## Circles Ex 10.2 Q8

**Answer :**

We have been given that $\angle TRQ = 30^\circ$.

From the property of tangents we know that a tangent will always be perpendicular to the radius at the point of contact. Therefore,

$\angle QRO = 90^\circ$

Looking at the given figure we can rewrite the above equation as follows,

$\angle TRQ + \angle TRO = 90^\circ$

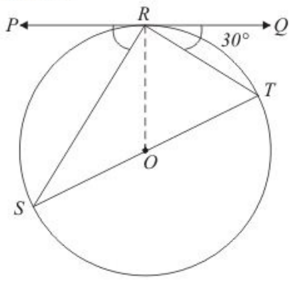
We know that $\angle TRQ = 30^\circ$. Therefore,

$30^\circ + \angle TRO = 90^\circ$

$\angle TRO = 60^\circ$

Now consider $\triangle TRO$. The two sides of this triangle *OR* and *OT* are nothing but the radii of the same circle. Therefore,

*OR* = *OT*




And hence $\triangle TRO$ is an isosceles triangle. We know that the angles opposite to the equal sides of the isosceles triangle will be equal. Therefore,

$\angle TRO = \angle OTR$

We have found out that $\angle TRO = 60^\circ$. Therefore,

$\angle OTR = 60^\circ$

Now consider $\triangle TRO$. We know that sum of all angles of a triangle will always be equal to $180^\circ$. Therefore,

$\angle TRO + \angle OTR + \angle TOR = 180^\circ$

$60^\circ + 60^\circ + \angle TOR = 180^\circ$

$\angle TOR = 60^\circ$

Now let us consider the straight line *SOT*. We know that the angle of a straight line is $180^\circ$. Therefore,

$\angle SOT = 180^\circ$

From the figure we can see that,

$\angle SOT = \angle SOR + \angle TOR$

That is,

$\angle SOR + \angle TOR = 180^\circ$

We have found out that $\angle TOR = 60^\circ$. Therefore,

$\angle SOR + 60^\circ = 180^\circ$

$\angle SOR = 120^\circ$

Let us take up $\triangle SOR$ now. The sides *SO* and *OR* of this triangle are nothing but the radii of the same circle and hence they are equal. Therefore, $\triangle SOR$ is an isosceles triangle. In an isosceles triangle, the angles opposite to the two equal sides of the triangle will be equal. Therefore we have,

$\angle OSR = \angle ORS$

Also the sum of all angles of a triangle will be equal to $180^\circ$. Therefore,

$$\angle SOR + \angle ORS + \angle OSR = 180^\circ$$
$$\angle SOR + 2\angle ORS = 180^\circ$$

In the previous step we have found out that $\angle SOR = 120^\circ$. Therefore,

$$120^\circ + 2\angle ORS = 180^\circ$$
$$2\angle ORS = 60^\circ$$
$$\angle ORS = 30^\circ$$

Let us now take up $\angle ORP$. We know from the property of tangents that the angle between the radius of the circle and the tangent at the point of contact will be equal to $90^\circ$. Therefore,

$\angle ORP = 90^\circ$

By looking at the figure we can rewrite the above equation as follows,

$\angle PRS + \angle ORS = 90^\circ$

In the previous section we have found that $\angle ORS = 30^\circ$. Therefore,

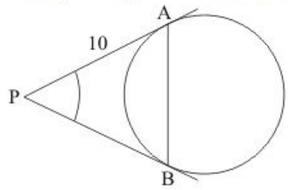
$$\angle PRS + 30^\circ = 90^\circ$$
$$\angle PRS = 60^\circ$$

Thus we have found out that $\angle PRS = 60^\circ$.

## Circles Ex 10.2 Q9

**Answer :**

Let us first put the given data in the form of a diagram.




From the property of tangents we know that the length of two tangents drawn to a circle from a common external point will always be equal. Therefore,

*PA=PB*

Consider the triangle *PAB*. Since we have *PA=PB*, it is an isosceles triangle. We know that in an isosceles triangle, the angles opposite to the equal sides will be equal. Therefore we have,

$\angle PAB = \angle PBA$

Also, sum of all angles of a triangle will be equal to $180^\circ$. Therefore,

$$\angle PAB + \angle PBA + \angle APB = 180^\circ$$
$$60^\circ + 2\angle PBA = 180^\circ$$
$$2\angle PBA = 120^\circ$$
$$\angle PBA = 60^\circ$$

Since we know that $\angle PAB = \angle PBA$,

$\angle PAB = 60^\circ$

Now if we see the values of all the angles of the triangle, all the angles measure $60^\circ$. Therefore triangle *PAB* is an equilateral triangle.

We know that in an equilateral triangle all the sides will be equal.

It is given in the problem that side *PA* = 10 cm. Therefore, all the sides will measure 10 cm. Hence, *AB* = 10 cm.

Thus the length of the chord *AB* is 10 cm.

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