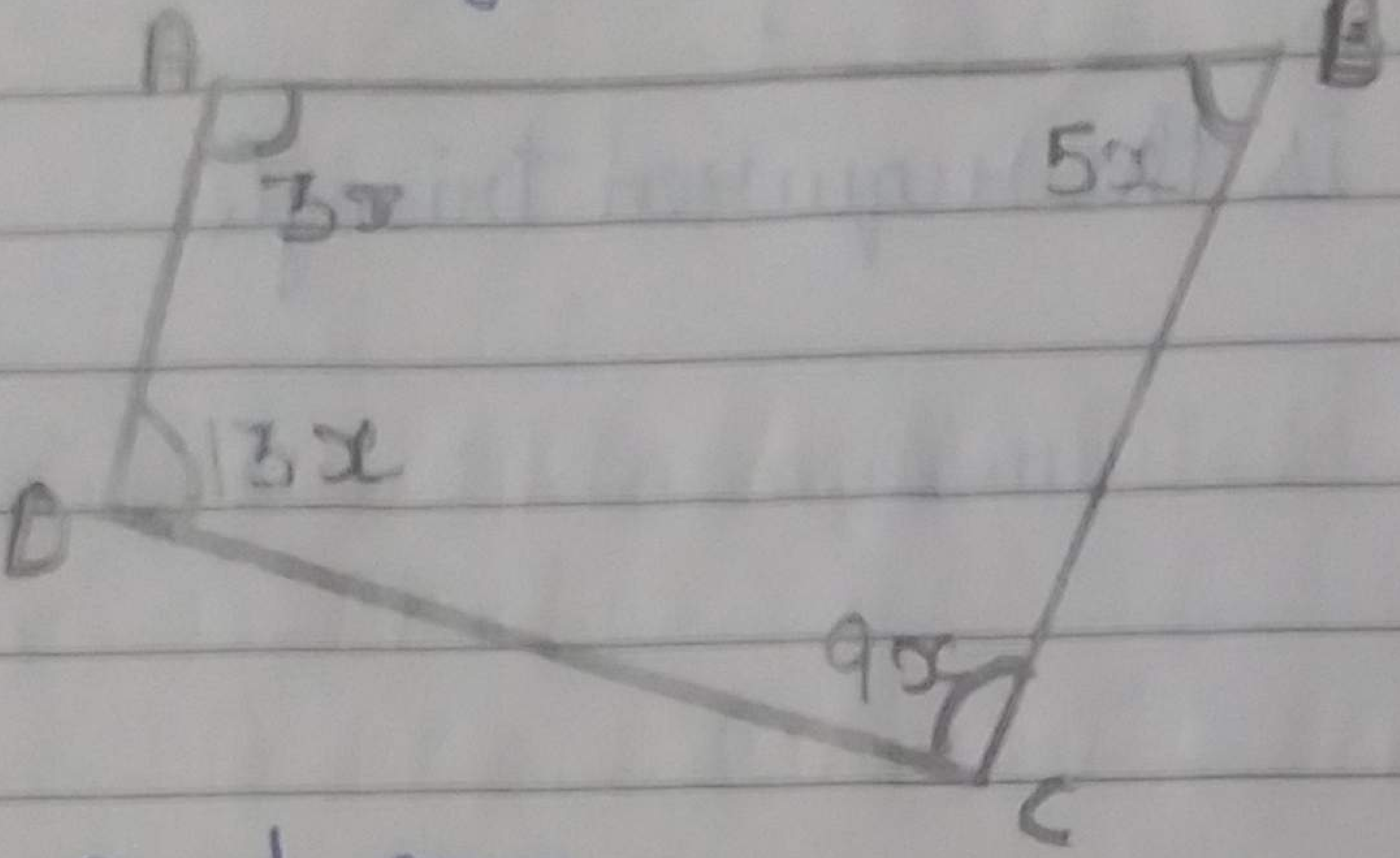
2019

CHAPTER - 8

Quadrilaterals

Ex: 8.1

1. Refer text book pg: 146



Soln:

In a Quad. ABCD,

Sum of all 4 angles = 360°

Sum of ratio = $3x + 5x + 9x + 13x$

$= 30x$

$30x = 360^\circ$

$x = \frac{\cancel{360}^{12}}{\cancel{30}_{1}}$

$x = 12^\circ$

The angles are ⇒ $3 \times 12 = 36^\circ$

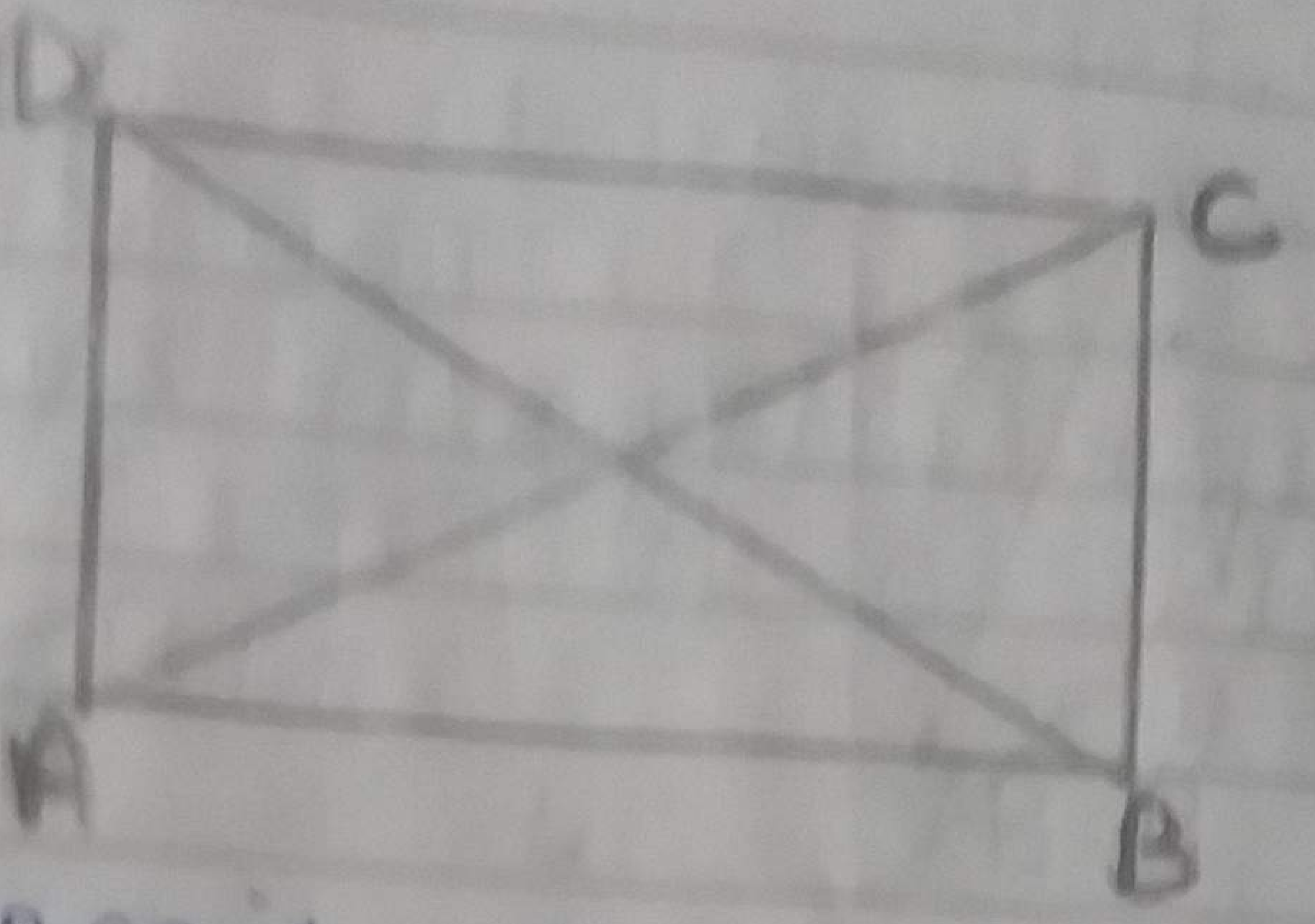
$5 \times 12 = 60^\circ$

$9 \times 12 = 108^\circ$

$13 \times 12 = 156^\circ$

$\boxed{\text{Ans} \Rightarrow 36^\circ, 60^\circ, 108^\circ, 156^\circ}$

2. Refer text book pg. 146



Soln:
Given:

ABCD is a ||ogram
Diagonals, (AC = BD)

To prove: ABCD is a rectangle.

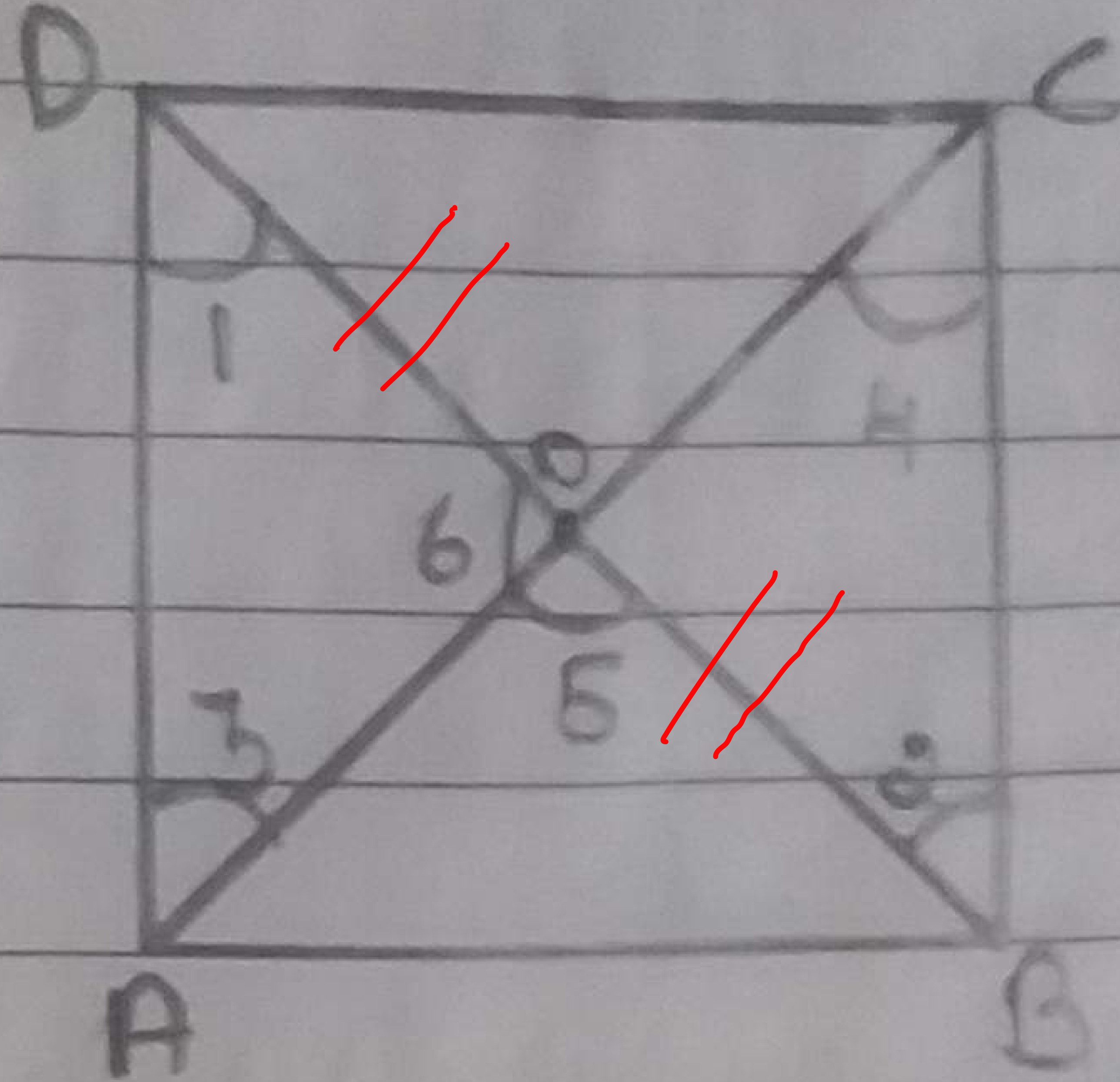
Proof: In △ ABC and △ BAD,
AB = AB (Common)
AC = BD (given)
BC = AD (opposite sides are equal)
∴ △ABC ≅ △BAD (by SSS rule)
∴ ∠A = ∠B (by CPCT)
Since ABCD is a ||ogram,
AD || BC and AB being a transversal,
∠A + ∠B = 180° (Co-interior angles)
⇒ ∠A + ∠A = 180° (∵ ∠A = ∠B)
⇒ 2∠A = 180°
⇒ ∠A = $\frac{180°}{2}$ = 90°

∴ ∠B = 90°
∴ ||gm is a rectangle

Hence Proved

DATE

4. Show that the diagonals of a Square are equal and bisect each other at 90°.



Soln:

given:

ABCD is a Square

To prove: i) AC = BD

ii) AC and BD bisects each other at 90°.

Proof:

i) In $\triangle ABC$ and $\triangle BAD$,

AB = AB (common)

AD = BC (given, all sides are equal in a Square)

$\angle A = \angle B$ (90°, Angles of a Square are 90°.)

$\therefore$ $\triangle ABC \cong \triangle BAD$ (by SAS rule.)

$\therefore$ AC = BD (CPCT)

Hence Proved (i)

ii) In ΔAOD and ΔBOC.

$AD = BC$ (given)

$\angle 1 = \angle 2$ (alternate interior angles)

$\angle 3 = \angle 4$ (alternate interior angles)

$\therefore$ $\Delta AOD \cong \Delta BOC$ (by ASA rule)

$\therefore$ $\left.\begin{array}{l} OA = OC \\ OD = OB \end{array}\right\}$ — (by cpct)

$\boxed{\text{(i.e) AC and BD bisect each other.}}$

iii) In ΔAOB and ΔDOA,

$AB = AD$ (given)

$OA = OA$ (common)

$OB = OD$ (by CPCT (ii))

$\therefore \triangle AOB \cong \triangle DOA$ (by SSS rule.)

$\therefore \angle 5 = \angle 6$ (by CPCT)

But $\angle 5 + \angle 6 = 180^\circ$ (Linear Pair)

$\Rightarrow 2\angle 5 = 180^\circ$

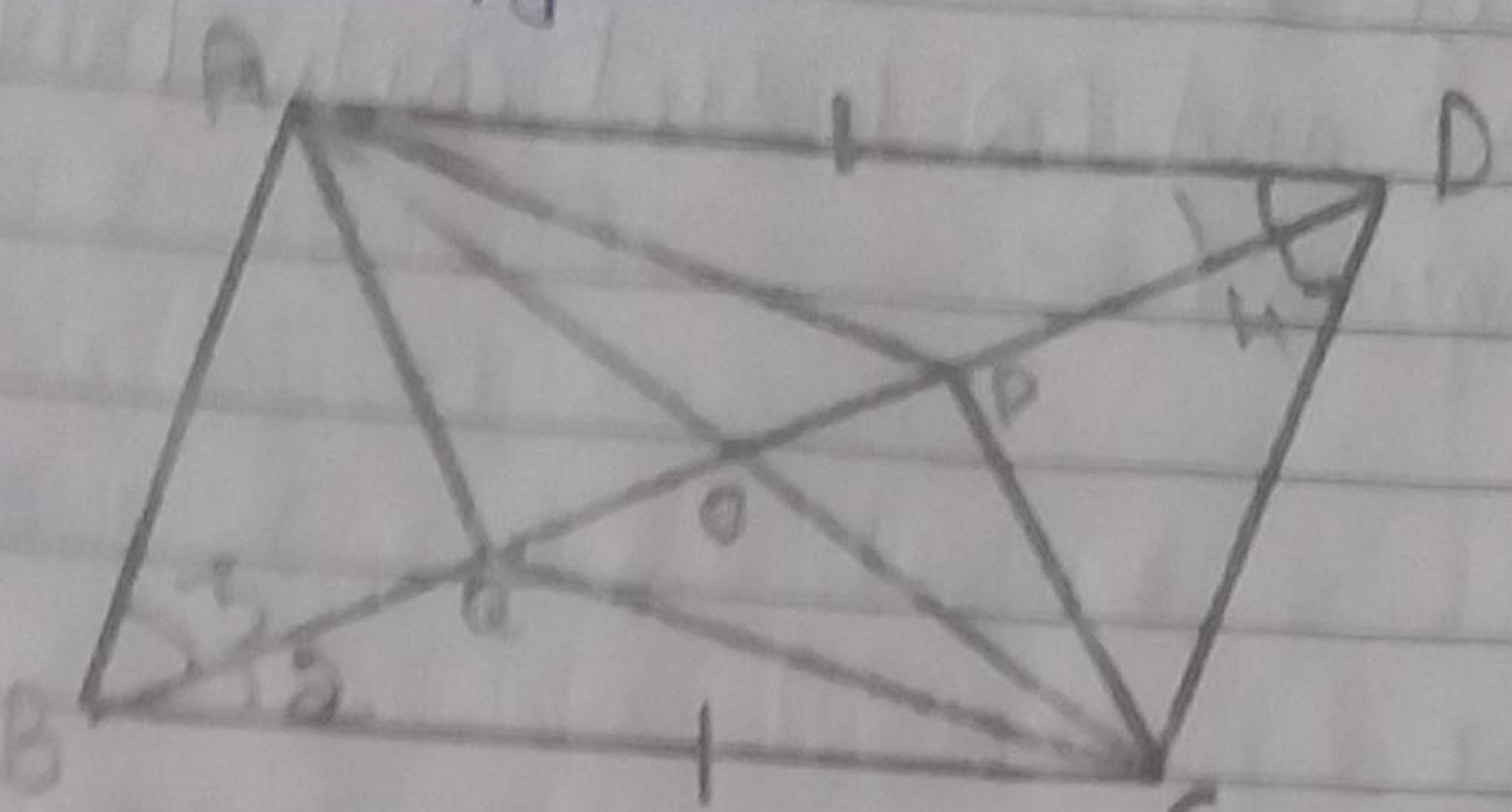
$\Rightarrow \angle 5 = \frac{\cancel{180^\circ}^{90^\circ}}{\cancel{2}}$

$\angle 5 = 90^\circ$

Thus diagonals bisect each other at 90°.

Hence Proved.

9. Refer text book pg: 147



given:

ABCD is a llogram and
PD = QB

Proof: i) $\triangle APD \cong \triangle CQB$

In $\triangle APD$ and $\triangle CQB$

AD = BC (given)
DP = BQ (given)
$\angle 1 = \angle 2$ (alternate interior angles)

$\therefore \triangle APD \cong \triangle CQB$ (by SAS rule)

Proved (i)

ii) $\therefore$ AP = CQ (by CPCT)

Proved (ii)

iii) $\triangle AQB \cong \triangle CPD$

In $\triangle AQB$ and $\triangle CPD$,

AB = CD (given)
DP = BQ (given)
$\angle 3 = \angle 4$ (alternate interior angles)

$\therefore \triangle AQB \cong \triangle CPD$ (by SAS rule.)

Proved (iii)

iv) $\therefore$ AQ = CP (by CPCT)

$\boxed{\text{Proved (iv)}}$ ✓

v) Since ABCD is a ||ogram,

$$\left.\begin{aligned} OA &= OC \\ OD &= OB \end{aligned}\right\} \text{— ① (Diagonals bisect each other)}$$

given:

$$DP = BQ \text{ — ②}$$

① − ②

$\Rightarrow$ OD − DP = OC − BQ

$\Rightarrow$ OP = OQ

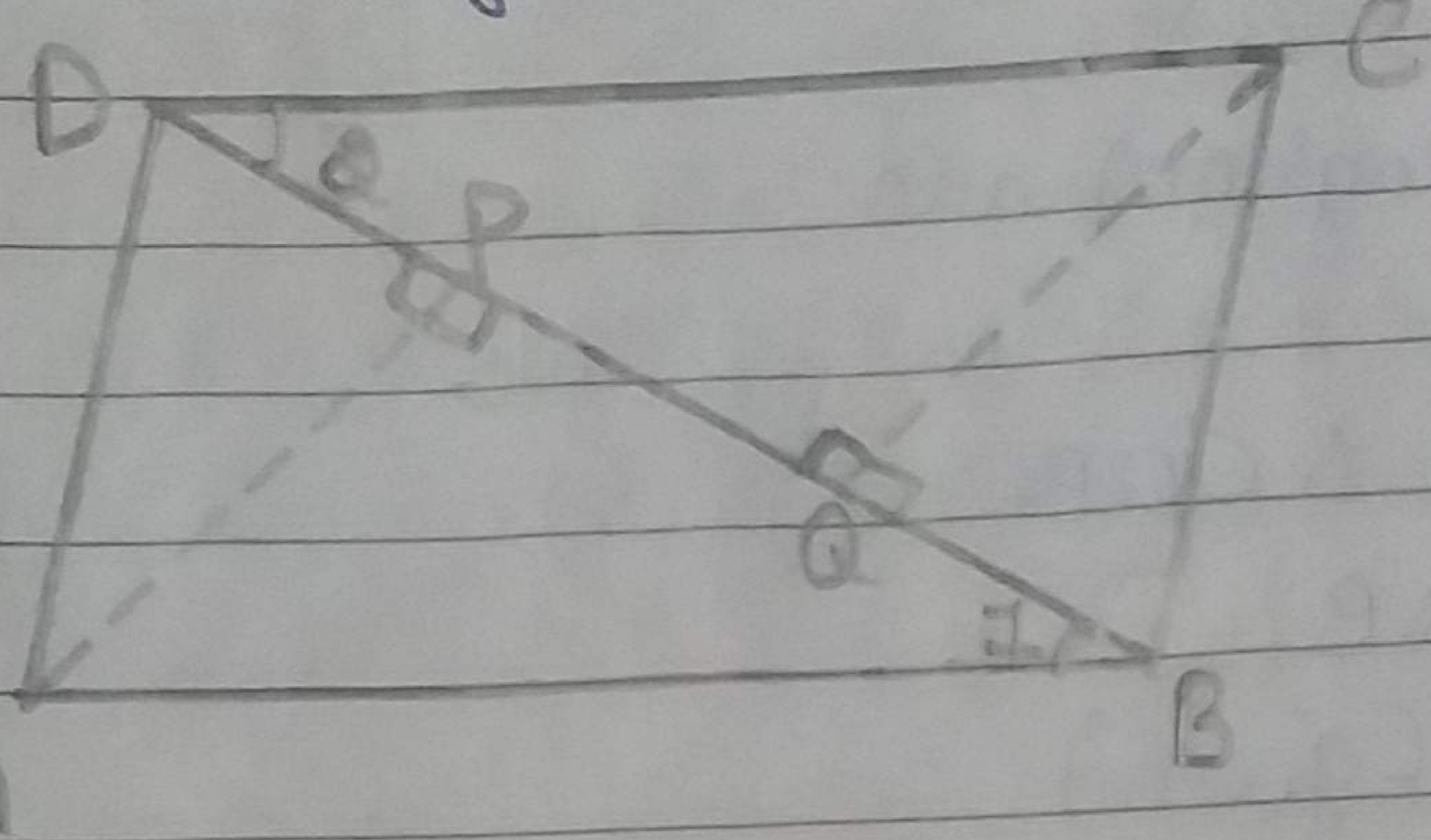
and OA = OC (given)

Thus, diagonals AC and PQ bisect each other.

$\boxed{\text{Hence AQCP is a ||ogram}}$ ✓

$\boxed{\text{Proved (v)}}$ ✓

10. Refer text book pg: 147



Soln: given:

ABCD is a ||ogram

To prove: i) $\Delta APB \cong \Delta CQD$

ii) $AP = CQ$

Proof:

i) In ΔAPB and ΔCQD,

$AB = CD$ (given)

$\angle CQD = \angle APB$ (90° each, given)

$\angle 1 = \angle 2$ (alternate interior angles)

$\therefore \Delta APB \cong \Delta CQD$ (by AAS rule)

Hence Proved.

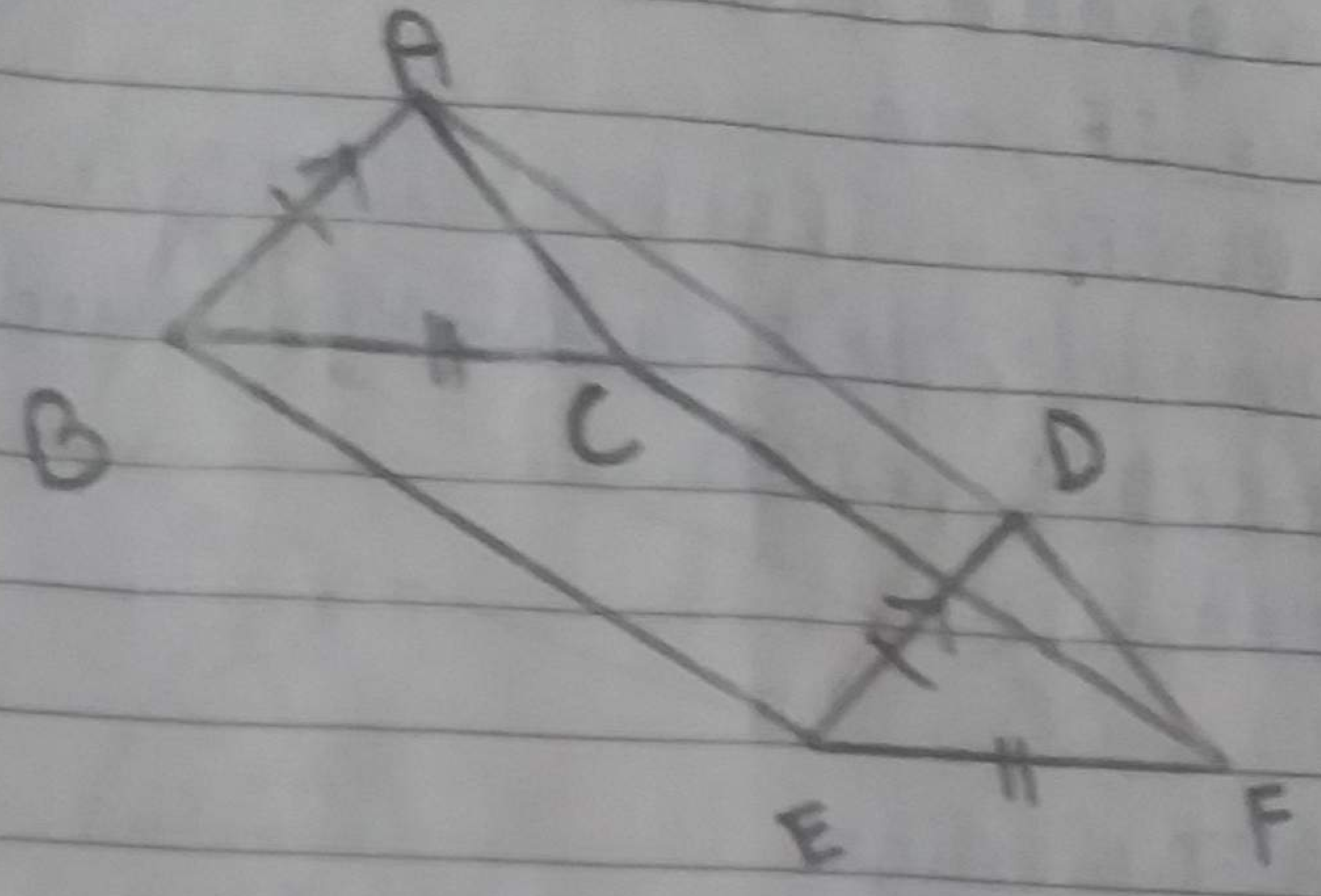
ii) Since $\Delta APB \cong \Delta CQD$,

$AP = CQ$ (by CPCT)

Hence Proved

PAGE No.
DATE

11. Refer text book pg: 147



Soln:

i) In quad. ABED,
given, AB = ED, and
AB ∥ ED
∴ one ~~pair~~ pair of opposite sides are ∥el and equal
Hence ABED is a ∥gm.
(i) Proved

ii) In quad BEFC,
given: BC = EF, and
BC ∥ EF
∴ one pair of opposite sides are ∥el and equal
Hence, BEFC is a ∥gm.
(ii) Proved

iii) $\because$ ABED is a $\parallel$gm

$$\Rightarrow \left.\begin{aligned} AD &= BE \\ AD &\parallel BE \end{aligned}\right\} \text{———} (1)$$

$\because$ BEFC is a $\parallel$gm

$$\Rightarrow \left.\begin{aligned} CF &= BE \\ CF &\parallel BE \end{aligned}\right\} \text{———} (2)$$

From (1) and (2)

$AD = CF$, and

$AD \parallel CF$

$\boxed{\text{(iii) Proved}}$

PAGE No.
DATE:

iv) In a quad ACFD,

AD = CF, and

AD ∥ CF

∴ one pair of opposite sides are ∥el and equal.

Hence ACFD is a ∥gm

iv) Proved

v) ∵ ACFD is a ∥gm

∴ AC = FD (opposite sides of a ∥gm)

(v) Proved

vi) In ΔABC and ΔDEF,

AB = DE (given)

BC = EF (given)

AC = DF (Proved (v))

∴ $\Delta ABC \cong \Delta DEF$ (by SSS rule)

Hence Proved.