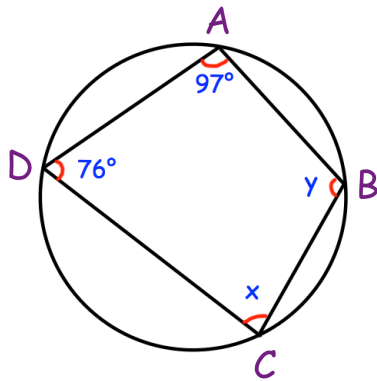
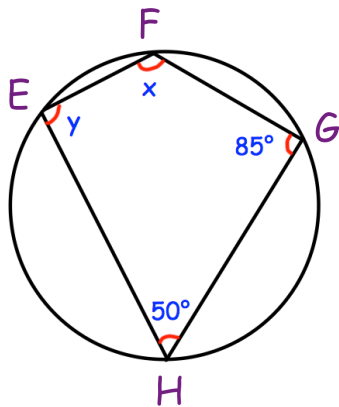


Find the missing angles in each of the following

a)



b)

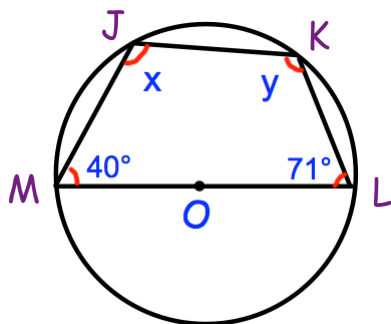


$$x = 130^\circ$$

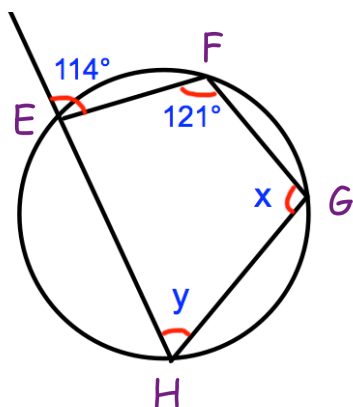
$$y = 180 - 85 = 95^\circ$$

(OPPOSITE ANGLES IN A CYCLIC QUADRILATERAL ADD UP TO 180°)

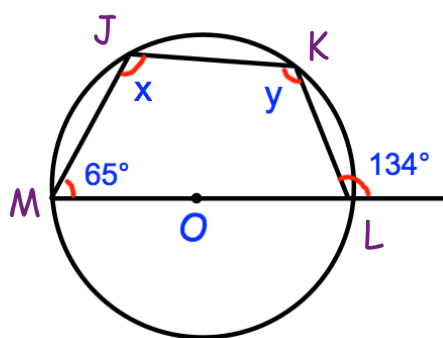
c)



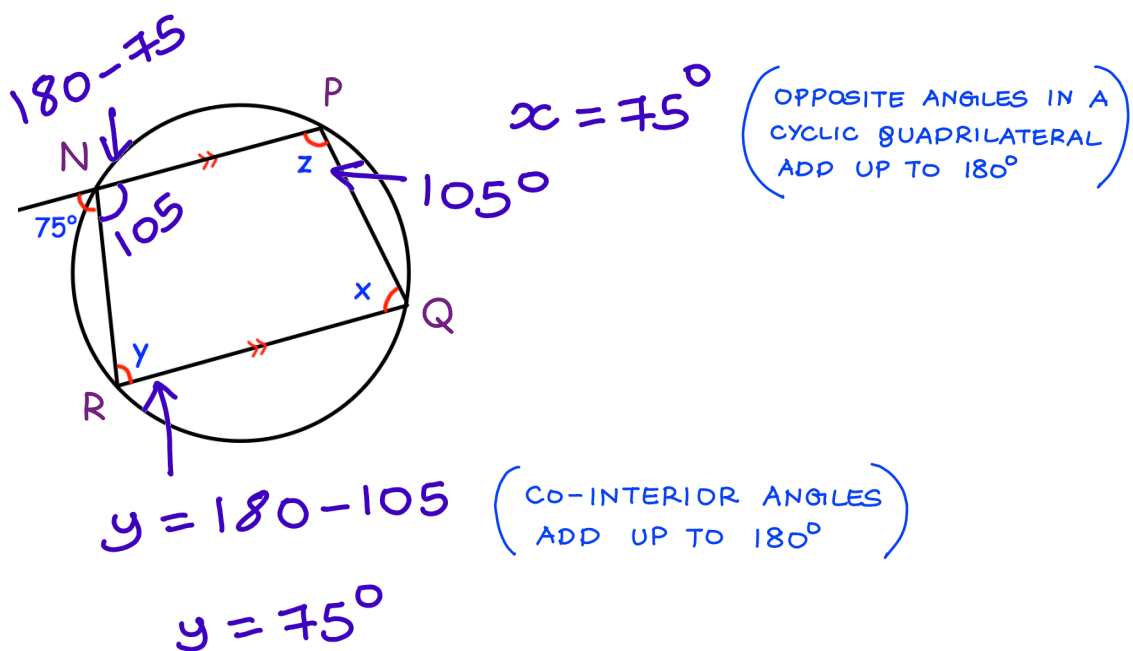
g)



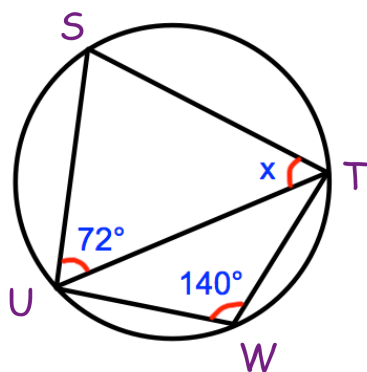
h)



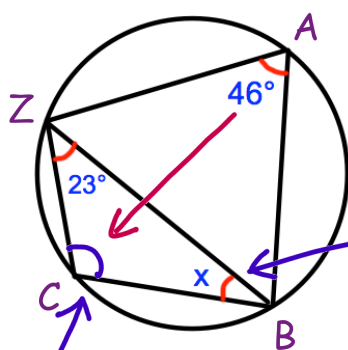
i)



j)



k)

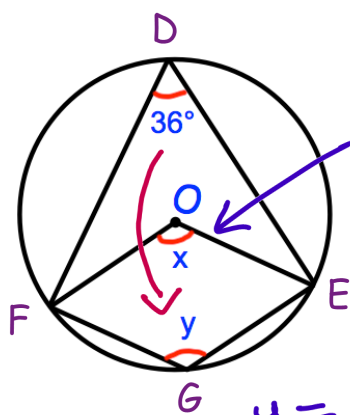


$$180 - 46 = 134^\circ$$

$$x = 180 - (134 + 23)$$

$$x = 23^\circ$$

l)



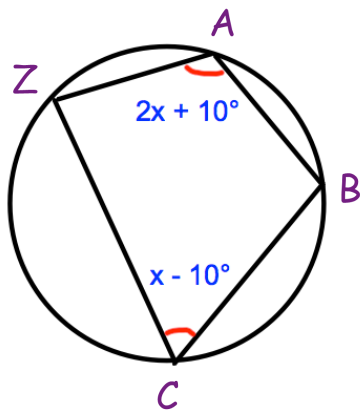
$$x = 2 \times 36 = 72^\circ$$

(THE ANGLE AT THE CENTRE IS TWICE THE ANGLE AT THE CIRCUMFERENCE)

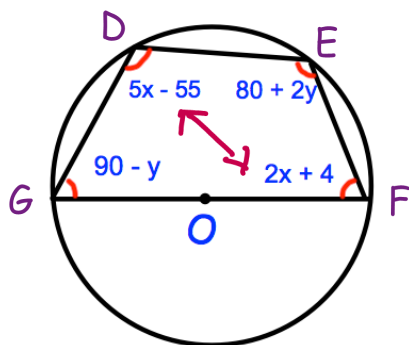
$$y = 180 - 36$$

$$y = 144^\circ$$

p)



q)



$$5x - 55 + 2x + 4 = 180$$

$$7x - 51 = 180$$

$$+51$$

$$\underline{7x} = \underline{231}$$

$$\cancel{7} \quad \quad \quad \cancel{7}$$

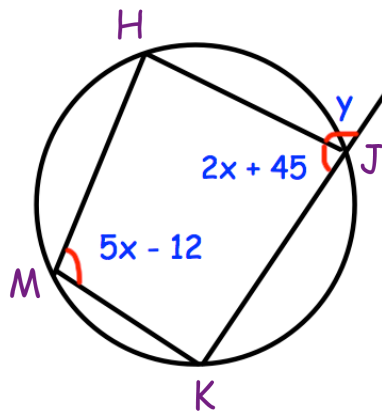
$$x = 33$$

$$90 - y + 80 + 2y = 180$$

$$170 + y = 180$$

$$y = 10$$

r)

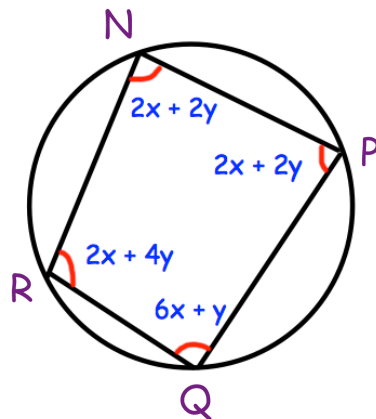


Find the values of x and y.

$$2x + 2y + 6x + y = 180$$

$$8x + 3y = 180$$

a)



$$2x + 4y + 2x + 2y = 180$$

$$4x + 6y = 180$$

$$8x + 3y = 180 \rightarrow \times 2 \rightarrow 16x + 6y = 360$$

$$4x + 6y = 180$$

↑
15

$$60 + 6y = 180$$

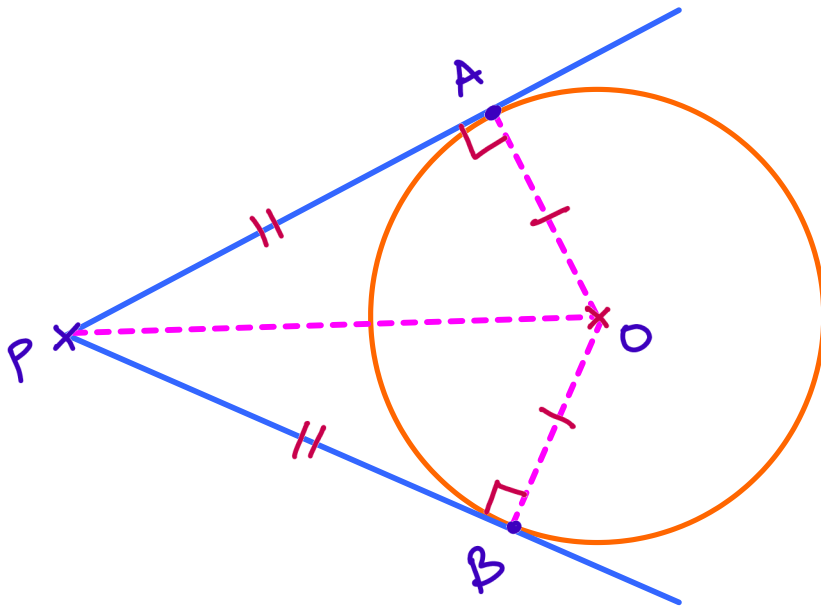
$$6y = 120 \Rightarrow y = 20$$

$$\begin{array}{r} 4x + 6y = 180 \\ (-) \quad (-) \quad (-) \\ \hline \end{array}$$

$$12x = \frac{180}{12}$$

$$x = 15$$

8) TANGENTS from the SAME POINT are the SAME LENGTH.



② $\hat{P}AO = \hat{P}BO = 90^\circ$ (A TANGENT AND A RADIUS MEET AT 90°)

⑤ $AO = BO$ (Radii)

⑧ $PO = \text{common hypotenuse}$

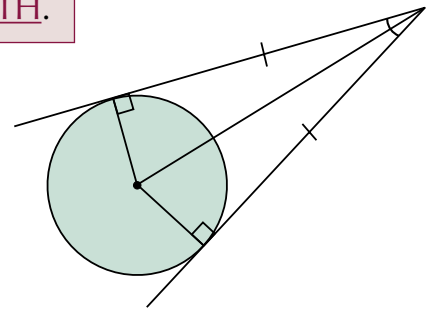
Proving Triangles are Congruent

- 1) SSS three sides are the same
- 2) AAS two angles and a corresponding side match up
- 3) SAS two sides and the angle between them match up
- 4) RHS a right angle, the hypotenuse and one other side all match up

8) TANGENTS from the SAME POINT are the SAME LENGTH.

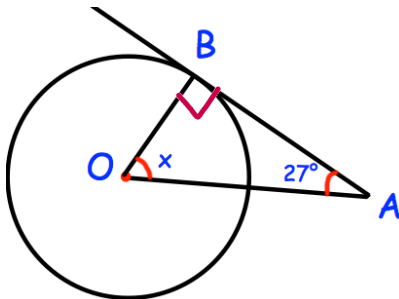
Two tangents drawn from an outside point are always equal in length, creating two congruent right-angled triangles as shown.

There's more about
congruence on p.121.

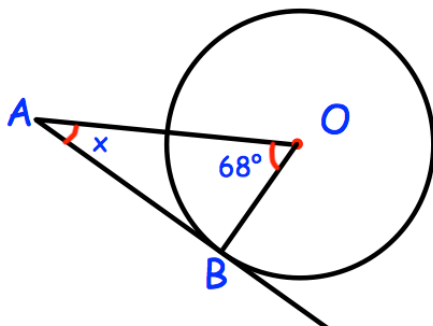


Find the value of x in each diagram. The lines AB and AC are tangents.

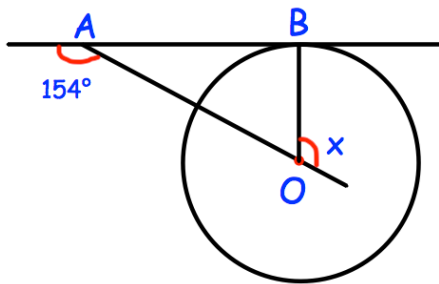
a)



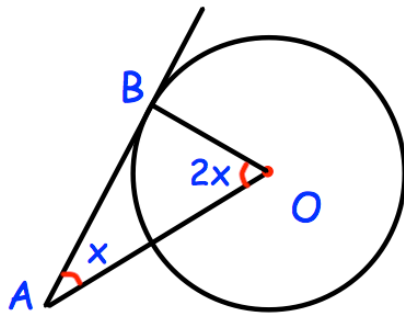
b)



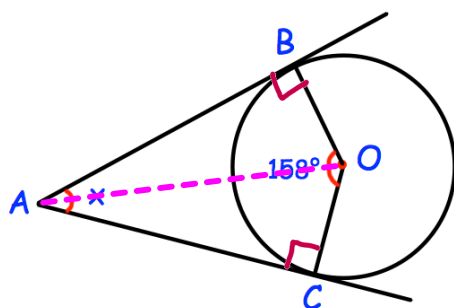
c)



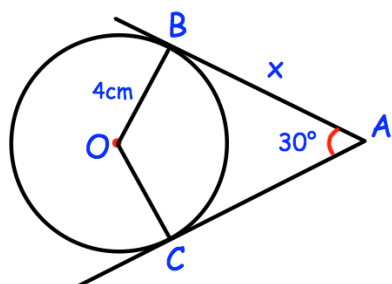
d)



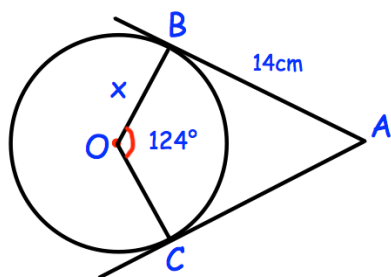
e)



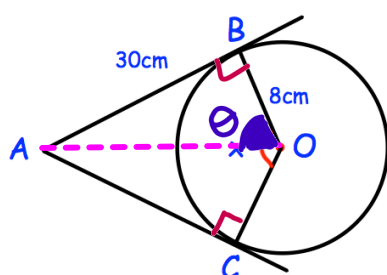
d)



e)



f)



$$\tan \theta = \frac{30}{8}$$

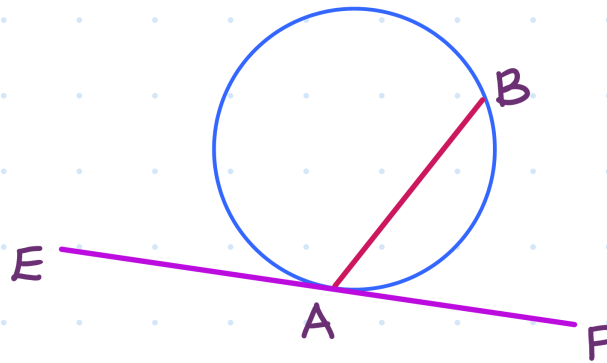
$$\theta = \tan^{-1} \left(\frac{30}{8} \right)$$

$$\theta = 75.06^\circ$$

$$x = 150^\circ$$

$\leftarrow$
x2

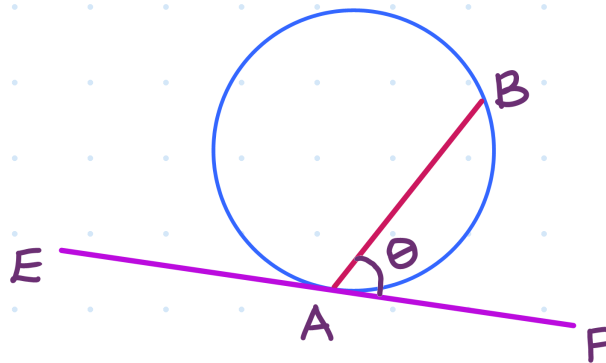
THE ALTERNATE SEGMENT THEOREM



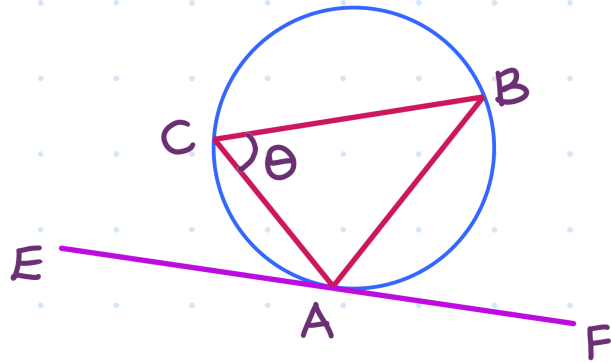
AB : CHORD

EAF : TANGENT TO THE CIRCLE AT 'A'

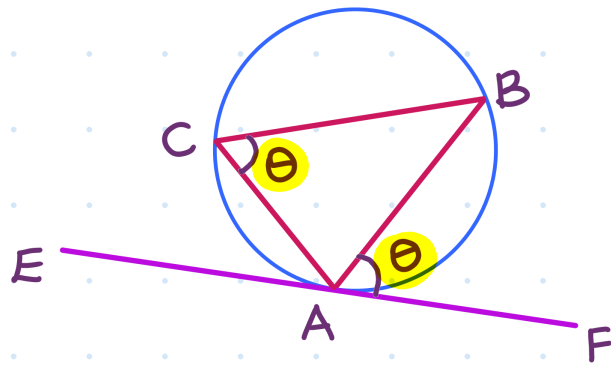
(i)



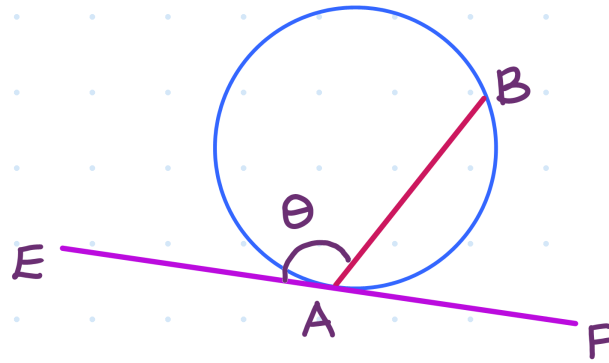
θ : ANGLE BETWEEN THE CHORD AB
AND TANGENT EAF IN THE
MINOR SEGMENT OF THE CIRCLE.



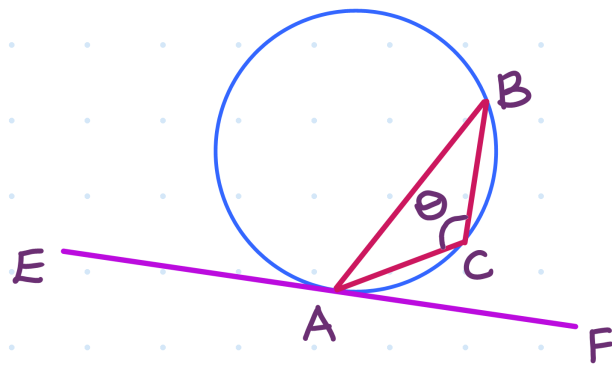
θ : ANGLE SUBTENDED BY CHORD AB
AT THE CIRCUMFERENCE IN THE
MAJOR SEGMENT OF THE CIRCLE



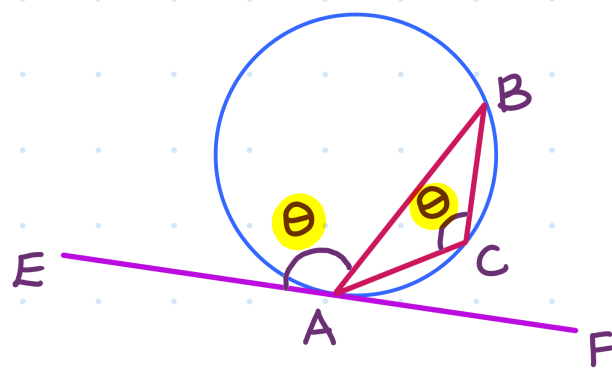
(ii)



θ : ANGLE BETWEEN CHORD AB AND TANGENT EAF IN THE MAJOR SEGMENT OF THE CIRCLE.

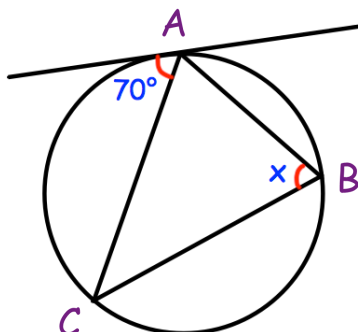


θ : ANGLE SUBTENDED BY CHORD AB AT THE CIRCUMFERENCE IN THE MINOR SEGMENT OF THE CIRCLE.



Find the missing angles

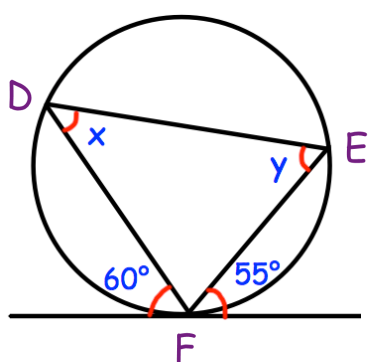
a)



$$x = 70^\circ$$

(THE ALTERNATE
SEGMENT THEOREM)

b)

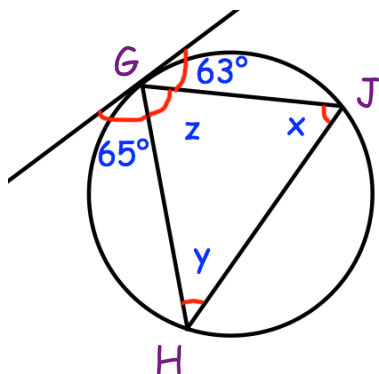


$$x = 55$$

$$y = 60$$

(THE ALTERNATE
SEGMENT THEOREM)

c)



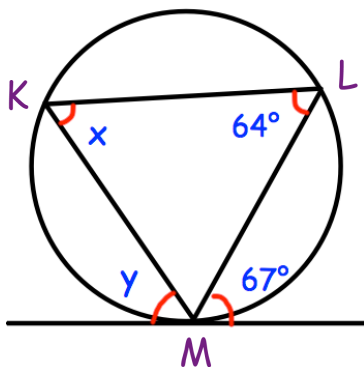
$$x = 65$$

$$y = 63$$

$$z = 52^\circ$$

(THE ALTERNATE
SEGMENT THEOREM)

d)

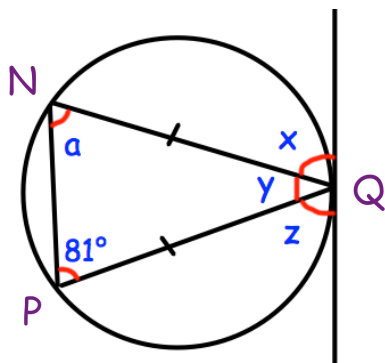


$$y = 64$$

$$x = 67$$

(THE ALTERNATE SEGMENT THEOREM)

e)



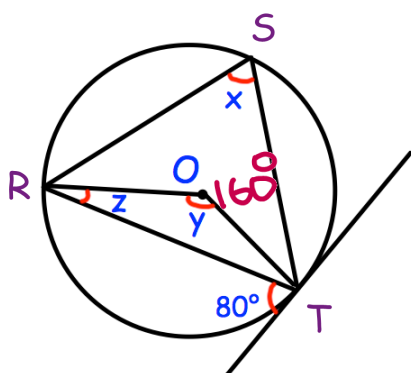
$$x = 81^\circ$$

(THE ALTERNATE SEGMENT THEOREM)

$$a = z = 81^\circ$$

$$y = 18^\circ$$

f)



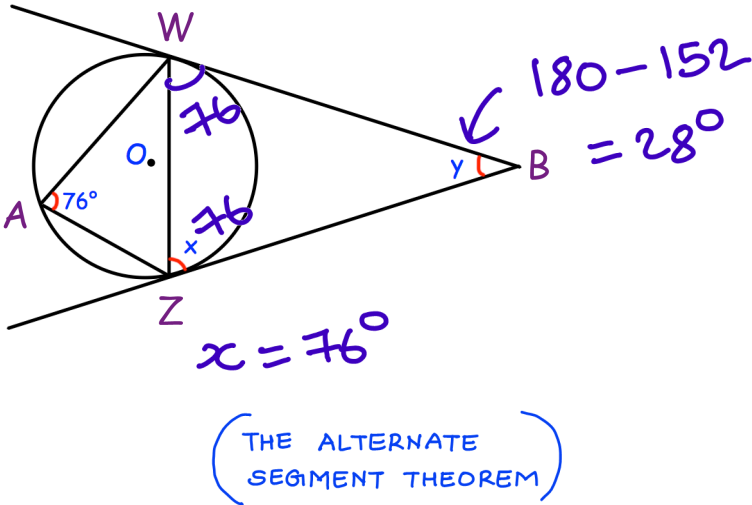
$$x = 80^\circ$$

(THE ALTERNATE SEGMENT THEOREM)

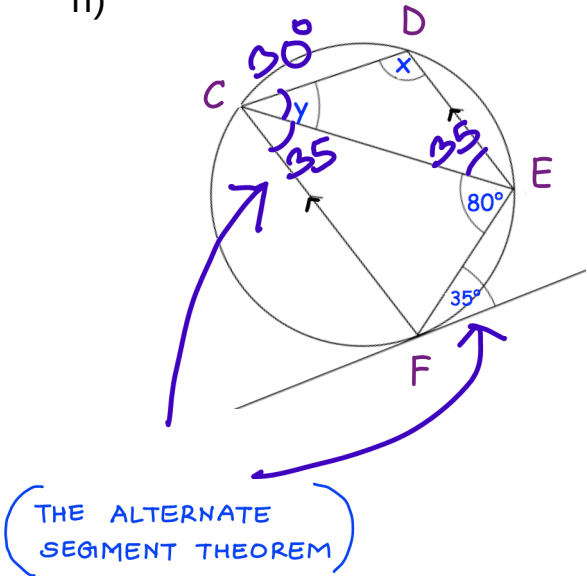
$$y = 2 \times 80 = 160^\circ$$

$$z = 10^\circ$$

g)



h)



i)

