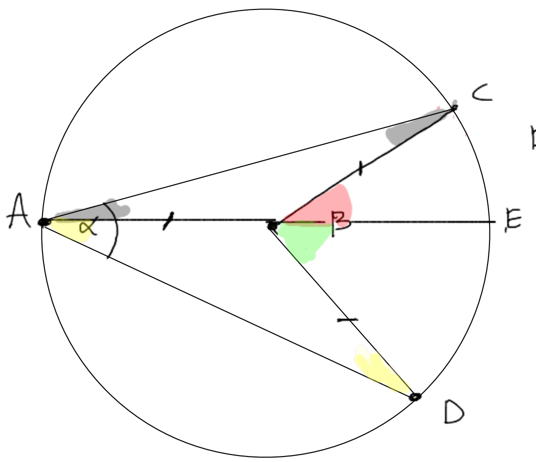
Ch. 3

what is radian measure?

arc length, on the unit circle has length θ



unit circle

$B = 2\alpha$ why?

$\angle CBE = 2\angle CAB$

$\angle EBD = 2\angle BAD$

$+$

$\beta = \angle CBD$

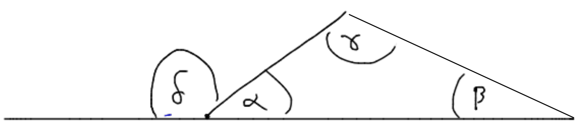
$\parallel$

$\angle CBE + \angle EBD = 2\angle CAB + 2\angle BAD$

$= 2(\angle CAB + \angle BAD)$

$= 2\alpha$

Euclidlean Exterior Angle Theorem:



$\delta = \gamma + B$

sum of remote angles

Assume $\alpha + \gamma + \beta = 180$

Fact δ is exterior angle to Δ

Supplementary Angles:

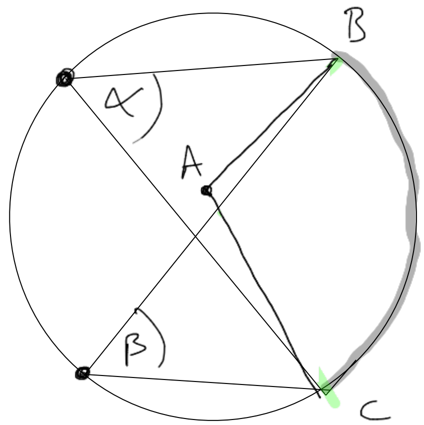
$\delta + \alpha = 180$

$\alpha = 180 - \delta$

$\Rightarrow 180 - \delta + \gamma + B = 180$

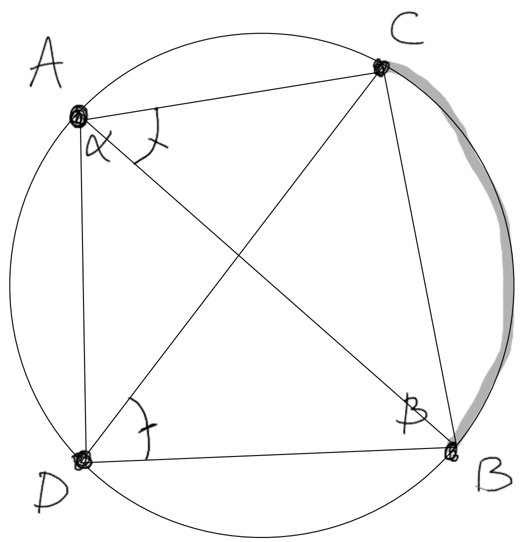
$\gamma + B = \delta$

use the result above to show $\alpha = B$.



From the proposition,
each is $\frac{1}{2}$ the angle $\angle BAC$

Use this result to prove the following about opposite angles in a inscribed quadrilateral



α, B are opp. angles &

$$\underline{\alpha + B = 180}$$

For arc CB, it's subtended both $\angle CDB$ & $\angle BAC$ which are equal by the above.

show $\alpha + B = 180$

Euclidean $\Rightarrow$ $\beta + \angle BDC + \angle DCB = 180$

we know: $\angle BDC = \angle CAB$

$\angle DAB = \angle DCB$ (subtend arc DB)

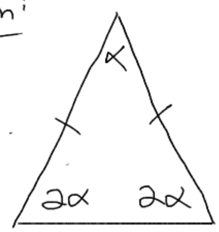
so $\beta + \underbrace{\angle CAB + \angle DAB} = 180$

$\beta + \alpha = 180$

Two clever constructions for inscribed pentagon (in a circle).

Euclid.

Begin:



$$\alpha + 2\alpha + 2\alpha = 180$$

$$5\alpha = 180$$

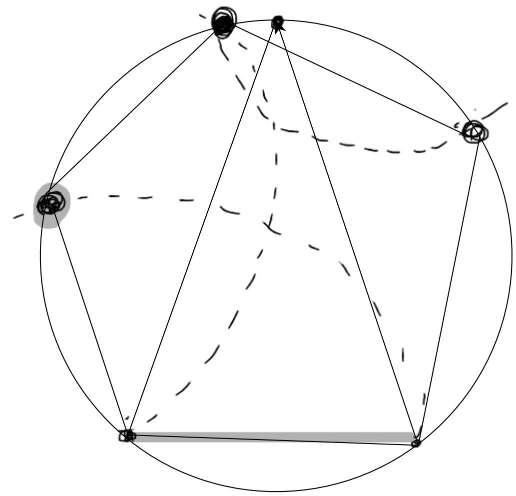
$$\alpha = 36^\circ = \frac{\pi}{5}$$

isosceles
base angles twice
the top angle

Third the base of the Δ is
one edge of the .

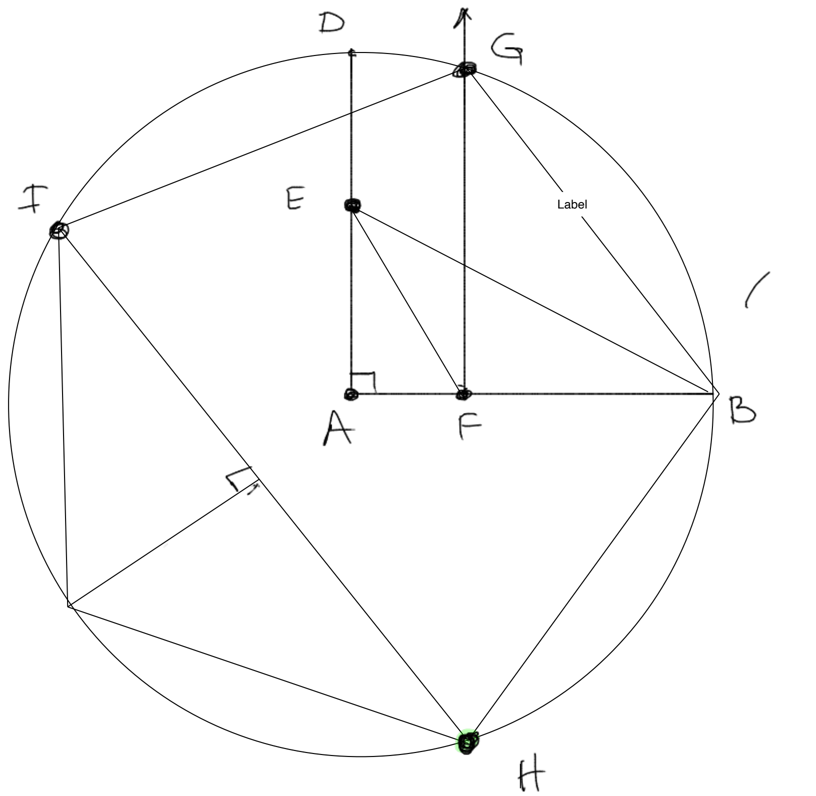
Fourth compass @ one vertex
w/ radius the other
vertex intersect an
arc with the circle

Next Take a given
circle



and place a triangle
similar to the
one on left as
shown.

Richmond's Construction (1893)



1. From center make radius $\frac{1}{2}$ take $\perp$ @ center
2. Bisect AD
3. Form EB
4. Bisect the angle $\angle BEA$, Form EF
5. Raise $\perp$ from F, intersect circle @ G
6. segment BG is a side of the