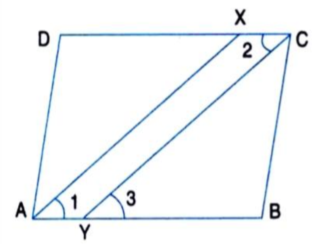
General instructions for Students: Whatever be the notes provided, everything must be copied in the Maths copy and then do the HOMEWORK in the same copy.

11(ii) Prove that bisectors of any two opposite angles of a parallelogram are parallel.



Given: AX and CY bisect $\angle A$ and $\angle C$ respectively.

To prove: $AX \parallel CY$

Proof: $\angle A = \angle C$ [Opp. angles of a $\parallel$gram are equal]

$\therefore \frac{1}{2}\angle A = \frac{1}{2}\angle C \Rightarrow \angle 1 = \angle 2$ ……………………. (i)

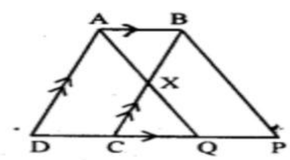
Now, $AB \parallel CD$ and CY is a transversal $\therefore \angle 2 = \angle 3$ [Alt. int. $\angle$s] …………. (ii)

From (i) and (ii), $\angle 1 = \angle 3$ [Corressponding $\angle$s are equal]

$\therefore AX \parallel CY$ **Proved.**

14(a) ABCD is a parallelogram and X is mid – point of BC, the line AX produced meets DC produced at Q the parallelogram ABPQ is completed.

Prove that (i) $\Delta ABX \cong \Delta QCX$ (ii) $DC = CQ = QP$



Proof: In ΔABX and ΔQCX $\angle ABX = \angle QCX$ [Alt. int. $\angle$s]

$BX = CX$ [X is mid – point of BC]

$\angle AXB = \angle QXC$ [Vert. opp. $\angle$s]

$\therefore \Delta ABX \cong \Delta QCX$ [ASA congruency rule] **Proved.**

$\therefore AB = CQ$ [C.P.C.T.] ……………… (i)

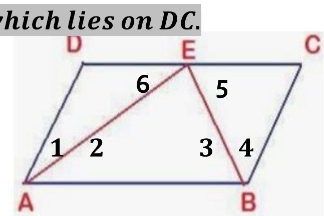
$AB = DC$ [Opp. angles of a $\parallel$gram ABCD are equal] …. (ii)

$AB = PQ$ [Opp. angles of a $\parallel$gram ABPQ are equal] ….. (iii)

From (i), (ii) and (iii), $DC = CQ = QP$ **Proved.**

19. ABCD is a parallelogram bisectors of angles A and B meet at E which lies on DC.

Prove that $AB = 2\,AD$.



To prove: $AB = 2\,AD$

Proof: $\angle 1 = \angle 2$ [$\because$ AE bisects $\angle A$] ………… (i)

$\angle 3 = \angle 4$ [$\because$ BE bisects $\angle B$] ………… (ii)

$\angle 2 = \angle 6$ $\quad$ $[\because AB \parallel CD \text{ and } AE \text{ is a transversal, } Alt. Int. \angle s] \ldots\ldots\ldots\ldots (iii)$

$\angle 3 = \angle 5$ $\quad$ $[\because AB \parallel CD \text{ and } BE \text{ is a transversal, } Alt. Int. \angle s] \ldots\ldots\ldots\ldots (iv)$

From (i) and (iii), $\quad \angle 1 = \angle 6$

$\therefore \quad AD = DE$ $\quad$ [sides opp. to equal angles are equal] $\ldots\ldots..(v)$

From (ii) and (iv), $\quad \angle 4 = \angle 5$

$\therefore \quad BC = CE$ $\quad$ [sides opp. to equal angles are equal] $\ldots\ldots..(vi)$

$AD = BC$ $\quad$ [Opp. sides of a $\parallel$ gram are equal] $\ldots\ldots\ldots\ldots (vii)$

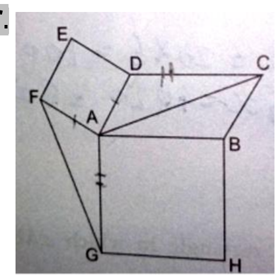
From (v), (vi) and (vii), $\quad DE = CE$

Now, $\quad AB = CD \implies AB = DE + CE$

$\implies AB = AD + AD$

$\implies AB = 2\,AD$ $\qquad$ **Proved.**

22(b) ABCD is a parallelogram, ADEF and AGHB are two squares. Prove that $FG = AC$.



Proof : We join FG and AC

$\angle FAG + 90^\circ + 90^\circ + \angle BAD = 360^\circ$

$\implies \angle FAG = 360^\circ - 90^\circ - 90^\circ - \angle BAD$

$\implies \angle FAG = 180^\circ - \angle BAD \ldots\ldots\ldots\ldots\ldots..(i)$

$\angle B + \angle BAD = 180^\circ$ $\qquad$ [Sum of two adjacent angles of a $\parallel$ gram is 180°]

$\implies \angle B = 180^\circ - \angle BAD \ldots\ldots\ldots\ldots (ii)$

From (i) and (ii), $\quad \angle FAG = \angle B \ldots\ldots\ldots\ldots\ldots\ldots\ldots.(iii)$

In ΔAFG and ΔABC, $\quad AF = BC$

$AG = AB$

$\angle FAG = \angle B$ $\qquad$ [By (iii)]

$\Delta AFG \cong \Delta ABC$ $\qquad$ [SAS congruency rule]

$\therefore \quad FG = AC$ $\qquad$ **Proved.**

HOMEWORK

EXERCISE NO. – 13.1

QUESTION NUMBERS : 11(iii), 12(i), 14(b), 15, 17, 18, 21, 22(i) and 23