the sum of angle 1 and 2 above is less than 180° , then lines will intersect on side B. If both $\angle 1 + \angle 2 = 180^\circ$ and $\angle 3 + \angle 4 = 180^\circ$, than lines *m* and *n* will be parallel and will not intersect on either side.