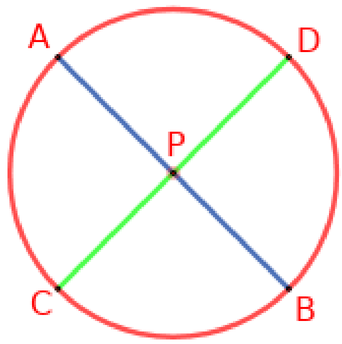
## MATHEMATICS ONLINE CLASS X ON 12-08-2021

# CIRCLES

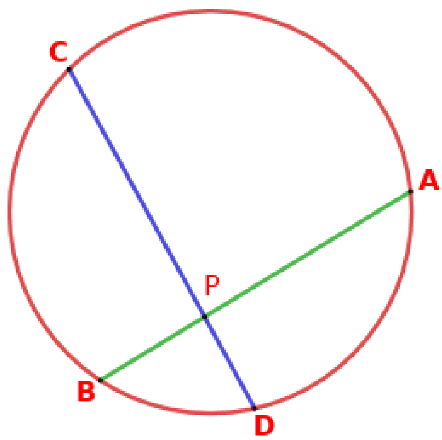
click

### Two Chords

**Draw two diameters of a circle.**
**These two diameters intersect at the centre of the circle.**
**Diameters are chords of circle.**
**When they intersect we get four parts PA, PB, PC and PD.**
**Here PA = PB = PC = PD (Radii of the circle)**



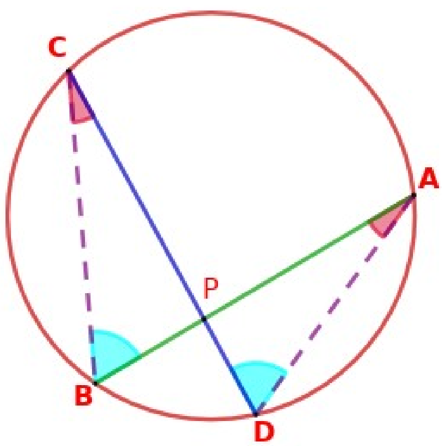

**Draw two non diametrical chords AB and CD intersecting at a point P inside the circle.**
**Here also we get 4 parts PA, PB, PC and PD.**
**They are all not equal.**
**We have to find the relation between PA, PB, PC and PD.**
**Draw this picture in your notebook and measure the lengths of PA, PB, PC and PD.**
**Find the product of the parts of the chord AB (ie; PA × PB)**
**Find the product of the parts of the chord CD (ie; PC × PD)**
**We get PA × PB = PC × PD**






**Proof :**

**In the figure, AB and CD are two chords of the circle intersecting at a point P inside the circle.**
**Join AD and BC. ∠A and ∠C are angles made by the arc BD at its alternate arc.**
**They are equal.**
**∴ ∠A = ∠C**



$\angle D$ and $\angle B$ are angles made by the arc AC at its alternate arc.
They are equal.
$\therefore \angle B = \angle D$
Consider $\Delta APD$ and $\Delta BPC$
All angles of $\Delta APD$ and $\Delta BPC$ are equal.
$\therefore \Delta APD$ and $\Delta BPC$ are similar.
In similar triangles, sides opposite to equal angles are proportional.

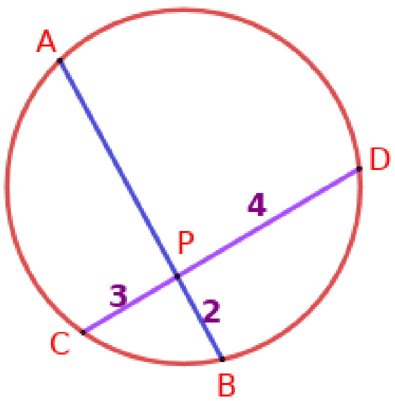
$$\frac{PC}{PA} = \frac{PB}{PD}$$

By cross multiplication, we get $PA \times PB = PC \times PD$

**If two chords of a circle intersect within the circle then the products of the parts of the two chords are equal.**

**Question**

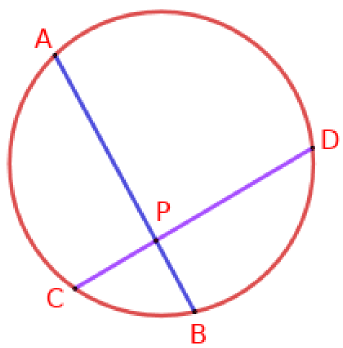
In the figure, PB = 2 cm, PC = 3 cm, PD = 4 cm.
Find the length of AB.



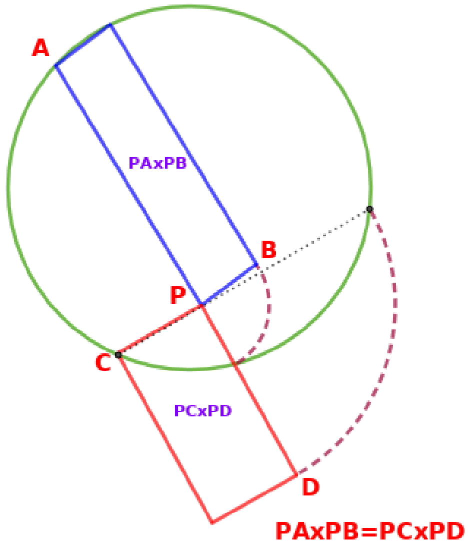

**Answer**

PB = 2 cm
PC = 3 cm
PD = 4 cm
We have $PA \times PB = PC \times PD$
$PA \times 2 = 3 \times 4 = 12$
$PA = \frac{12}{2} = 6$ cm
$\therefore AB = PA + PB = 6 + 2 = 8$ cm

In the figure, $PA \times PB = PC \times PD$
PA, PB, PC and PD are the lengths of parts of the chords AB and CD. Therefore, PA, PB, PC and PD are numbers.
$PA \times PB$ is the area of a rectangle of sides PA and PB
Similarly, $PC \times PD$ is the area of a rectangle of sides PC and PD



**PA × PB = PC × PD means area of these two rectangles are equal.**




**If two chords of a circle intersect within a circle , then the rectangle formed by the parts of the same chord have equal area.**



## ASSIGNMENT

**The chords AB and CD intersect at a point P. If PA = 9 cm, PD = 12 cm, AB = 13 cm. Find the lengths of PB, PC and CD.**