

Assignment 3

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Download latex-tikz codes from

https://github.com/KBVijayVarma/EE3900/tree/main/Assignment_3

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PROBLEM (CONSTRUCTION Q 2.19)

Draw a circle of radius 3 and any two of its diameters. Draw the ends of these diameters. What figure do you get?

SOLUTION

Let us draw a Circle of radius 3 with centre O.

Let AB and CD be any two diameters of this circle such that $\overline{AB} \not\perp \overline{CD}$.

A Quadrilateral ACBD is formed by joining the ends of these diameters.

Diameters AB and CD are of equal length i.e., $\overline{AB} = \overline{CD}$.

Hence diagonals of the Quadrilateral ACBD are of equal length.

Radii of the Circle are of equal length, i.e., $\overline{OA} = \overline{OB} = \overline{OC} = \overline{OD} = 3$.

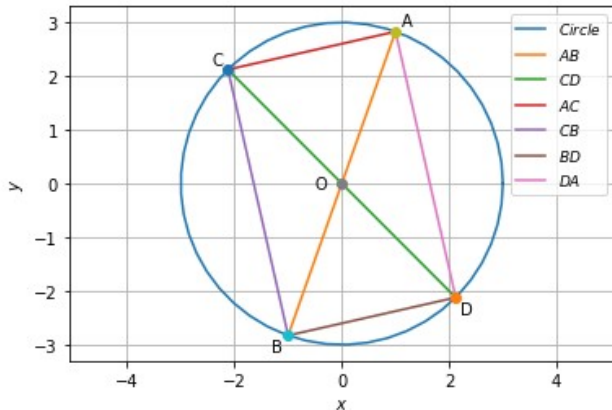


Fig. 0: Rectangle

\therefore Diagonals $\overline{AB} = \overline{CD}$ and $\overline{OA} = \overline{OB} = \overline{OC} = \overline{OD}$

So, the Diagonals of the Quadrilateral ACBD, \overline{AB} and \overline{CD} are of equal length and are bisecting each other.

Rectangle is a Quadrilateral having Diagonals of equal length and the Diagonals should bisect each other.

Hence, the Quadrilateral ACBD is a **Rectangle**. This can be verified from above figure 0.

Now, let us take two diameters PQ and RS of the circle such that $\overline{PQ} \perp \overline{RS}$.

From above, we get that Diagonals $\overline{PQ} = \overline{RS}$ and $\overline{OP} = \overline{OQ} = \overline{OR} = \overline{OS}$.

But $\overline{PQ} \perp \overline{RS}$.

So, the Diagonals of the Quadrilateral PRQS, \overline{PQ} and \overline{RS} are of equal length and are bisecting each other perpendicularly.

Square is a Quadrilateral having Diagonals of equal length and the Diagonals should bisect each other perpendicularly.

Hence, the Quadrilateral PRQS is a **Square**.

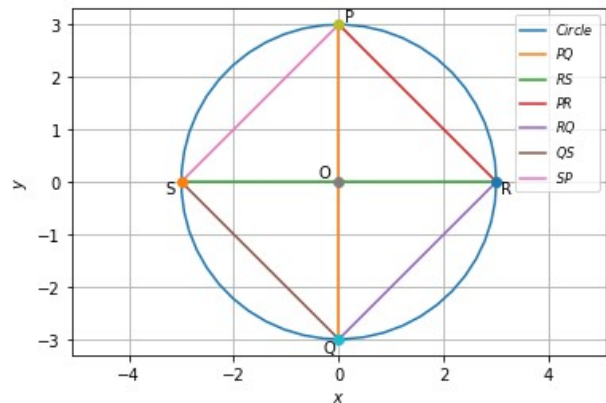


Fig. 0: Square

This can be verified from above figure 0.

Therefore, the figure is a Rectangle if the Diameters are not perpendicular and is a Square if the Diameters are perpendicular.