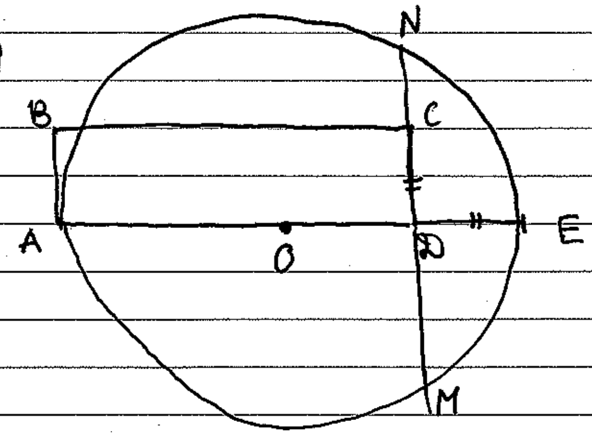
(3.4)



1) $DE \cong CD$

2). O the midpoint of AE

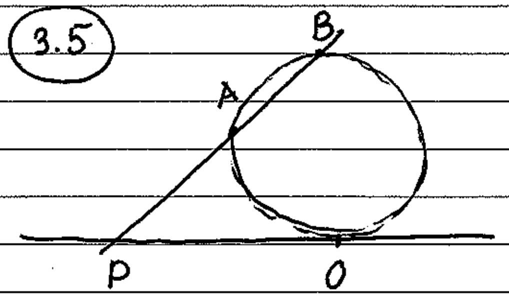
3). $\odot$ c O r OE, get M and N

4) $ND \cong DM$ (III.3) Square with side DN

$DN \times DM = AD \times DE$

$DN^2 = AD \times DC$ (III. 35)

(3.5)

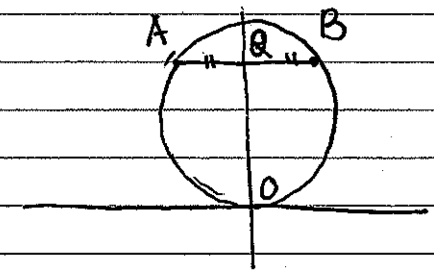


I. If AB is not parallel to ℓ get $P = (AB) \cap \ell$

Construct PO such that $PO^2 = PA \times PB$ (as in 3.4)

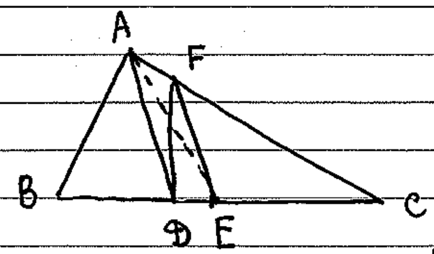
Draw a circle around $\triangle ABO$ (III. 37)

II If AB is parallel to ℓ, draw perpendicular bisector OQ to AB, get O.



Draw a circle around $\triangle ABO$ (III. 3)

(3.10)

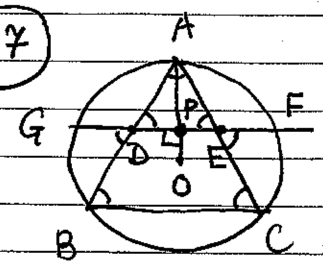


Cont (AFD) = Cont (ADE) (I. 38)

Cont (ABD) = Cont (AEC) $= \frac{1}{2}$ Cont (ABC) (I. 38)

Cont (AFDB) = Cont (AEB) − Cont (ADE) + + Cont (AFD) = Cont (AEB) $= \frac{1}{2}$ Cont (ABC)

4.7



(1) $DF \times GE = AE \times EC$ (III.35)

$DE \cong AE \cong EC$ since $\triangle ADE$ ~~isosceles~~ is equilateral

DE being midline (all angles congruent)

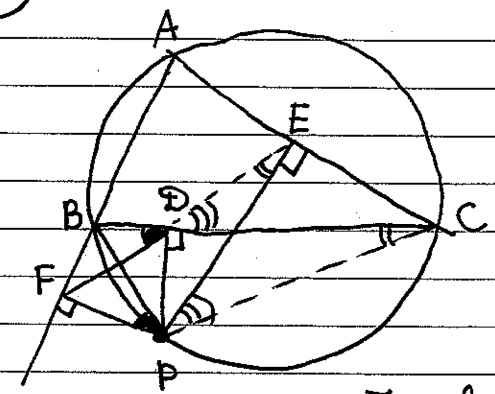
$PF \cong PG$ (III.3)

$DP \cong PE$ ($\triangle ADE$ isosceles)

So $GD \cong EF$ and $GE \cong DF$

By (1) $EF \times DF = DE^2$

5.13

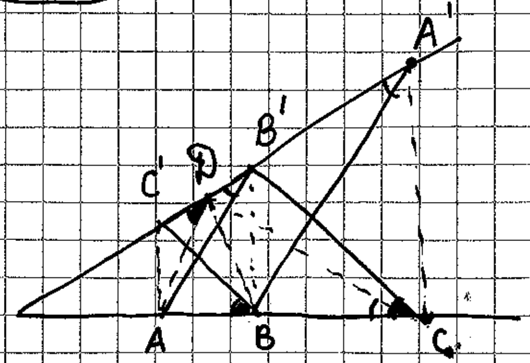


PDEC is cyclic $\Rightarrow$
$\angle EDC \cong \angle EPC$

FBDP is cyclic $\Rightarrow$
$\angle BDF \cong \angle BPF$

AFPE is cyclic $\Rightarrow \angle BAC + \angle FPE = 2RA$
ABPC is cyclic $\Rightarrow \angle BAC + \angle BPC = 2RA$
Therefore $\angle FPE \cong \angle BPC \Rightarrow \angle BFF \cong \angle EPC$
Thus, $\angle BDF \cong \angle EDC \Rightarrow$ vertical $\Rightarrow$
F, D, E on the same line

5.15



By Construction $ADB'C$ is cyclic. Hence $\angle DCA \cong \angle DB'A$

But $AB' \parallel BA'$, therefore $\angle DB'A \cong \angle DA'B$. So $\angle DCA \cong \angle DA'B$.

Therefore $DA'CB$ is cyclic.

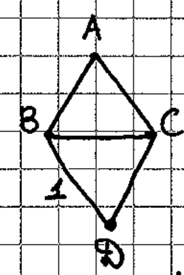
$\angle C'BA \cong \angle B'CA$ since $B'C \parallel C'B$.

$\angle ADB' + \angle B'CA = 2RA$, since $ADB'C$ is cyclic, and $\angle C'DA + \angle ADB' = 2RA$. Therefore $\angle C'DA \cong \angle C'BA$ and $AC'DB$ is cyclic.

Thus, we have $\angle BDA' + \angle A'CB = 2RA$, $\angle BDC' + \angle BAC' = 2RA$

Therefore $\angle C'AB + \angle BCA' = 2RA \Rightarrow C'A \parallel A'C$.

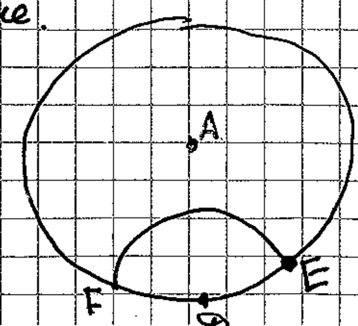
5.18 Assume the contrary. Pick up a point A. Let the color of A be blue.



$\triangle ABC \cong \triangle BCD$, both equilateral.
Then A, B, C have 3 different colors and B, C, D have 3 different colors.
Therefore D must be blue again.

$|BD| = 1 = |AB|$

All points on the circle Γ centered at A and radius AD are blue.



Take the circle with center D radius AB. It meets Γ in two points F and E.
D and E have the same color
$|DE| = |AB| = 1$