1. \( \angle DBA = 53^\circ \). AC is a tangent to the circle at B. Find \( \angle DEB \) (marked \( \theta \)).

2. Find \( \angle WOX \) (marked \( \theta \)).

3. QRST is a parallelogram. Show that \( \triangle PQT \) is isosceles.

4. JK is parallel to ML. O is the centre of the circle. Find the size of \( \angle PMJ \).
Answers: Merit+ Circle Geometry Practice #5

1. $\angle DBA = 53^\circ$. AC is a tangent to the circle at B. 
   Find $\angle DEB$ (marked $\theta$).
   
   $\angle DBO = 37^\circ$ ($\angle ABO = 90^\circ$ as tangent $\perp$ to radius)
   $\angle DEB = 53^\circ$ (interior angles $\Delta$ add to 180°)

2. Find $\angle WOX$ (marked $\theta$).
   
   $\angle VWO = 71^\circ$ ($\Delta$ from radii is isosceles)
   $\angle VOW = 38^\circ$ (interior angles $\Delta$ add to 180°)
   $\angle VOX = 122^\circ$ ($\angle$ at centre = 2x angle at edge from same arc)
   $\angle WOX = 84^\circ$ ($\angle VOX = \angle VOW + \angle WOX$)
   
   or calculate $\angle s$ in $\Delta VWO$ as first two steps above
   $\angle VWX = 119^\circ$ (opposite on cyclic quad add to 180°)
   $\angle OWX = 48^\circ$ (remainder after $\angle VWO = 71^\circ$ is taken off 119°)
   $\angle WXO = 48^\circ$ ($\Delta$ from radii is isosceles)
   $\angle WOX = 84^\circ$ (interior angles of $\Delta$ add to 180°)

3. QRST is a parallelogram.
   Show that $\Delta PQT$ is isosceles.
   
   Let $\angle TPQ = x$
   $\angle TSR = 180^\circ - x$ (Opposite angles cyclic quad add to 180°)
   $\angle TQR = 180^\circ - x$ (symmetry of parallelogram)
   $\angle TQP = x$ (angles on a line add to 180°)
   As $\angle TPQ = \angle TQP$ the $\Delta PQT$ must be isosceles
   
   or let $\angle PRS = y$
   $\angle TQP = y$ (corr on $||$) and $\angle TSR = 180^\circ - y$ (co-int on $||$)
   $\angle TPQ = y$ (opp on cyclic quad) and so $\angle TPQ = \angle PQT \Rightarrow$ isosceles

4. JK is parallel to ML
   O is the centre of the circle
   Find the size of $\angle PMJ$
   
   $\angle OLM = 41^\circ$ (corresponding on $||$ are equal)
   $\angle LMO = 41^\circ$ ($\Delta$ from radii is isosceles)
   $\angle OMP = 49^\circ$ ($\angle LMP = 90^\circ$ as from ends of diameter)
   $\angle PMJ = 131^\circ$ (angles on line add to 180°)
   or put in light blue line shown to do last step
   $\angle PMJ = 41^\circ + 90^\circ$ (vertically opposite $\angle LMO + 90^\circ$)