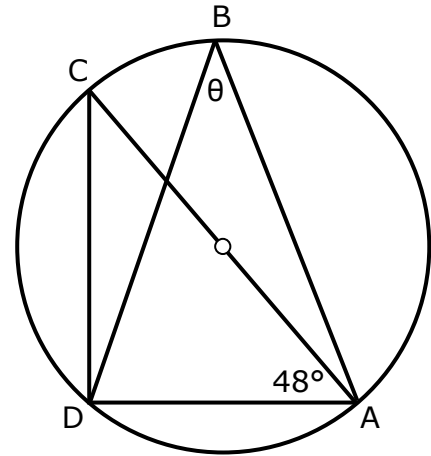
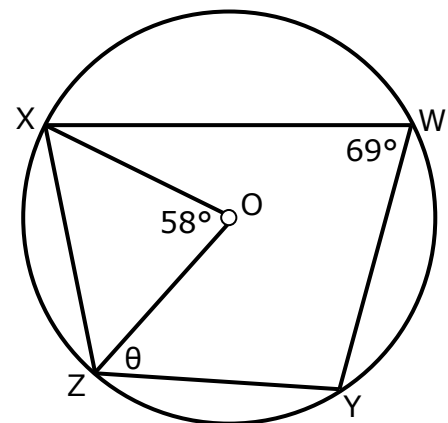


Merit+ Circle Geometry Practice #1

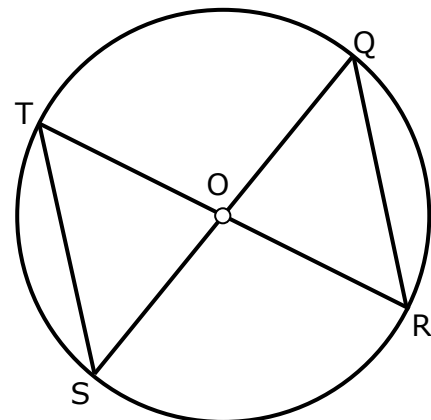
1. Find $\angle DBA$ (marked θ).



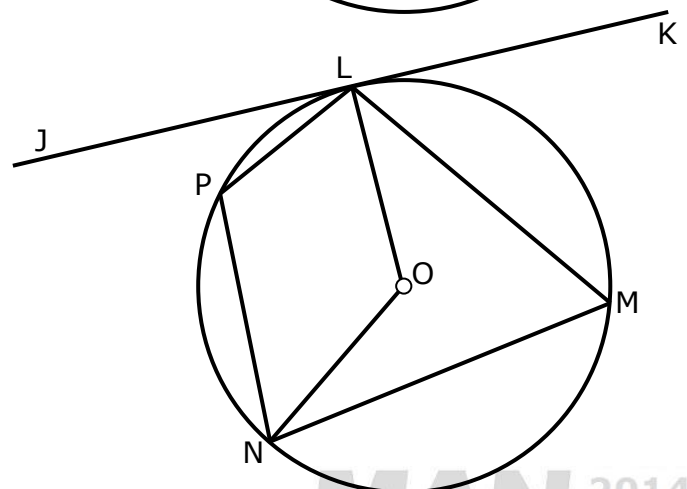
2. Find $\angle OZY$ (marked θ).



3. Show that ST is parallel to QR.



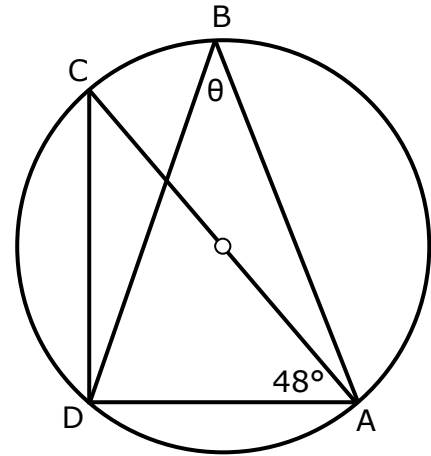
4. JK is a tangent intersecting at L.
If $\angle LPN = 2 \times \angle MLK$ show that
LM is the same length as MN



Answers: Merit+ Circle Geometry Practice #1

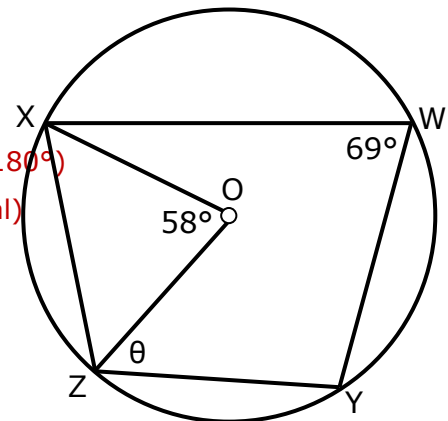
1. Find $\angle DBA$ (marked θ).

$\angle ADC = 90^\circ$ (subtended from ends of a diameter)
 $\angle DCA = 42^\circ$ (angles in triangle add to 180°)
 $\angle DBA = 42^\circ$ (angles subtended by the same arc are equal)



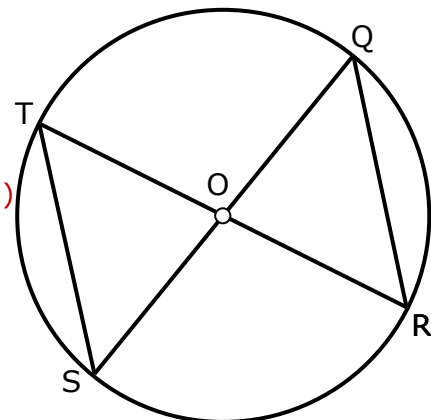
2. Find $\angle OZY$ (marked θ).

$\angle YZX = 111^\circ$ (opposite sides of cyclic quadrilaterals add to 180°)
 $\angle OZX = \angle OXZ$ (base angles of an isosceles triangle are equal)
 $\angle OZX = 61^\circ$ (interior angles of a triangle add to 180°)
 $\angle OZY = 50^\circ$ (difference between $\angle XZY$ and $\angle OZX$)



3. Show that ST is parallel to QR.

Let $x = \angle QOR = \angle TOS$ (vertically opposite angles are equal)
 $\angle OST = \angle OTS$ (base angles of an isosceles triangle are equal)
 $\angle OST = 90^\circ - \frac{1}{2}x$ (interior angles of a triangle add to 180°)
 $\angle OQR = 90^\circ - \frac{1}{2}x$ (as for the triangle OTS above)
 $\angle OQR$ and $\angle OST$ are alternate and equal
 ST must be parallel to QR as alternate angles on a transversal are equal



4. JK is a tangent intersecting at L.
 If $\angle LPN = 2 \times \angle MLK$ show that
 LM is the same length as MN

Let $2x = \angle LPN$ so $x = \angle MLK$
 $\angle MLO = 90^\circ - x$ (Tangent is at 90° to a radius it touches)
 $\angle LMN = 180^\circ - 2x$ (opposite sides of cyclic quad add to 180°)
 $\angle LON = 4x$ (angle subtended to centre is twice the angle to the sides and $\angle LPN = 2x$)
 $\angle ONM = 90^\circ - x$ (quadrilateral LMNO's interior angles add to 360°)

Since $\angle MNO = \angle MLO$ and $OL = ON$ (both radii) quadrilateral LMNO is symmetric
 LM and MN must be the same length if LMNO is symmetric.

