- Lemma 1: M is midpoint of PQ.
  - $AF^2 = FM \cdot FN = FB^2 \Rightarrow$
  - $\Rightarrow$ F is mid point of AB
  - $\Rightarrow$ M is midpoint of PQ

- Lemma 2: $EM \perp PQ$

Arc $\overset{\frown}{MB}$ = Arc $\overset{\frown}{BD}$ $\Rightarrow$

$\Rightarrow \angle DMB = \angle MDB \Rightarrow$

$\Rightarrow \angle ABE = \angle ABM$.

Analog: $\angle BAE = \angle BAM$.

$\Rightarrow$ M is simetric of E, through AB.

$\Rightarrow ME \perp AB \parallel PQ$.

Lemmmos 1 and 2:

$\Rightarrow$ E in perpendicular bisector of PQ.

□