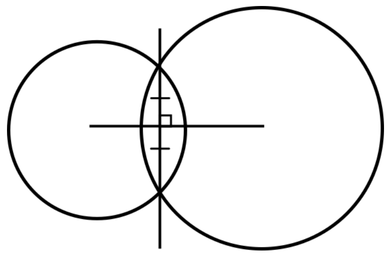
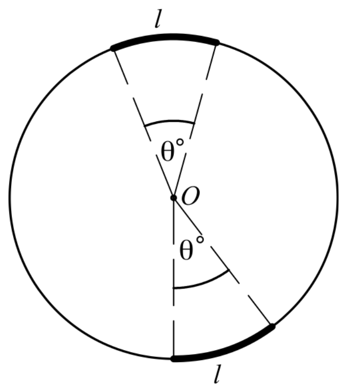
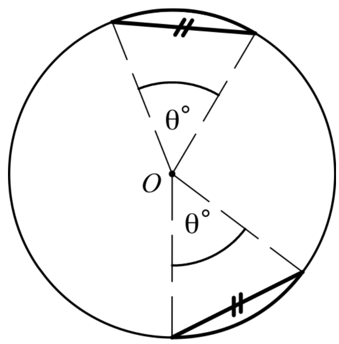
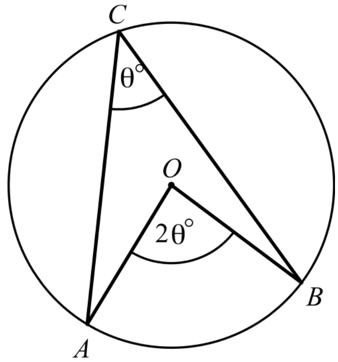
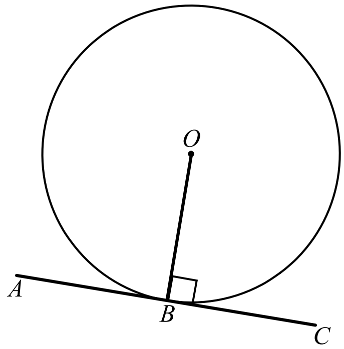
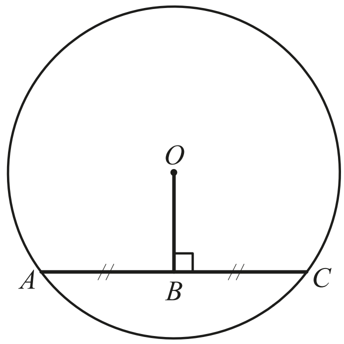
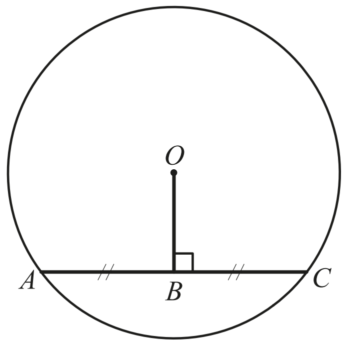
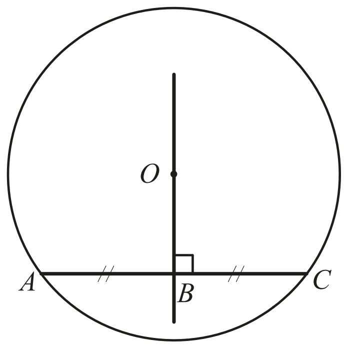
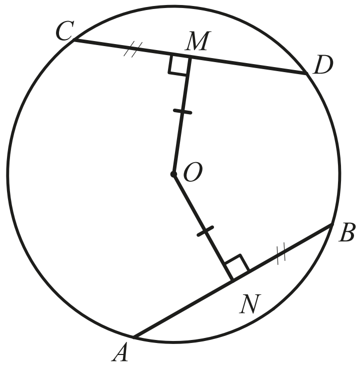
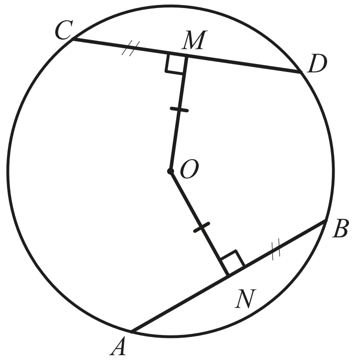
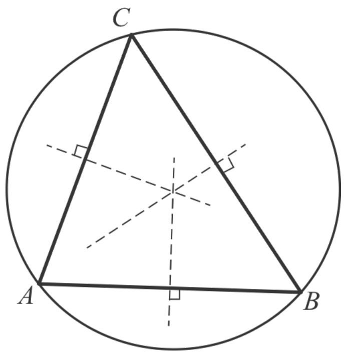
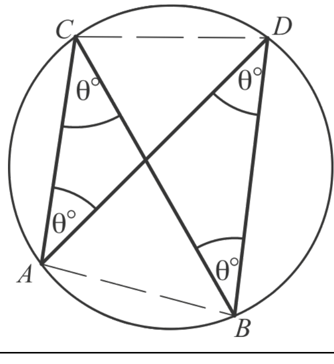
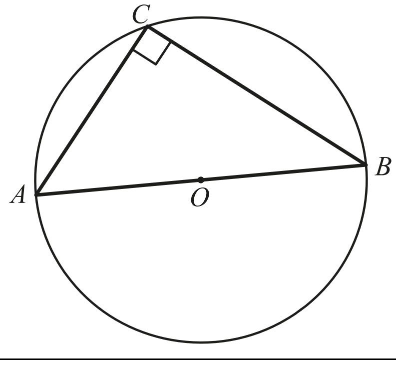
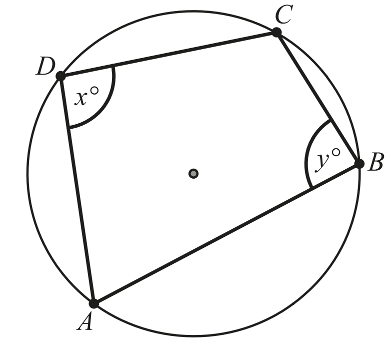
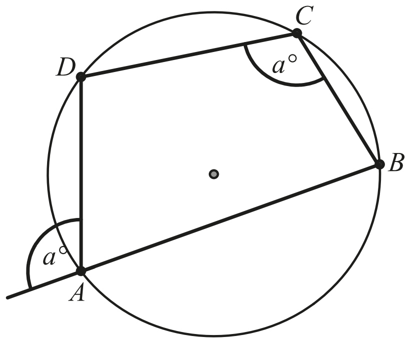
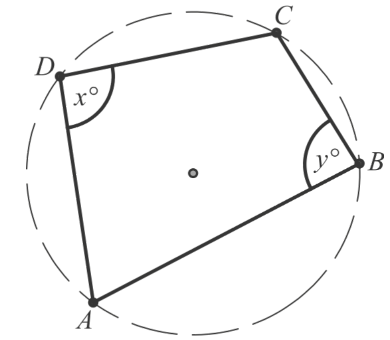
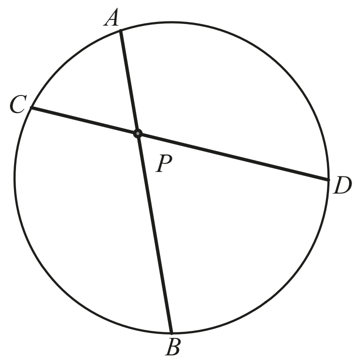
Circle geometry theorems

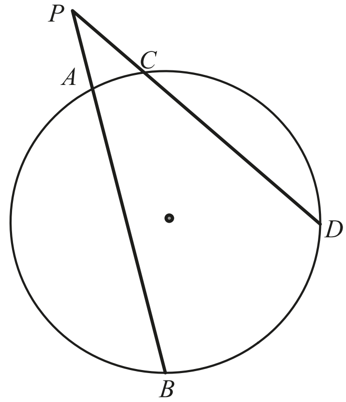
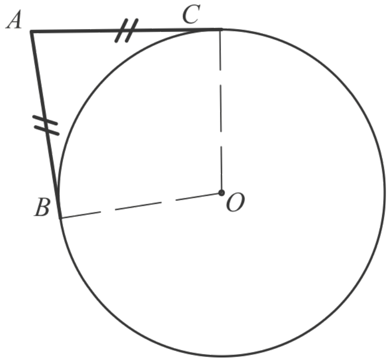
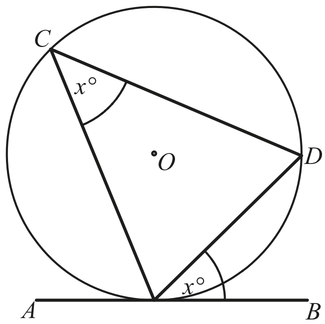
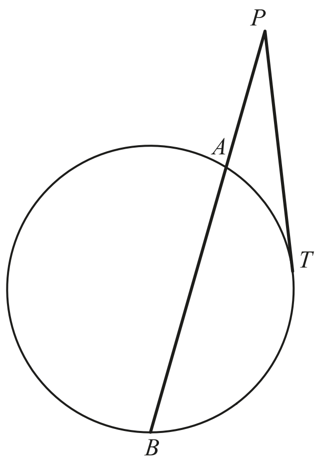
http://topdrawer.aamt.edu.au/Geometric-reasoning/Big-ideas/Circle-geometry/Angle-and-chord-properties

	Theorem	Suggested abbreviation	Diagram
1.	When two circles intersect, the line joining their centres bisects their common chord at right angles.	centres of touching circles	
2.	Equal arcs on circles of equal radii subtend equal angles at the centre, and conversely.	equal arcs, equal angles	
3.	Equal angles at the centre stand on equal chords, and conversely.	equal chords, equal angles OR angles standing on equal chords OR angles standing on equal arcs	

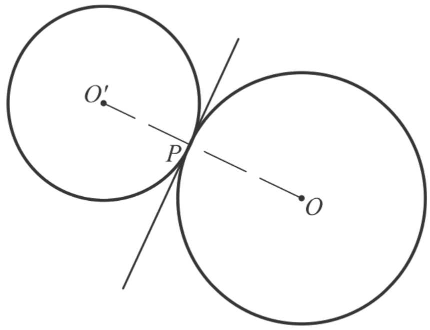
	Theorem	Suggested abbreviation	Diagram
4.	The angle at the centre is twice the angle at the circumference subtended by the same arc.	angles at the centre and circumference	
5.	The tangent to a circle is perpendicular to the radius drawn to the point of contact and conversely.	tangent perpendicular to radius	
6.	The perpendicular from the centre of a circle to a chord bisects the chord.	perpendicular from the centre	
7.	The line from the centre of a circle to the midpoint of a chord is perpendicular to the chord.	line joining centre to midpoint of chord	
8.	The perpendicular bisector of a chord passes through the centre of the circle.	perpendicular bisector of chord	

	Theorem	Suggested abbreviation	Diagram
9.	Equal chords in equal circles are equidistant from the centres.	equal chords equidistant from centre	
10.	Chords in a circle which are equidistant from the centre are equal.	equal chords equidistant from centre	
11.	Any three non-collinear points lie on a unique circle, whose centre is the point of concurrency of the perpendicular bisectors of the intervals joining the points.	perpendicular bisector of chord passes through the centre	
12.	Angles in the same segment are equal.	angles in the same segment	
13.	The angle in a semi-circle is a right angle.	angle in a semi-circle	

	Theorem	Suggested abbreviation	Diagram
14.	Opposite angles of a cyclic quadrilateral are supplementary.	opposite angles in a cyclic quad	 $x + y = 180$
15.	The exterior angle at a vertex of a cyclic quadrilateral is equal to the interior opposite angle.	exterior angle of cyclic quad	
16.	If the opposite angles in a quadrilateral are supplementary then the quadrilateral is cyclic. Note: This theorem is also a test for four points to be concyclic.	converse of opposite angles in a cyclic quad	 If $x + y = 180$ then *ABCD* is a cyclic quadrilateral.
17.	The products of the intercepts of two intersecting chords are equal.	intersecting chords	 $AP \times BP = CP \times DP$

	Theorem	Suggested abbreviation	Diagram
18.	The products of the intercepts of two intersecting secants to a circle from an external point.	intersecting secants	 $AP \times BP = CP \times DP$
19.	Tangents to a circle from an external point are equal.	tangents from external point	
20.	The angle between a tangent and a chord through the point of contact is equal to the angle in the alternate segment.	angle in alternate segment OR angle between tangent and chord	
21.	The square of the length of the tangent from an external point is equal to the product of the intercepts of the secant passing through this point.	square of the tangent OR intersecting tangent and secant OR tangent and secant	 $PT^2 = AP \times PB$

Supplementary theorems

	Theorem	Suggested abbreviation	Diagram
1.	Two circles touch if they have a common tangent at the point of contact.	tangent of touching circles	
2.	If an interval subtends equal angles at two points on the same side of it then the endpoints of the interval and the four points are concyclic.	converse of angles in the same segment