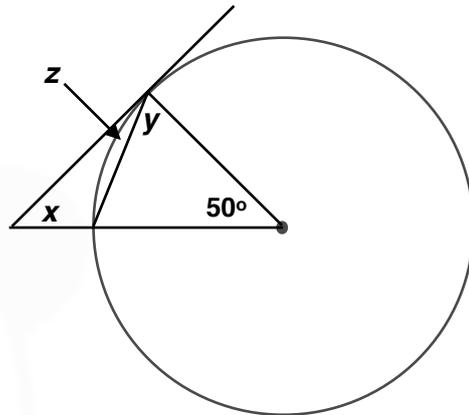


## Alternate Segment Theorem

### Starter

1. (Review of last lesson)  
Find the marked angles, giving reasons for your answers.

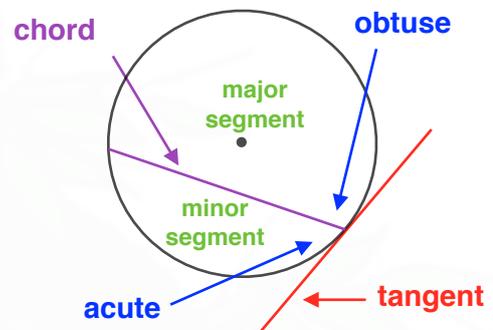


### Notes

The *alternate segment theorem* looks at the angle between a chord and the tangent at the point where they meet the circumference.

A chord can form an acute or an obtuse angle with its tangent.

Remember: a chord splits a circle into two segments — the major segment and the minor segment.

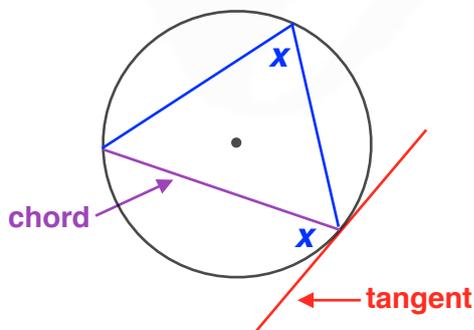


### Circle theorem

8. The angle between a tangent and a chord is equal to the angle at the circumference in the alternate segment.

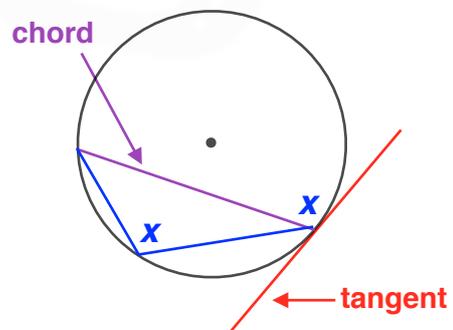
#### Acute angle

The acute angle between the chord and the tangent is in the *minor segment*. It is *equal to the angle at the circumference* in the *major segment*.



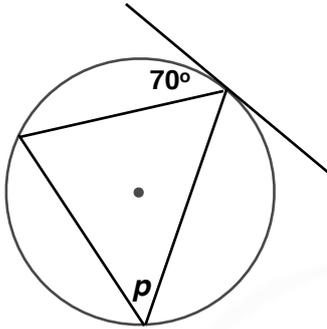
#### Obtuse angle

The obtuse angle between the chord and the tangent is in the *major segment*. It is *equal to the angle at the circumference* in the *minor segment*.

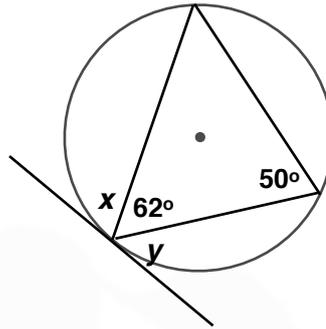


**E.g. 1** Find the marked angles:

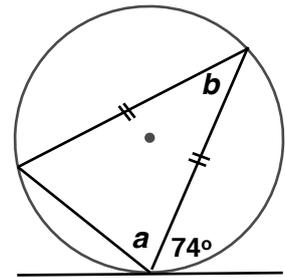
(a)



(b)

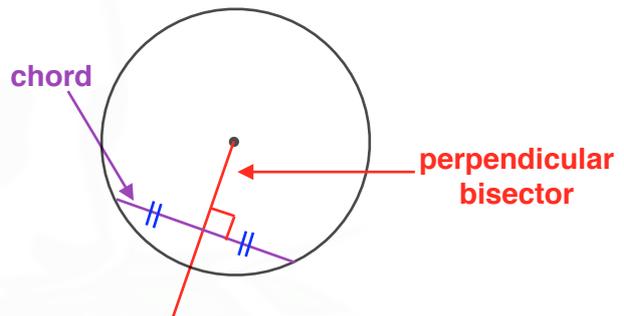


(c)



**Circle theorem**

9. The perpendicular bisector of a chord passes through the centre of a circle



Video: [Circle theorems](#)

[Solutions to Starter and E.g.s](#)

**Exercise**

9-1 class textbook:

p82 E3.4 Qu 1-16 odd, 17-22

A\*-G class textbook:

p76 E3.4 Qu 1-16 odd, 17-21

9-1 homework book:

p29 E3.4 Qu 1-13

A\*-G homework book:

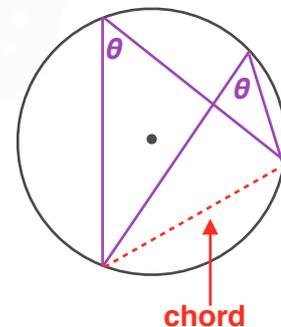
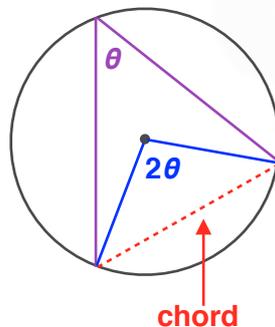
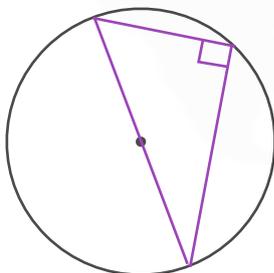
p22 E3.4 Qu 1-12

**Summary**

1. Angle in a semi-circle is  $90^\circ$ .

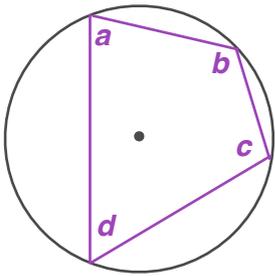
2. Angle at **centre** is twice angle at the **circumference** from the same chord

3. Angles at **circumference** from the same chord are equal



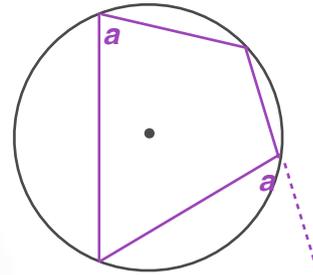
**N.B.** For 2 and 3 the angles must come from the **same chord**.

4. The opposite angles of a cyclic quadrilateral add up to 180 degrees.

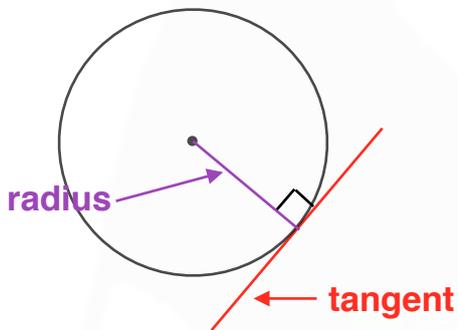


$$a + c = 180^\circ$$
$$b + d = 180^\circ$$

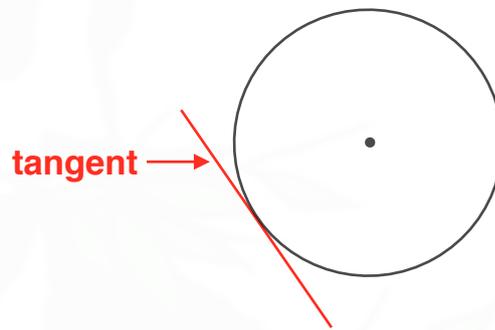
5. The exterior angle of a cyclic quadrilateral equals the opposite interior angle.



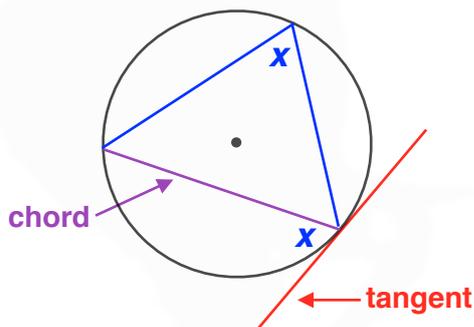
6. The angle between a tangent and a radius is 90 degrees.



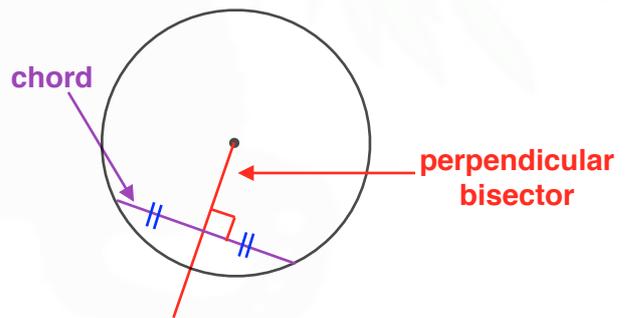
7. Tangents from a point to a circle are equal in length



8. The angle between a tangent and a chord is equal to the angle at the circumference in the alternate segment.



9. The perpendicular bisector of a chord passes through the centre of a circle.



Homework book answers (only available during a lockdown)