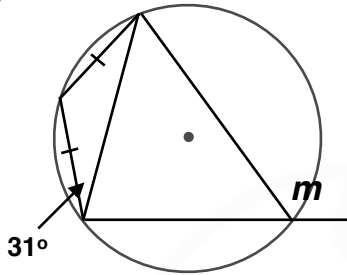


## Tangents to Circles

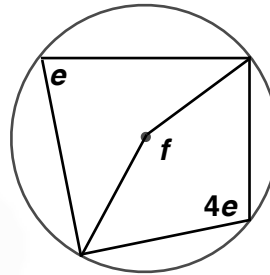
### Starter

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

(a)

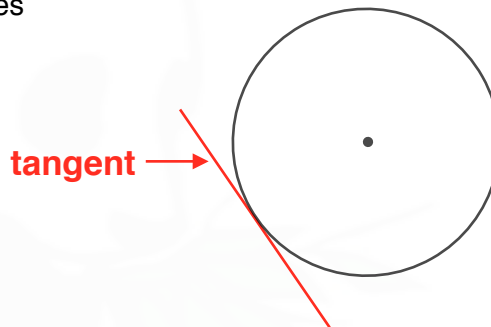


(b)



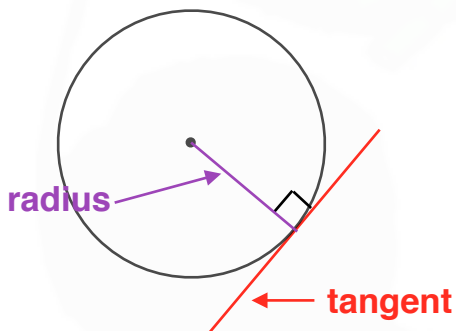
### Notes

A tangent to a circle is a line that just touches the circumference but does not cross it.

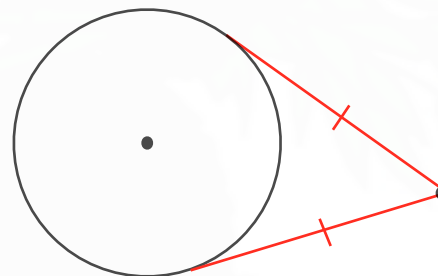


### Circle theorems

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

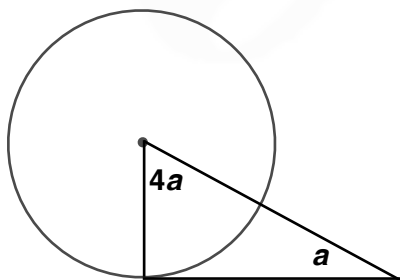


7. Tangents from a point to a circle are equal in length

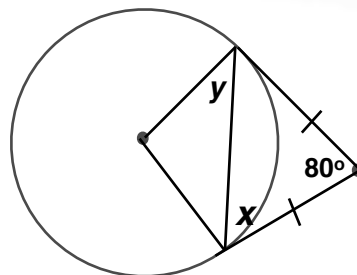


**E.g. 1** Find the marked angles or lengths.

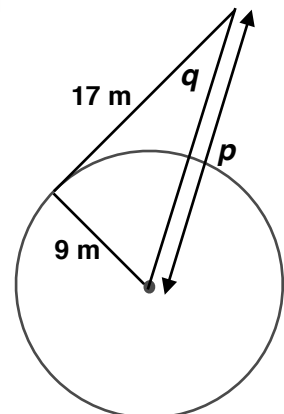
(a)



(b)



(c)



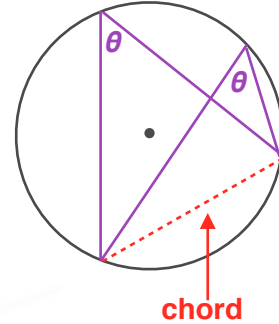
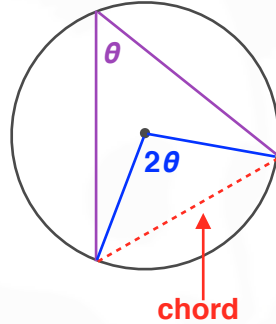
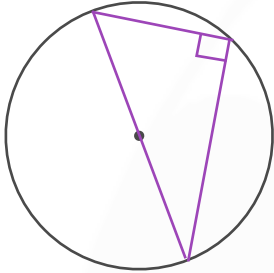
Video: [Circle theorems](#)

**Exercise**

- 9-1 class textbook: p79 E3.3 Qu 1-12 odd, 13-21  
 A\*-G class textbook: p72 E3.3 Qu 1-11 odd, 12-19  
 9-1 homework book: p27 E3.3 Qu 1-8  
 A\*-G homework book: p21 E3.3 Qu 1-8

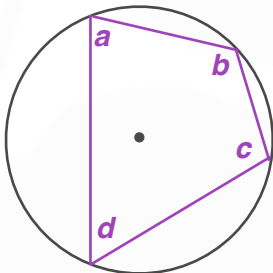
**Summary**

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



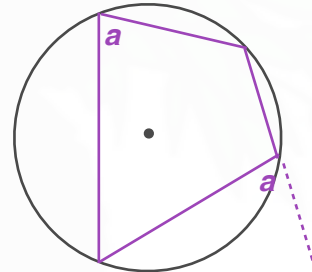
**N.B.** For 2 and 3 the angles must come from the **same chord**.

4. The opposite angles of a cyclic quadrilateral add up to 180 degrees.
5. The exterior angle of a cyclic quadrilateral equals the opposite interior angle.

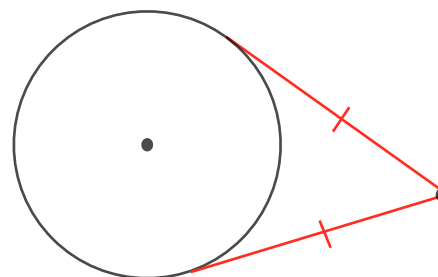
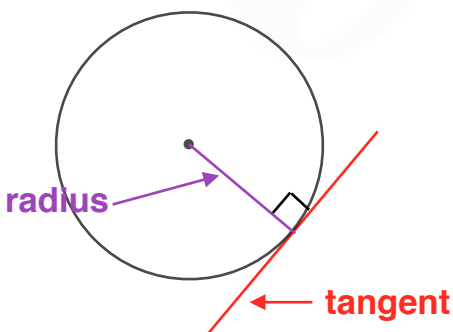


$$a + c = 180^\circ$$

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



6. The angle between a tangent and a radius is 90 degrees.
7. Tangents from a point to a circle are equal in length



**Homework book answers (only available during a lockdown)**

