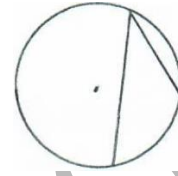
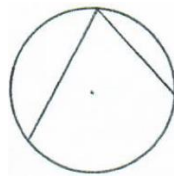


### 16 Angles Formed by Chords, Secants, and Tangents

#### I Inscribed Angles

**D16-1** An **inscribed angle** is an angle whose vertex is on a circle and whose sides contain chords of the circle. The inscribed angle may intercept a minor arc, a major arc or a semicircle.

**T16-1** The measure of an inscribed angle is equal to half the measure of its intercepted arc.



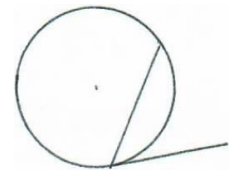
**C16-1** If two inscribed angles intercept the same arc, then the angles are congruent.

**C16-2** If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.

**C16-3** An angle inscribed in a semicircle is a right angle.

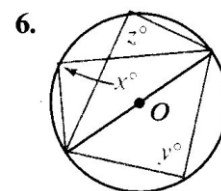
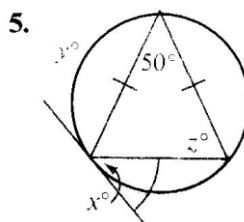
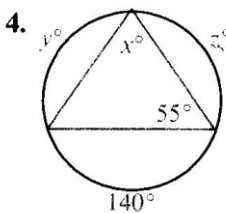
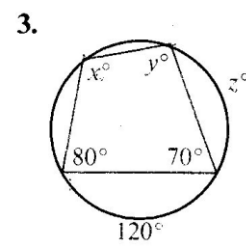
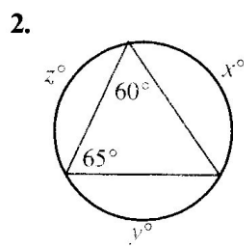
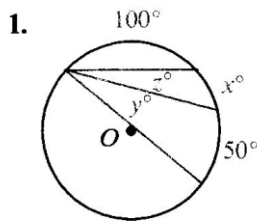


**T16-2 Chord-Tangent Angle Theorem** The measure of an angle formed by a chord and a tangent is equal to half the measure of the intercepted arc.



#### Exercise I

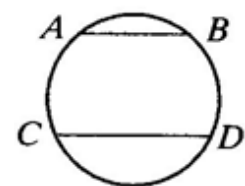
1-6 Find  $x$ ,  $y$ ,  $z$ .



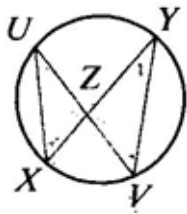
7. Prove: If two chords of a circle are parallel, the two arcs between the chords are congruent.

Given:  $\overline{AB} \parallel \overline{CD}$ .

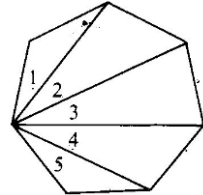
Prove:  $AC \cong BD$



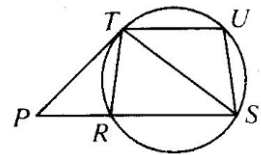
8. Prove:  $\triangle UXZ \sim \triangle YVZ$ .



9. Find the measures of the numbered angles in a regular polygon with 7 sides.



10. Given:  $\overline{PT}$  is a tangent;  $\overline{TU} \parallel \overline{PS}$ . Find three similar triangles and prove them similar.



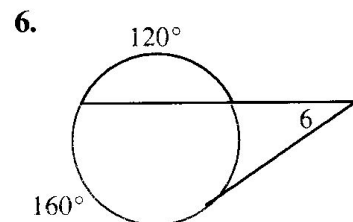
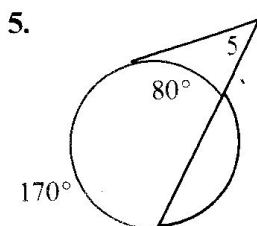
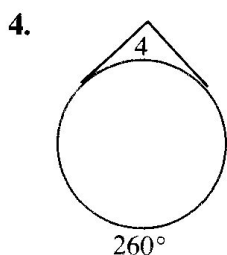
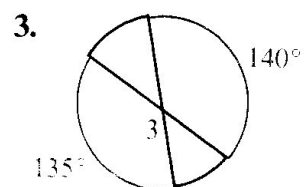
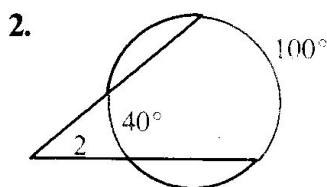
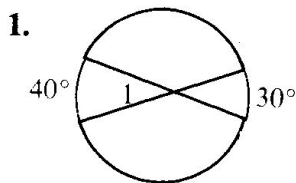
**II Other Angles**

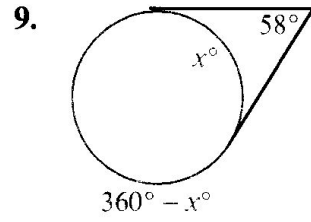
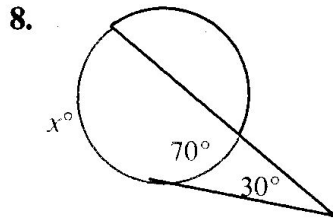
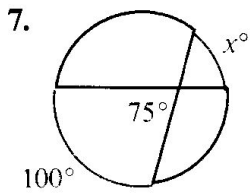
**T16-3 Chord-Chord Angle Theorem** The measure of an angle formed by two chords that intersect inside a circle is equal to half the sum of the measures of the intercepted arcs.

**T16-4 Secant-Secant, Secant-Tangent, Tangent-Tangent Angle Theorem** The measure of an angle formed by two secants, two tangents, or a secant and a tangent drawn from a point outside a circle is equal to half the difference of the measures of the intercepted arcs.

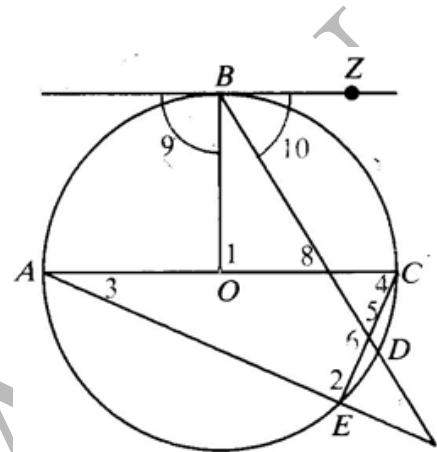
**Exercise II**

1-9 Find the measure of each numbered angle.





10.  $\overline{BZ}$  is tangent to  $\odot O$ ;  $\overline{AC}$  is a diameter;  $m\angle C = 90^\circ$ ;  $m\angle D = 30^\circ$ ;  $m\angle E = 20^\circ$ .  
Find the measure of each numbered angle.

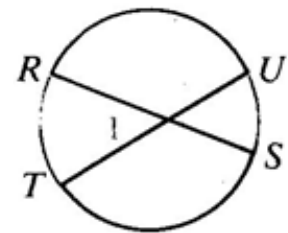


11. (a) If  $m\angle RT = 80$  and  $m\angle US = 40$ , then  $m\angle 1 =$  \_\_\_\_\_.

(b) If  $m\angle RU = 130$  and  $m\angle TS = 100$ , then  $m\angle 1 =$  \_\_\_\_\_.

(c) If  $m\angle 1 = 50$  and  $m\angle RT = 70$ , then  $m\angle US =$  \_\_\_\_\_.

(d) If  $m\angle 1 = 52$  and  $m\angle US = 36$ , then  $m\angle RT =$  \_\_\_\_\_.

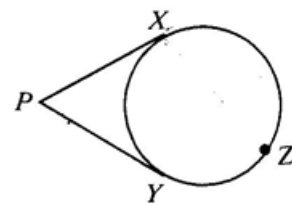


12.  $\overline{PX}$  and  $\overline{PY}$  are tangents.

(a) If  $m\angle XZY = 250$ , then  $m\angle P =$  \_\_\_\_\_.

(b) If  $m\angle XY = 90$ , then  $m\angle P =$  \_\_\_\_\_.

(c) If  $m\angle P = 85$ , then  $m\angle XY =$  \_\_\_\_\_.

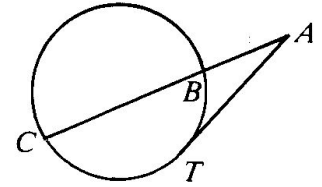


13.  $\overline{AT}$  is a tangent.

(a) If  $m\widehat{CT} = 110$  and  $m\widehat{BT} = 50$ , then  $m\angle A =$  \_\_\_\_\_.

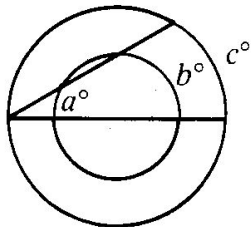
(b) If  $m\angle A = 40$  and  $m\widehat{BT} = 40$ , then  $m\widehat{CT} =$  \_\_\_\_\_.

(c) If  $m\angle A = 35$  and  $m\widehat{CT} = 110$ , then  $m\widehat{BT} =$  \_\_\_\_\_.



14. A Quadrilateral circumscribed about a circle has angles of  $80^\circ, 90^\circ, 94^\circ$ , and  $96^\circ$ . Find the measures of the four nonoverlapping arcs determined by the points of tangency.

15. Write an equation involving  $a, b$ , and  $c$ .



16. Find the ratio of  $x : y$ .

