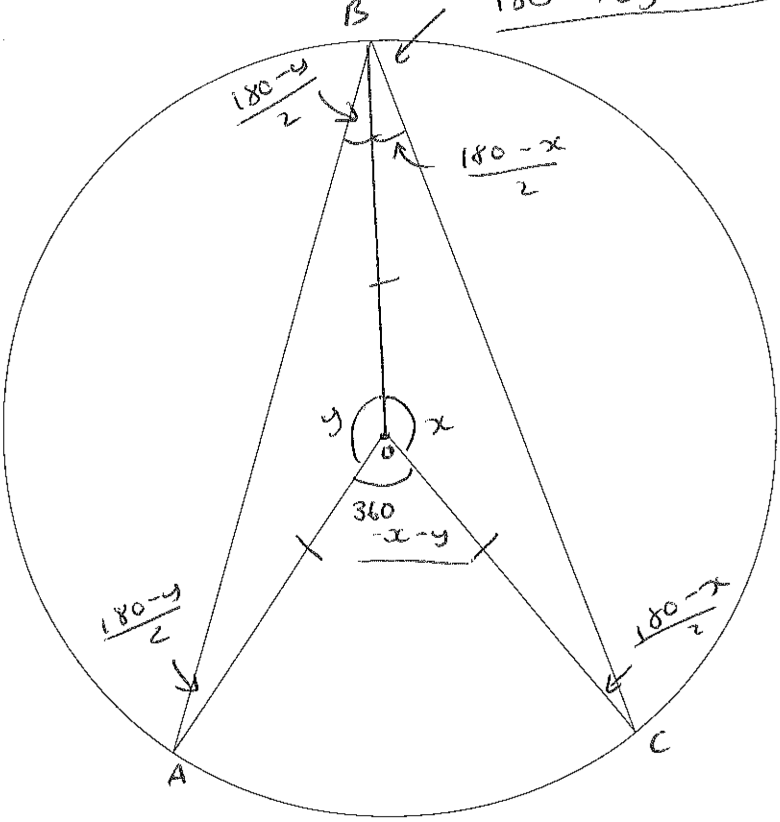


Prove that the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference

Let $BOC = x$

$AOB = y$

$\therefore AOC = 360 - x - y$

Angles CBO and BCO $= \frac{180 - x}{2}$ (angles in isosceles triangle)

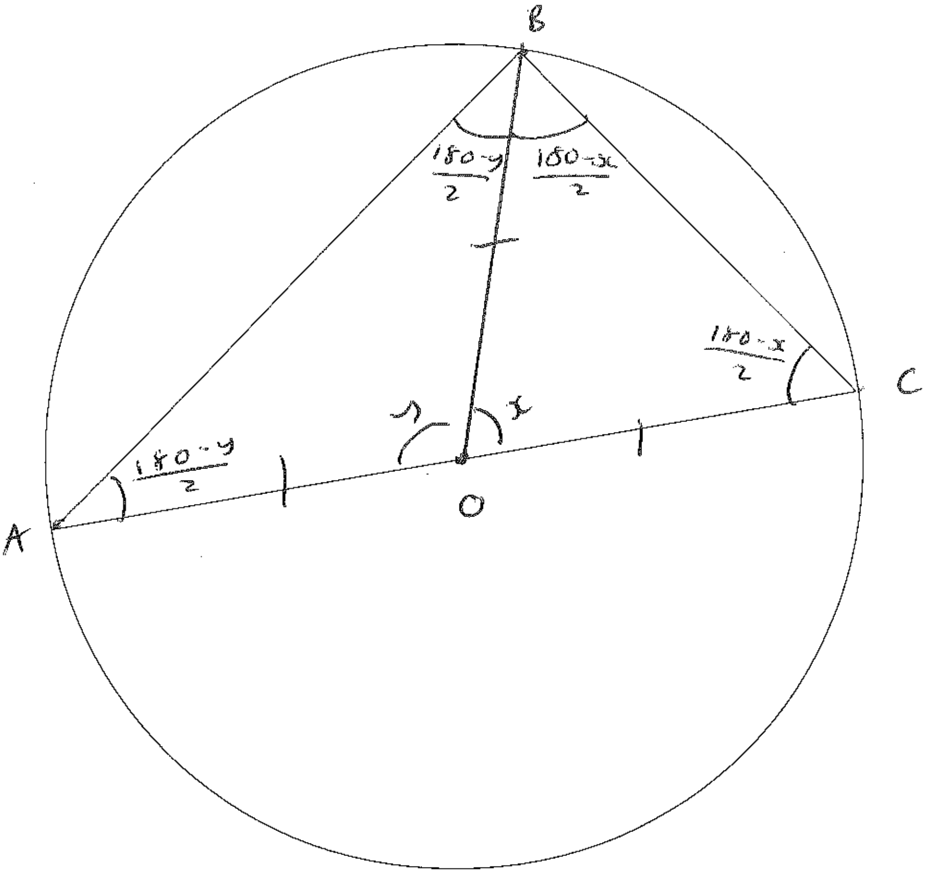
Angles BAO and ABO $= \frac{180 - y}{2}$ — " —

Angle $ABC = \frac{180 - y}{2} + \frac{180 - x}{2}$

$90 - \frac{1}{2}y + 90 - \frac{1}{2}x$

$180 - \frac{1}{2}x - \frac{1}{2}y$

$360 - x - y = 2(180 - \frac{1}{2}x - \frac{1}{2}y)$ (4)



Prove the angle subtended at the circumference by a semicircle is a right angle

Let $AOB = y$ and $BOC = x$

$x + y = 180°$

Angles ~~BO~~: ABO and $BAO = \frac{180 - y}{2}$

Angles BCO and $CBO = \frac{180 - x}{2}$

(Angles in isosceles triangle)

$ABC = \frac{180 - y}{2} + \frac{180 - x}{2}$

$= 90 - \frac{1}{2}y + 90 - \frac{1}{2}x$

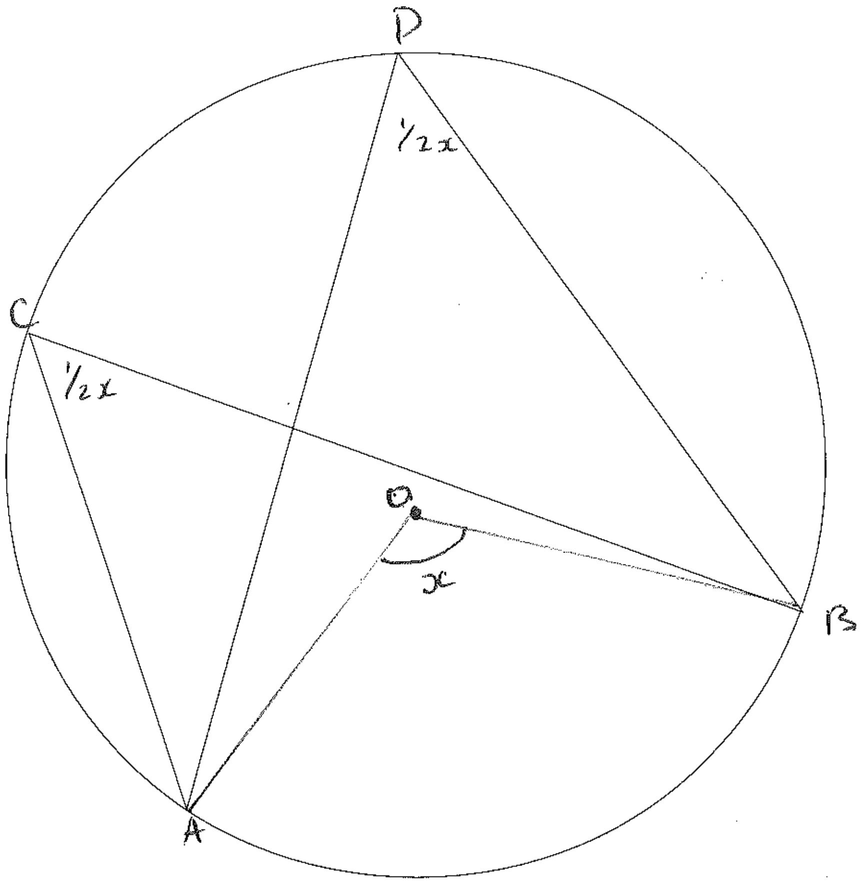
$= 180 - \frac{1}{2}y - \frac{1}{2}x$

(As $x + y = 180$ $\frac{1}{2}x + \frac{1}{2}y = 90$)

$= 180 - (\frac{1}{2}x + \frac{1}{2}y)$

$= 180 - 90 = 90°$

(4)



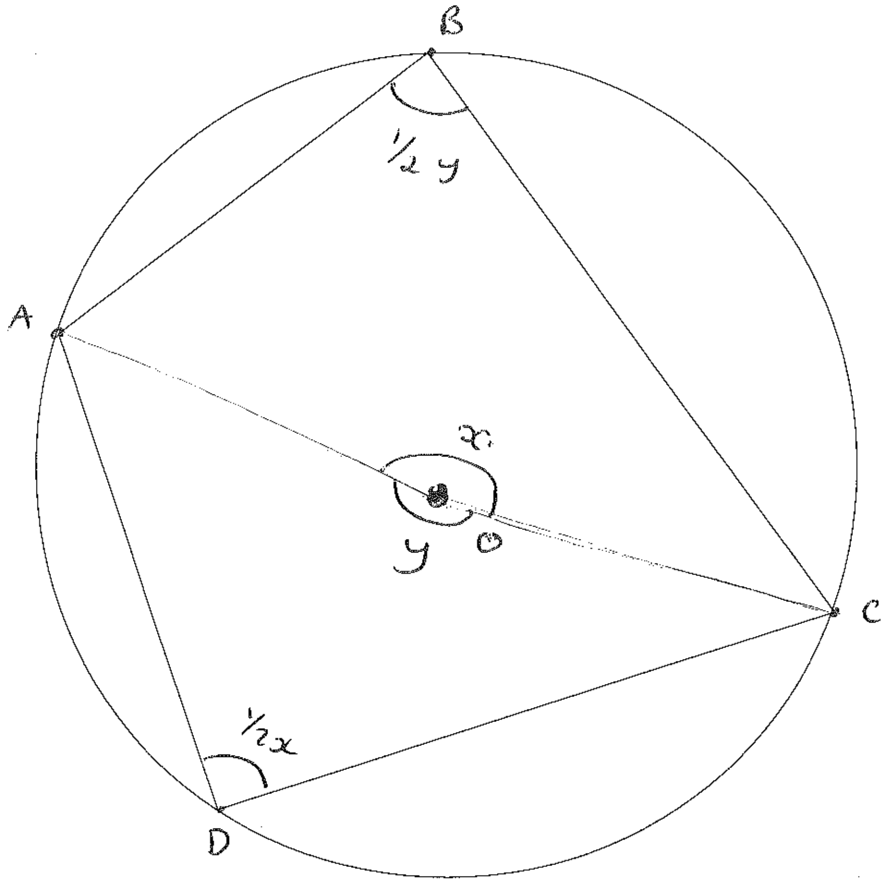
Prove that angles in the same segment are equal

Angle AOB = x

ACB and ADB = $\frac{1}{2}x$ (angles at circumference are half angles at centre)

$\frac{1}{2}x = \frac{1}{2}x$

(4)



Prove that opposite angles of a cyclic quadrilateral sum to 180°

Let angle AOC (minor) $= x$

Let angle AOC (Major) $= y$

Angle $x + y = 360°$ (angles at a point)

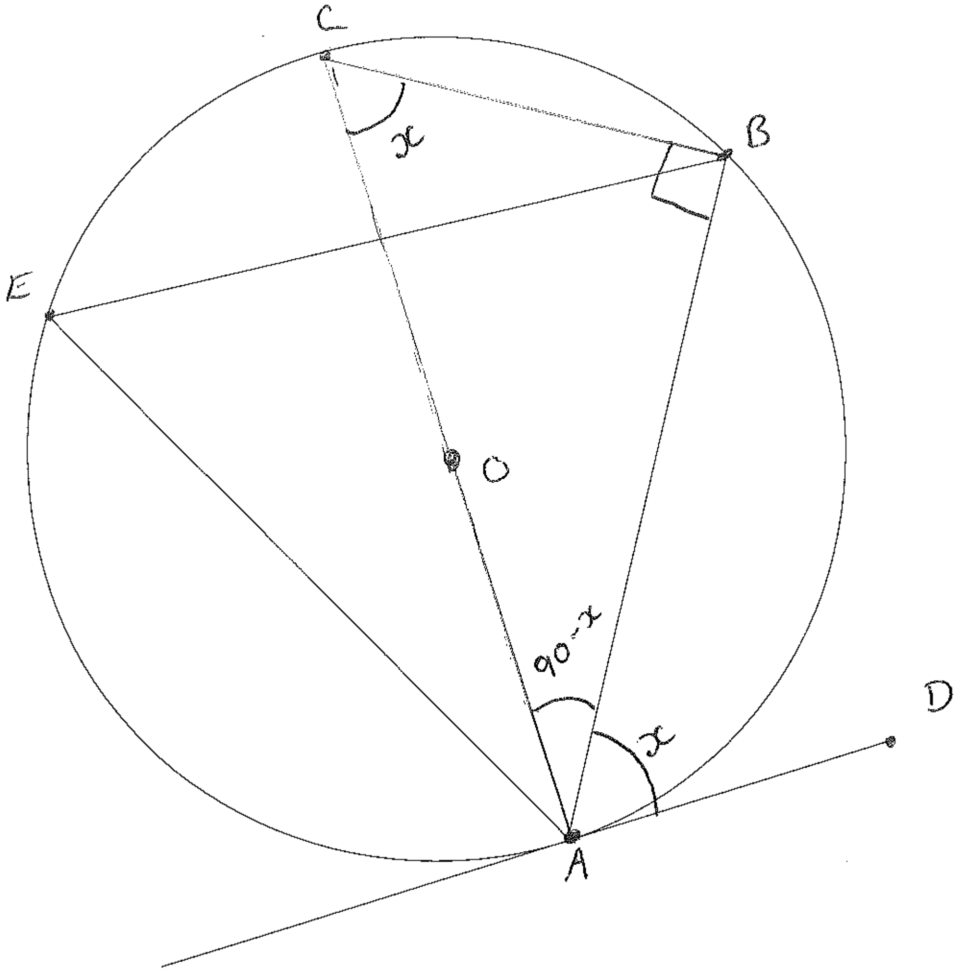
$A\hat{D}C = \frac{1}{2}x$ (Angle at circumference, is half angle at centre.

$A\hat{B}C = \frac{1}{2}y$

As $x + y = 360$

$\frac{1}{2}x + \frac{1}{2}y = 180$

(4)



Prove the alternate segment theorem

The angle where tangent meets radius is $90°$

The angle in a semi circle is $90°$

Let angle BAD $= x$

$\therefore$ Angle BAC $= 90 - x$ (tangent meets radius)

$\therefore$ Angle ACB $= x$ (Angles in a triangle add up to $180°$ $180 - 90 - (90 - x) = x$)

Angle AEB also $= x$ (Angles in same segment are equal)

(4)