ODM EDUCATIONAL GROUP
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PERIOD 2

MATHEMATICS

CHAPTER NUMBER :~ 5
CHAPTER NAME :~INTRODUCTION TO EUCLID'S GEOMETRY

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LEARNING OUTCOME:-

1.Students will be able to learn to learn application of axioms and postulates.

Consider the following statement : There exists a pair of straight lines that are everywhere equidistant from one another. Is this statement a direct consequence of Euclid's fifth postulate? Explain.

Take any line l and a point P not on l. Then, by Playfair's axiom, which is equivalent to the fifth postulate, we know that there is a unique line m through P which

is parallel to l.

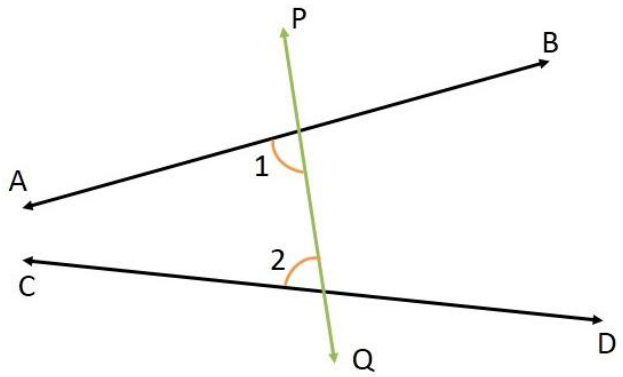
Now, the distance of a point from a line is the length of the perpendicular from the point to the line. This distance will be the same for any point on m from l and any

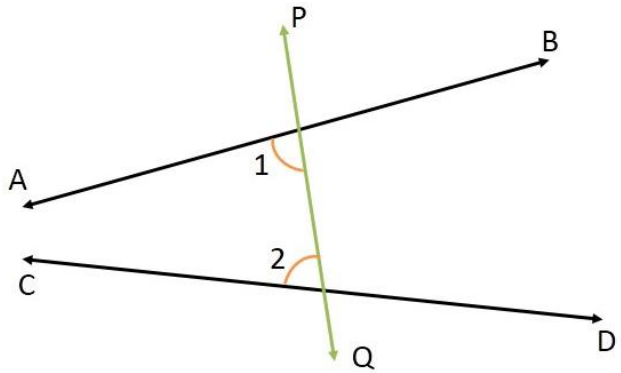
point on l from m. So, these two lines are everywhere equidistant from one another.

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

Postulate 5 : If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produced indefinitely, meet on that side on which the sum of angles is less than two right angles.

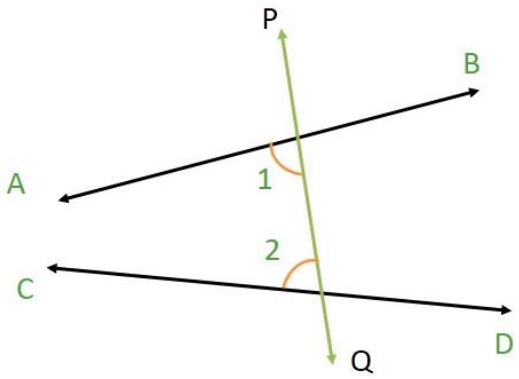
Here two right angles means 180°

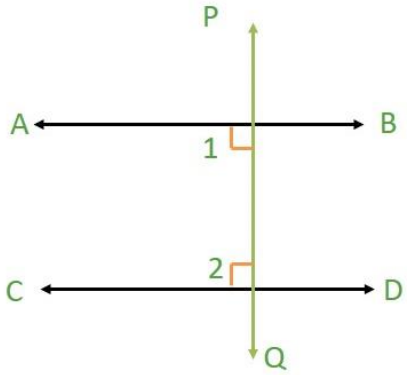




It says if $\angle 1 + \angle 2 < 180°$

Then lines AB & CD meet on left side of line of PQ





If $\angle 1 + \angle 2 = 180°$

Then lines AB & CD do not intersect and intersecting line PQ is perpendicular to AB & CD.

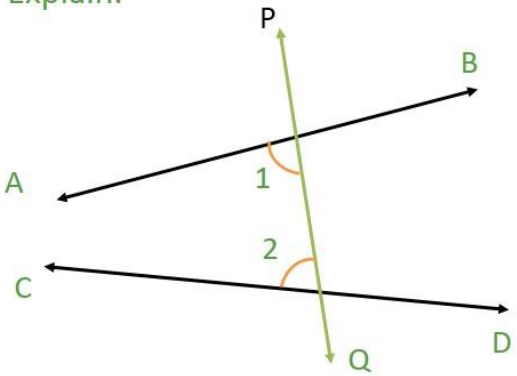
We rewrite postulate 5 as

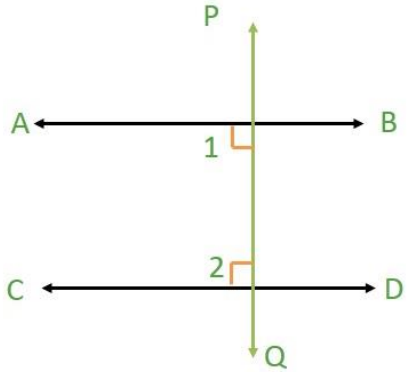
" Straight lines intersecting

(i) There is a line through p which is parallel to l and (ii) there is only on such line.

(ii) Two distinct intersecting lines cannot be parallel to the same line.

Does Euclid's fifth postulate imply the existence of parallel lines? Explain.





Postulate 5 : If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two righ angles, then the two straight lines, if produced indefinitely, meet on that side on which the sum of angles is less than two right angle

If a straight line PQ falls on two straight lines AB & CD such that ∠ 1 + ∠ 2 = 180° & ∠1 = 90° , ∠2 = 90°

Then lines AB & CD wont meet,

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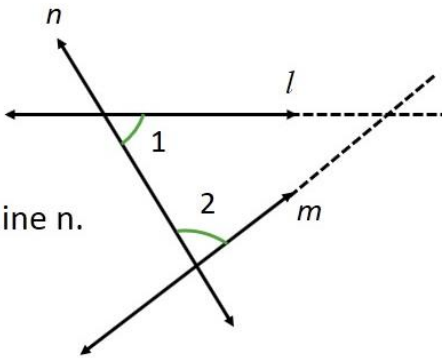
Does Euclid's fifth postulate imply the existence of parallel lines ? Explain.

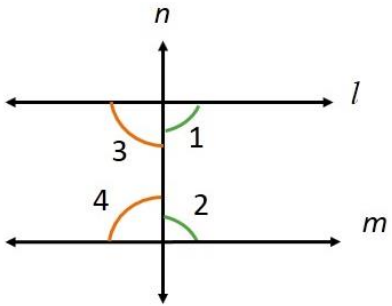
Euclid's 5th postulate is "If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produced indefinitely, meet on that side on which the sum of angles is less than two right angles."

It says that if,

$\angle 1 + \angle 2 < 180°$

then line l & m meet on right side of line n.





Now, since

l & m are parallel, then

$\angle 1 + \angle 2 = 180°$

$\therefore$ By Euclid's 5th postulate, line l & m will not meet on right side of n *(Since sum is not less than 180°)*

Similarly,

$\angle 3 + \angle 4 = 180°$

$\therefore$ By Euclid's 5th postulate, line l & m will not meet on left side of line n.

Thus, Euclid's 5th postulate implies existence of parallel lines

HOMEWORK ASSIGNMENT

Exercise 5.2

AHA

1. Differentiate the concept of parallel lines and intersecting lines.

THANKING YOU

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