1. State, without proof, what you know about the parallelogram ABCD
   (a) if AC bisects ∠BAD
   (b) if AC = BD
   (c) if AC ⊥ BD

2. In fig. 2, ABCD and ABXY are parallelograms such that DCYX is a straight line. Use the SAA test to prove that ΔADY ≅ ΔBCX.
3. In fig. 3, ABCD is a parallelogram and A is the centre of the circle. Prove that $\angle KAD = \angle CDA$. [No construction.]

4. In fig. 4, the diagonals of the parallelogram ABCD cut at K; any line through K cuts AB, CD at X, Y. Prove that $KX = KY$. 
5. In fig. 5, P is the mid-point of the side BC of a parallelogram ABCD; DP and AB meet, when produced, at Q. Prove that AB = BQ.

6. In fig. 6, ABCD is parallelogram. Prove that the perpendiculars from B and D to AC are equal.
7. In fig. 7, ABCD and ABPQ are parallelograms. Prove that CDQP is a parallelogram.
8. In fig. 8, \( \triangle PQR \) is formed by drawing lines through A, B, C parallel to BC, CA, AB respectively. Prove that A, B, C are the mid-points of the sides of \( \triangle PQR \).

9. In fig. 9, two equal circles, centres A, B, cut at C, D. Prove that ACBD is a rhombus.
10. In fig. 10, ABCD is a rhombus. If the bisector of \( \angle DAC \) cuts CD at P, prove that \( \angle DPA = 3\angle DAP \).

![Diagram of a rhombus with bisectors](image)

11. In fig. 11, ABCD is parallelogram such that the bisectors of \( \angle A \) and \( \angle B \) meet on CD. Prove that \( AB = 2BC \).
12. In fig. 12, $\angle A$ is a right angle of $\triangle ABC$; $ABPQ$ and $ACXY$ are squares lying outside $\triangle ABC$. Prove that $PAX$ is a straight line.
13. In fig. 13, ABCD and APQR are squares. Prove that BP = DR.

![fig. 13](image)

14. In fig. 14, ABCD is a parallelogram; ABLM and BCHK are squares outside the parallelogram. Prove that

(a) $\angle LBK = \angle BCD$

(b) $KL = BD.$

![fig. 14](image)
15. In fig. 15, the side AB of the parallelogram ABCD is produced to X, and the bisector of $\angle CBX$ meets DA produced and DC produced at E and F. Prove that $DE = DF = BA + BC$. 
16. In fig. 16, H, K are the mid-points of AB, AC, and HKP is a straight line. Prove that
(a) \( CP = AH \),
(b) CPHB is a parallelogram,
(c) \( HK = \frac{1}{2} BC \).

17. In fig. 17, ABCD and APCQ are parallelograms. Prove that
(a) AC, BD, PQ are concurrent, i.e. pass through the same point;
(b) \( PB \parallel DQ \).
18. In fig. 18, ABCD is a rhombus; PABQ is straight line such that \( PA = AB = BQ \). Prove that PD and QC when produced cut at right angles.

19. In fig. 19, Q is any point on the diagonal AC of a parallelogram ABCD. Prove that the areas of XQRD and PQYB are equal. [Hint: The area of a parallelogram is bisected by a diagonal.]