Given: ABCDEF is an equiangular hexagon
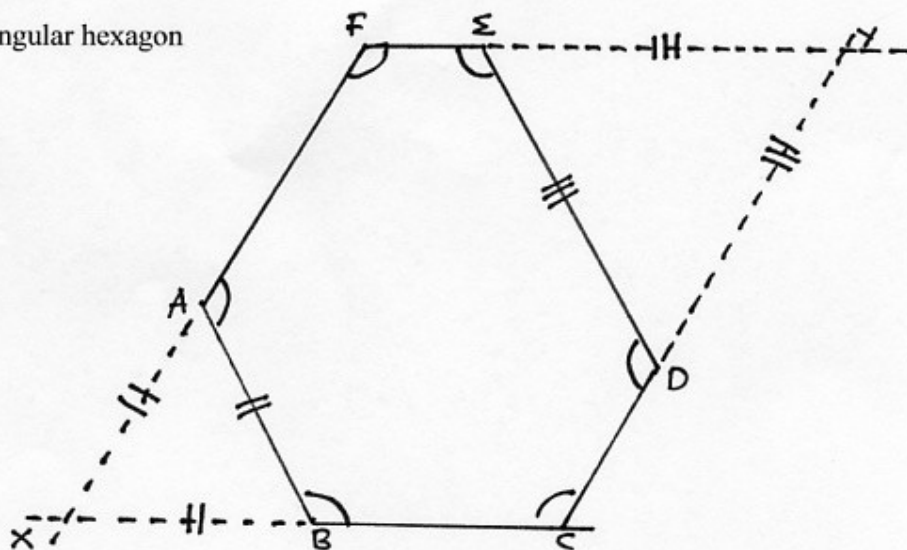**Prove**: AB+BC = FE+ED

1. ABCDEF is equiangular hexagon (Given)

2. All angles are equal to 120 degrees (interior angles of an equiangular hexagon are 120 degrees)

3. Extend AF towards A and extend BC towards B so the two rays intersect at X. (Construction)

4. Extend FE towards E and extend DC towards D so the two rays intersect at Y. (Construction)

5. Angle XAB and XBA are 60 degrees (exterior angles of an equiangular hexagon are 60 degrees)

6. Angle YED and YDE are 60 degrees (exterior angles of an equiangular hexagon are 60 degrees)

7. Angle X and Y are 60 degrees (triangle sum theorem)

8. △ XAB and △ YED are equilateral triangles (definition of equilateral triangles)

9. XB = AB and YE = ED (definition of equilateral triangles)

10. Angles C and F are equal (Given)

11. XFYC is Parallelogram (If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram)

12. FY = XC (If a quadrilateral is a parallelogram, then the opposite sides are congruent)

13. FY= FE + EY; XC = XB + BC (Segment addition postulate)

14. FE + EY = XB + BC (substitution)

15. FE + ED = AB + BC (substitution)

Krishna Choudhary - 8ᵗʰ Grade
Nobel Middle School, Northridge