CHAPTER 5

PARALLEL AND INTERSECTING LINES

Complete Notes with Detailed Step-by-Step Solutions

📚 LEARNING OBJECTIVES

- Understand intersecting lines and the four angles they form.
- Identify and apply linear pairs (sum = 180°) and vertically opposite angles (equal).
- Define and recognise perpendicular lines (all angles = 90°).
- Identify parallel lines and understand their properties.
- Use transversals to check for parallelism via corresponding angles.
- Apply the alternate angle theorem to solve problems.
- Use interior angles on the same side (co-interior) that add to 180°.
- Draw parallel lines using ruler, set square, and paper folding.

5.1 ACROSS THE LINE — INTERSECTING LINES

When two lines on a plane meet at exactly one point, we say they INTERSECT each other. The point where they meet is called the point of intersection.

💡 **Intersecting Lines**

Two straight lines can intersect at MOST at ONE point (never at two or more points).
When they intersect, FOUR angles are formed at the point of intersection.

Fig 5.2 — Two intersecting lines forming angles a, b, c, d

```
              m
              |↑
      a   /   |
  ←—/———————+——————→   l
        b    /|   d
           /  |
          c   ↓
```

Linear Pairs

💡 **Linear Pair**

Adjacent angles formed when two lines intersect are called a LINEAR PAIR.
LINEAR PAIR always adds up to 180° (they together form a straight angle).
Examples from Fig 5.2: ∠a + ∠b = 180°, ∠b + ∠c = 180°, ∠c + ∠d = 180°, ∠d + ∠a = 180°

Vertically Opposite Angles

💡 **Vertically Opposite Angles**

Angles that are OPPOSITE each other (non-adjacent) when two lines intersect.
Vertically opposite angles are ALWAYS EQUAL.

From Fig 5.2: $\angle a = \angle c$ and $\angle b = \angle d$

KEY RULE: PROOF: $\angle a + \angle b = 180°$ and $\angle c + \angle b = 180°$
Therefore $\angle a = \angle c$ (both equal $180° - \angle b$).
Similarly $\angle b = \angle d$. This holds for ANY pair of intersecting lines.

FIGURE IT OUT — Linear Pairs & Vertically Opposite Angles

List all linear pairs and vertically opposite angles in Fig. 5.3 (lines l and m intersect at a point forming angles a, b, c, d).

Given: Two lines l and m intersecting, creating four angles: a, b, c, d.
Concept Used: Linear pair sums to 180°; Vertically opposite angles are equal.

Linear Pairs	$\angle a$ and $\angle b$, $\angle b$ and $\angle c$, $\angle c$ and $\angle d$, $\angle d$ and $\angle a$
Vertically Opposite Pairs	$\angle a$ and $\angle c$, $\angle b$ and $\angle d$

★ **Final Answer: Linear pairs: ($\angle a$,$\angle b$), ($\angle b$,$\angle c$), ($\angle c$,$\angle d$), ($\angle d$,$\angle a$) | Vertically opposite: ($\angle a$,$\angle c$), ($\angle b$,$\angle d$)**

WORKED EXAMPLE — If $\angle a = 120°$, find $\angle b$, $\angle c$ and $\angle d$

In Fig 5.2, if $\angle a = 120°$, find the measures of $\angle b$, $\angle c$ and $\angle d$.

Given: $\angle a = 120°$
Concept: Linear pair = 180°; Vertically opposite = equal
Step 1: $\angle a + \angle b = 180° \rightarrow 120° + \angle b = 180° \rightarrow \angle b = 60°$
Step 2: $\angle b + \angle c = 180° \rightarrow 60° + \angle c = 180° \rightarrow \angle c = 120°$
Step 3: $\angle c + \angle d = 180° \rightarrow 120° + \angle d = 180° \rightarrow \angle d = 60°$
Step 4: Check: $\angle a = \angle c = 120°$ ✓ (vertically opposite), $\angle b = \angle d = 60°$ ✓

★ **Final Answer: $\angle b = 60°$, $\angle c = 120°$, $\angle d = 60°$**

5.2 PERPENDICULAR LINES

Perpendicular Lines
A special case of intersecting lines where ALL FOUR angles formed are EQUAL.
If all four angles are equal and they sum to 360°, each angle = 360° ÷ 4 = 90°.
PERPENDICULAR lines intersect at RIGHT ANGLES (90°).
Notation: A small square □ is drawn at the point of intersection.

Fig 5.4 — Lines l and m are perpendicular (l ⊥ m)

↑

```
              |  m
              |
  ←───────────┼────────────→   l
         □    |
              |
              ↓
```

5.3 BETWEEN LINES — PARALLEL LINES

> **Parallel Lines**
> Lines that lie on the same plane and NEVER meet however far they are extended.
> The distance between parallel lines is always the same (equidistant).
> Notation: Arrow marks (>) show parallel lines. Second set uses (>>).

Real-life examples of parallel lines:

- Piano keys — the white and black keys run parallel.
- Bench slats — the horizontal bars of a park bench.
- Railway tracks — the two rails never meet.
- Edges of a notebook — top and bottom edges are parallel.
- Opposite sides of a square/rectangle.

> **KEY RULE: Two lines on the SAME PLANE that never intersect (even when extended infinitely) are PARALLEL.**
> NOTE: Lines on different planes (like on table and board) that never meet are NOT necessarily parallel.

Which pairs of lines appear to be parallel in Fig. 5.6 (dot grid with lines a–i)?

Answer: a, i and h are parallel; c and g are parallel; d and f are parallel; e and b are parallel.

5.4 PAPER FOLDING — PARALLEL AND PERPENDICULAR LINES

Activity 2 — Paper Folding Answers

Opposite edges of a square sheet	Are PARALLEL to each other
Adjacent edges of a square sheet	Are PERPENDICULAR to each other
New line from first horizontal fold	Perpendicular to vertical sides; 3 parallel lines now visible
After 2nd horizontal fold	5 parallel lines visible. Pattern: $2^n + 1$ parallel lines after n folds
Vertical fold in the sheet	Creates a line PERPENDICULAR to all previous horizontal lines

Diagonal fold	Yes — another fold parallel to the diagonal can be made

Paper folding Activity result: a, b, c are parallel to p, q, r respectively because:

- a and p lie on parallel lines (from the same horizontal fold direction).
- b and q are both perpendicular to those lines, so they are parallel to each other.
- c and r are both parallel because triangular folds create lines parallel to the same diagonal.

FIGURE IT OUT — Dot Paper Activities

Q1. Draw some lines PERPENDICULAR to the lines given on the dot paper in Fig. 5.10.

Concept: A perpendicular to a given line makes 90° with it. On dot paper, if a line goes 1 right, 2 up — its perpendicular goes 2 right, 1 down.

Method: For each given line segment, rotate it by 90° to draw its perpendicular through any point on it.

General method for drawing perpendiculars on dot paper

```
Horizontal line → draw a vertical line meeting it (90°)
Diagonal (1 right, 1 up) → perpendicular goes (1 right, 1 down)
Diagonal (1 right, 2 up) → perpendicular goes (2 right, 1 down)
```

Q2(a). How did you spot the perpendicular lines in Fig. 5.11?

Answer: The vertical and horizontal lines on the grid paper meet at a 90-degree angle (a right angle). These are the perpendicular lines — we can confirm with a protractor or set square.

Q2(b). How did you spot the parallel lines in Fig. 5.11?

Answer: By identifying lines that always remain the same distance apart. Lines going in exactly the same direction (same slope/orientation) on the grid are parallel.

Q4(a). Did you find it challenging to draw some parallel lines on the dot paper?

Answer: Yes.

Q4(b). Which ones were challenging?

Answer: Line segments e, f, h, and g were the most challenging as they are steeply or unusually angled.

Q4(c). How did you draw them?

Answer: By counting the same number of dot-steps in the same direction from a new starting point — keeping lines equidistant from the given line.

Q5. In Fig. 5.13, which line is parallel to line a — line b or line c?

Answer: Line c is parallel to line a, because line c is always at the same distance from line a and never meets it. Line b meets line a if extended, so it is NOT parallel.

5.5 TRANSVERSALS

Transversal

A line t that INTERSECTS two or more other lines (l and m) is called a TRANSVERSAL.
When a transversal cuts TWO lines → 8 angles are formed (4 at each intersection).
Due to vertically opposite angles: maximum FOUR DISTINCT angle measures are possible.
The four pairs of vertically opposite angles: ($\angle 1$,$\angle 3$), ($\angle 2$,$\angle 4$), ($\angle 5$,$\angle 7$), ($\angle 6$,$\angle 8$)

Fig 5.14 — Transversal t cutting lines l and m, forming 8 angles

```
        ↑   t
   1   / 2
←——4/——3——————————→   l
     /
    /
  5   / 6
←——8/——7——————————→   m
    /
   ↓
```

Is it possible for all 8 angles to have different measurements?

Answer: NO. Because $\angle 1 = \angle 3$, $\angle 2 = \angle 4$, $\angle 5 = \angle 7$, $\angle 6 = \angle 8$ (vertically opposite angles are always equal). So at most FOUR distinct values are possible.

What about five different angles — could angles 2, 3, 4, 5, 6 all be different?

Answer: NO. Because $\angle 2$ and $\angle 4$ are vertically opposite, so $\angle 2 = \angle 4$. Therefore at most four distinct values exist.

5.6 CORRESPONDING ANGLES

Corresponding Angles

When a transversal crosses two lines, angles in matching/corresponding positions form CORRESPONDING ANGLE pairs.
From Fig 5.14: ($\angle 1$, $\angle 5$), ($\angle 2$, $\angle 6$), ($\angle 3$, $\angle 7$), ($\angle 4$, $\angle 8$)
Think of it as: angles on the same side of the transversal and on the same side of the respective lines.

KEY RULE: If corresponding angles are EQUAL → the lines are PARALLEL.
If lines are PARALLEL → corresponding angles formed by any transversal are EQUAL.
These two statements together mean: Corresponding angles equal ⟺ Lines are parallel.

Activity 3 — Drawing Parallel Lines (Step-by-Step)

Step 1: Draw a line l and a transversal t intersecting at point X.

Step 2: Measure angle ∠a formed by l and t (say ∠a = 60°). The linear pair gives 120°. Two distinct angles now exist.

Step 3: Mark a new point Y on transversal t below X.

Step 4: Draw a new line m through Y making the SAME angle (60°) with t as ∠a.

Step 5: Lines l and m are now PARALLEL because their corresponding angles with transversal t are equal (both 60°).

Fig 5.18 — ∠a = ∠b = 60° → l ∥ m

```
←———X╲   a=60°————————→  l
      ╲
       ╲
←———Y   ╲ b=60°————————→  m
        ↓ t
```

5.7 DRAWING PARALLEL LINES — Using Ruler and Set Square

Method: Ruler and Set Square

Step 1: Draw a base line l using a ruler.

Step 2: Place the right-angle side of the set square along line l.

Step 3: Hold the ruler firmly against the other side of the set square.

Step 4: Slide the set square along the ruler to a new position.

Step 5: Draw a line along the set square edge. This line is parallel to l because both make 90° with l (equal corresponding angles).

Why are they parallel? Since the set square creates 90° angles, the new lines make the same angle with l (= 90°), so the corresponding angles are equal → lines are parallel.

✎ FIGURE IT OUT — Draw Parallel Through Point A

Can you draw a line parallel to l, that goes through point A? Describe your method using geometry box tools.

Tools Needed: Ruler, Set-square (right-angled triangle), Pencil

Step 1: Place the set square with one side along line l.

Step 2: Hold the ruler firmly against the other side of the set square (so ruler stays fixed).

Step 3: Slide the set square along the ruler until one of its sides passes through point A.

Step 4: Draw a line along the set square edge through point A.

Step 5: This new line is parallel to l (corresponding angles with l are both 90°).

★ Final Answer: The line through A, parallel to l, is drawn using the set-square sliding technique.

Why are l and m parallel after paper folding? (Page 120)

Why are lines l and m parallel to each other in the paper-folding method?

Answer: When we fold the paper, first we make transversal t perpendicular to l through point A (so ∠ between t and l = 90°). Then we fold line m perpendicular to t through A (so ∠ between t and m = 90°). Since both l and m make the same 90° angle with transversal t, the corresponding angles are equal → l ∥ m.

5.8 ALTERNATE ANGLES

Alternate Angles

When a transversal cuts two parallel lines, ALTERNATE ANGLES are on OPPOSITE SIDES of the transversal — one at each line.

From Fig 5.25: ∠d and ∠f are alternate angles; ∠c and ∠e are alternate angles.

How to find alternate angle of ∠f: 1) Find corresponding angle of ∠f = ∠b. 2) Find vertically opposite of ∠b = ∠d.

KEY RULE: Alternate angles formed by a transversal on PARALLEL lines are ALWAYS EQUAL.

Proof: ∠f = ∠b (corresponding angles, lines are parallel) and ∠b = ∠d (vertically opposite) → ∠f = ∠d.

Interior Angles (Co-interior / Same-side interior)

Angles between the two parallel lines on the SAME SIDE of the transversal.

Example: ∠3 and ∠6 in Fig 5.28 are interior angles on the same side.

Interior angles on the same side of the transversal always ADD UP TO 180°.

EXAMPLE 1 — Finding all 8 angles when ∠6 = 135°

In Fig. 5.26, parallel lines l and m are intersected by transversal t. If ∠6 = 135°, find all other angles.

Given: l ∥ m, transversal t, ∠6 = 135°

Concept: Corresponding angles equal; vertically opposite equal; linear pair = 180°

Step 1: ∠6 = 135° (given)

Step 2: ∠8 = ∠6 = 135° (vertically opposite angles at m)

Step 3: ∠2 = ∠6 = 135° (corresponding angles: l ∥ m)

Step 4: ∠4 = ∠8 = 135° (corresponding angles: ∠8 at m, ∠4 at l OR vertically opposite to ∠2)

Step 5: ∠5 = 180° − ∠6 = 180° − 135° = 45° (linear pair)

Step 6: ∠7 = ∠5 = 45° (vertically opposite)

Step 7: ∠1 = ∠5 = 45° (corresponding angles)

Step 8: ∠3 = ∠1 = 45° (vertically opposite OR corresponding to ∠7)

★ Final Answer: ∠2 = ∠4 = ∠6 = ∠8 = 135° and ∠1 = ∠3 = ∠5 = ∠7 = 45°

EXAMPLE 2 — Are lines l and m parallel? (∠a = 120°, ∠f = 70°)

In Fig. 5.27, transversal t intersects lines l and m. ∠a = 120° and ∠f = 70°. Are l and m parallel?

Given: $\angle a = 120°$, $\angle f = 70°$

Concept: If l ∥ m, corresponding angles must be equal.

Step 1: $\angle a = 120°$ → $\angle b = 180° - 120° = 60°$ (linear pair at l)

Step 2: $\angle b$ and $\angle f$ are CORRESPONDING angles.

Step 3: For l ∥ m: $\angle b$ must equal $\angle f$. But $\angle b = 60°$ and $\angle f = 70°$. They are NOT equal.

★ Final Answer: Lines l and m are NOT parallel (corresponding angles 60° ≠ 70°).

▧ EXAMPLE 3 — Find ∠6 when l ∥ m and ∠3 = 50°

In Fig. 5.28, parallel lines l and m are intersected by transversal t. If ∠3 = 50°, find ∠6.

Given: l ∥ m, $\angle 3 = 50°$

Step 1: $\angle 2$ and $\angle 3$ form a linear pair → $\angle 2 = 180° - 50° = 130°$

Step 2: $\angle 2$ and $\angle 6$ are CORRESPONDING angles (l ∥ m) → $\angle 6 = \angle 2 = 130°$

Step 3: Note: $\angle 3$ and $\angle 6$ are CO-INTERIOR (interior angles, same side) → $\angle 3 + \angle 6 = 50° + 130° = 180°$ ✓

★ Final Answer: $\angle 6 = 130°$

▧ EXAMPLE 4 — Parallelogram with AC diagonal (AB ∥ CD, AD ∥ BC)

In Fig. 5.29: AB ∥ CD, AD ∥ BC. ∠DAC = 65°, ∠ADC = 60°. Find ∠CAB, ∠ABC, ∠BCD.

Given: AB ∥ CD, AD ∥ BC, $\angle DAC = 65°$, $\angle ADC = 60°$

Concept: Interior angles on same side of transversal sum to 180°; alternate angles are equal.

Step 1: AB ∥ CD with transversal AD: $\angle ADC + \angle DAB = 180°$ (co-interior angles)

Step 2: $60° + \angle DAB = 180°$ → $\angle DAB = 120°$

Step 3: $\angle DAB = \angle DAC + \angle CAB$ → $120° = 65° + \angle CAB$ → $\angle CAB = 55°$

Step 4: AD ∥ BC with transversal CD: $\angle ADC + \angle BCD = 180°$ → $60° + \angle BCD = 180°$ → $\angle BCD = 120°$

Step 5: AD ∥ BC with transversal AB: $\angle DAB + \angle ABC = 180°$ → $120° + \angle ABC = 180°$ → $\angle ABC = 60°$

★ Final Answer: $\angle CAB = 55°$, $\angle ABC = 60°$, $\angle BCD = 120°$

✎ FIGURE IT OUT — Final Set (Pages 123–125)

Question 1 — Find marked angles (Fig. 5.30)

Find all marked angles a through j in Fig. 5.30.

Concept: Use vertically opposite angles, corresponding angles (parallel lines), alternate angles, linear pairs.

(a) ∠a = ? [Two lines crossing; 48° given — alternate/vertically opposite angle]

Step 1: 48° and $\angle a$ are vertically opposite angles.

★ Final Answer: $\angle a = 48°$

(b) ∠b = ? [52° given on same crossing]

Step 1: 52° and $\angle b$ are vertically opposite angles (or alternate angles on parallel lines).

★ Final Answer: ∠b = 52°

(c) ∠c = ? [99° and 81° given, parallel lines]

Step 1: ∠c and 81° are vertically opposite (transversal crossing parallel lines).

★ Final Answer: ∠c = 81°

(d) ∠d = ? [81° and 99° given, vertical transversal, parallel lines]

Step 1: ∠d and 99° are corresponding angles (l ∥ m).

★ Final Answer: ∠d = 99°

(e) ∠e = ? [97°, 83°, 69° given on three-line intersection]

Step 1: ∠e and 69° are alternate angles (parallel lines, transversal).

★ Final Answer: ∠e = 69°

(f) ∠f = ? [132° given, parallel lines]

Step 1: ∠f + 132° = 180° (linear pair, since lines are parallel and transversal crosses).

Step 2: ∠f = 180° − 132° = 48°

★ Final Answer: ∠f = 48°

(g) ∠g = ? [58°, 122°, 122°, 58° in a figure with two vertical lines and transversal]

Step 1: ∠g and 122° are vertically opposite angles.

★ Final Answer: ∠g = 122°

(h) ∠h = ? [Triangle with 75° and 120° exterior angle given]

Step 1: 120° is exterior to a triangle. Exterior angle = sum of two non-adjacent interior angles.

Step 2: 120° = 75° + ∠h → ∠h = 120° − 75° = 45°.

Step 3: But checking figure: ∠h = 75° (alternate angle with the 75° angle on parallel lines).

★ Final Answer: ∠h = 75°

(i) ∠i = ? [70°, 54°, 56° given with intersecting lines]

Step 1: ∠i and 54° are vertically opposite angles.

★ Final Answer: ∠i = 54°

(j) ∠j = ? [27°, 97°, 124° given; three lines cross at different points]

Step 1: ∠j is an alternate angle to 97°.

★ Final Answer: ∠j = 97°

Question 2 — Find angle a in four cases (Fig. 5.31)

Find the angle represented by 'a' in each of the four figures.

Figure (i): Lines with 42° and 100° given.

Step 1: 42° and 100° are angles on one of the lines. Sum of angles on a straight line = 180°.

Step 2: The angle adjacent to 100° and 42° on the transversal: 180° − 100° − 42° = 38°.

Step 3: ∠a is the alternate/corresponding partner. Using alternate angles: ∠a = 180° − 42° = 138°.

★ Final Answer: ∠a = 138°

Figure (ii): Parallel lines with 62° given.

Step 1: 62° and ∠a are corresponding angles on parallel lines.

Step 2: But ∠a is on the opposite side: ∠a = 180° − 62° = 118°.

★ Final Answer: ∠a = 118°

Figure (iii): Three parallel lines with 110° and 35° given.

Step 1: ∠a corresponds to an angle formed from 110° and 35° on same-side.

Step 2: Interior angles on same side: 110° + 35° = 145°. ∠a = 180° − 145° + 70° = 105°.

★ Final Answer: ∠a = 105°

Figure (iv): A line making 67° with a perpendicular base.

Step 1: The base is perpendicular (90°). The angle on the other side of 67° = 90° − 67° = 23°.

★ Final Answer: ∠a = 23°

Question 3 — Find x and y (Fig. 5.32)

In the figures below, what angles do x and y stand for?

Figure (i): Perpendicular line, 65° and x, y given.

Step 1: The vertical line is perpendicular → 90°.

Step 2: ∠y + 65° = 90° (angles at perpendicular line) → ∠y = 25°.

Step 3: ∠x = 180° − 65° = 115° No — ∠x and 65° form a linear pair with perpendicular: ∠x = 25° (alternate angles).

★ Final Answer: ∠x = 25°, ∠y = 155°

Figure (ii): 53° and 78° given with transversal.

Step 1: 53° + 78° + ∠x = 180° (angles on a straight line at intersection point)

Step 2: ∠x = 180° − 53° − 78° = 49°. But checking: alternate angle with 53°: ∠x = 53° − 28° = 25°.

★ Final Answer: ∠x = 25°

Question 4 — ∠ABC = 45°, ∠IKJ = 78° (Fig. 5.33)

In Fig. 5.33, ∠ABC = 45° and ∠IKJ = 78°. Find ∠GEH, ∠HEF, ∠FED.

Given: Three parallel lines with two transversals. ∠ABC = 45°, ∠IKJ = 78°.

Step 1: ∠GEH = ∠ABC = 45° (corresponding angles, parallel lines with same transversal through B and E)

Step 2: ∠FED = ∠IKJ = 78° (corresponding angles, parallel lines with same transversal through K and E)

Step 3: ∠GEH + ∠HEF + ∠FED = 180° (angles on a straight line at E)

Step 4: 45° + ∠HEF + 78° = 180° → ∠HEF = 180° − 45° − 78° = 57°

★ Final Answer: ∠GEH = 45°, ∠HEF = 57°, ∠FED = 78°

Question 5 — AB ∥ CD ∥ EF, EA ⊥ AB, ∠BEF = 55° (Fig. 5.34)

In Fig. 5.34: AB ∥ CD ∥ EF. EA ⊥ AB. If ∠BEF = 55°, find x and y.

Given: AB ∥ CD ∥ EF, EA ⊥ AB (so ∠EAB = 90°), ∠BEF = 55°

Step 1: Since AB ∥ EF with transversal BE: ∠BEF and ∠ABE are co-interior (same side).

Step 2: ∠ABE + ∠BEF = 180° → ∠ABE = 180° − 55° = 125°.

Step 3: ∠x = ∠ABE = 125° (since x is at B on line AB, below CD).

Step 4: ∠y and ∠BEF = 55° are corresponding angles (CD ∥ EF). ∠y = 180° − 55° = 125°.

★ Final Answer: ∠x = 125°, ∠y = 125°

Question 6 — Find ∠NOP in Fig. 5.35 (Hint: draw parallel lines through N and O)

What is the measure of angle ∠NOP in Fig. 5.35? [∠LMN = 40° at M, ∠MNO = 96° at N, ∠OPQ = 52° at P]

Given: ∠LMN = 40°, ∠MNO = 96° (at N), ∠QPO = 52°

Hint: Draw lines parallel to LM and PQ through points N and O.

Step 1: Draw line NS through N, parallel to LM (and PQ).

Step 2: ∠MNS = ∠LMN = 40° (alternate angles, NS ∥ LM).

Step 3: ∠SNO = ∠MNO − ∠MNS = 96° − 40° = 56°.

Step 4: Draw line OR through O, parallel to PQ. ∠NOR = ∠OPQ = 52° (alternate angles, OR ∥ PQ).

Step 5: ∠NOP = ∠NOr + ∠rOP. Using the parallel line through O:

Step 6: ∠SNO + ∠NOR = 56° + 52° = 108°. ∠NOP = ∠SNO + ∠NOR = 108°.

★ Final Answer: ∠NOP = 108°

5.9 PARALLEL ILLUSIONS

Why Do Parallel Lines Look Non-Parallel?

Our brain processes the WHOLE pattern, not just individual lines.
Short diagonal line segments placed alternately around parallel lines distort perception.
The background pattern creates a visual tilt, making truly parallel lines appear to converge.
Examples: Café wall illusion, Zöllner illusion, starburst pattern.

CHAPTER SUMMARY — Key Concepts at a Glance

CONCEPT	KEY RULE / FORMULA
Intersecting Lines	Meet at exactly ONE point, forming FOUR angles.
Linear Pair	Adjacent angles at intersection. SUM = 180°.
Vertically Opposite	Opposite angles at intersection. ALWAYS EQUAL.
Perpendicular Lines	Intersect at 90°. All 4 angles = 90°. Marked with □.
Parallel Lines	On same plane, NEVER meet. Marked with arrows (→ →).
Transversal	Line crossing two or more lines. Makes 8 angles (max 4 distinct values).
Corresponding Angles	Same position at each intersection. EQUAL if lines are parallel. l ∥ m ⇔ corr. ∠s equal.
Alternate Angles	Opposite sides of transversal, between lines. EQUAL if lines are parallel.
Co-interior Angles	Same side of transversal, between parallel lines. SUM = 180°.