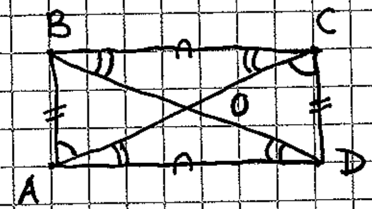
1.5.



$AB \parallel CD$
$BC \parallel AD$ by I.27

$\triangle ABC \cong \triangle CDA$ by ASA

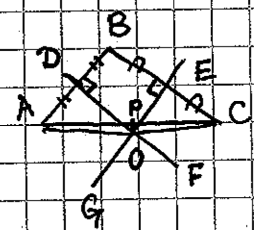
$AB \simeq CD$
$BC \simeq AD$ $\Rightarrow$ $\triangle ABC \cong \triangle DCB$ by SSA

$\Rightarrow AC \cong BD$

$\triangle OBC, \triangle OCD, \triangle ODA, \triangle OBC$ isosceles by I.6

Hence $BO \cong OC \cong OD \cong OA$

1.9.



DF perpendicular bisector to AB
GE perpendicular bisector to BC

We claim that they meet at some point O. Indeed, if they are parallel then by I.27 AB and BC are also parallel. Contradiction.

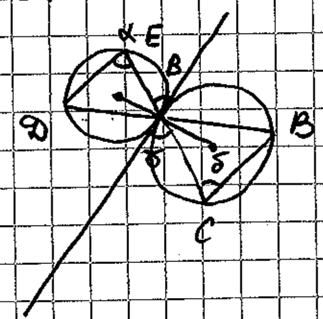
$OA \cong OB$ since $\triangle OAD \cong ODB$ SAS

Similarly $OB \cong OC$. So $OA \simeq OC$

Let $OP \perp AC$. Then $OAP \simeq OPC$ RASS So $AP \cong PC$

and OP is a perpendicular bisector to AC.

1.13.



By III.12
Draw a line through the centers of two circles. The line tangent to both circles is perpendicular to this line by III.16.

Then we have $\alpha \cong \beta$ by III.32

$\beta \simeq \gamma$ (vertical), $\gamma \cong \delta$ by III.32 again.

Hence ED is parallel to BC by I.28

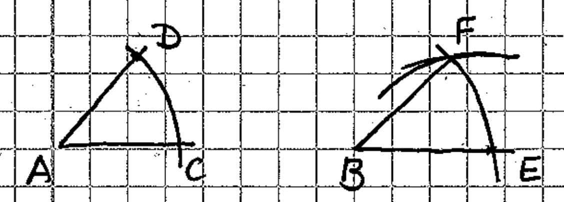
2.5. 1) Point C, ⊙ cA r AC Get D

2) ⊙ cB r AC Get E

3) ⊙ E r CD Get F

4) BF

∠DAC ≅ ∠FBE because △ADC ≅ △BFE (SSS)



2.7. 1) Choose A on a circle. ⊙ cA, get B and C.

2) ⊙ cB, r AB Get E, F

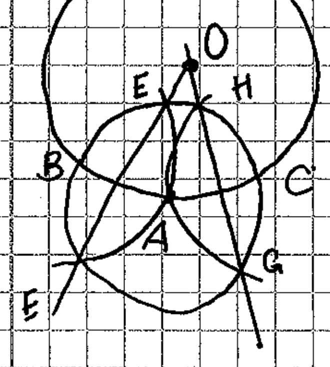
3) ⊙ cC r AB Get G H

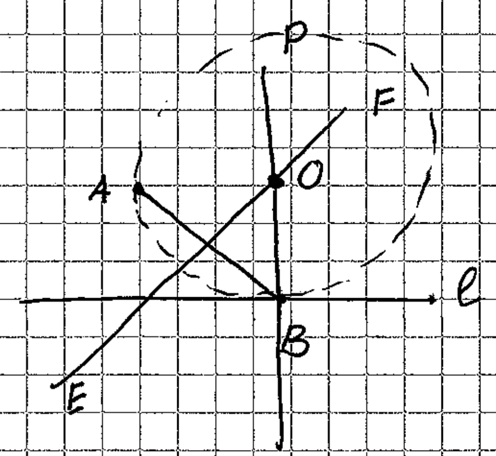
4) Line EF

5) Line GH

EF and GH meet at O (the center of the circle)

(equal distances OB ≅ OA ≅ OC)





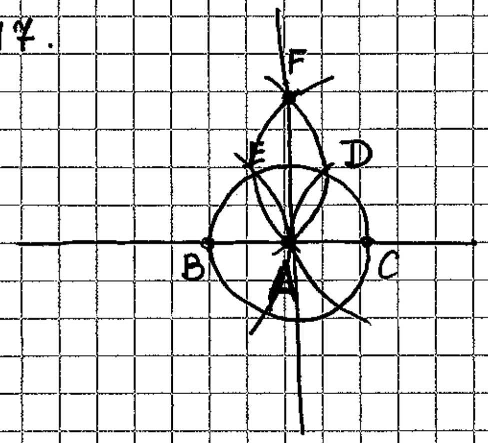
2.12.

1) EF perpendicular bisector to AB (3 steps)

2) PB ⊥ ℓ (4 steps)

3) ⊙ cO r OB

2.17.



1). ⊙ c A points B & C

2). ⊙ c B point E

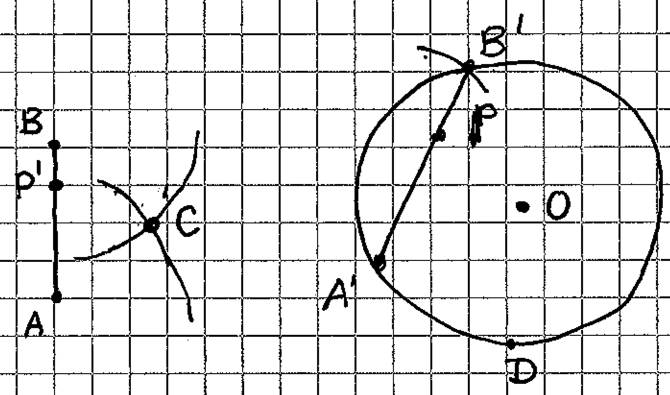
3) ⊙ c C point D

4) ⊙ c E

5) ⊙ c D poin F

6). line FA $\perp$ BC

2.22



1). D a point on the circle

2) ⊙ c B r OD

3) ⊙ c A r OD get C

4) ⊙ c C r OP get P'

5). ⊙ c P r BP' get B'

6). B'P

$BA \cong B'A'$ since

$\triangle CAB \cong \triangle OA'B'$

$\triangle P'CB \cong \triangle POB'$