FACULTY REFERENCE · CLASS 07 · LOGICAL REASONING (ANALYTICAL)

Mixed Facing + Combos · FACULTY REFERENCE

Internal use only | Lecture script | Worked answers | Method anchors

PURPOSE

Faculty preparation document for Lecture 04 (Mixed Facing + Combos). Per operator rule (2026-06-01), the student-facing lecture deck carries NO answers, NO rider questions, and NO step-by-step solves on screen — faculty asks riders orally and works the body live on the right canvas. This sheet is the safety net so faculty walks in with every final arrangement and every method anchor pre-loaded.

HOW TO USE

Read this sheet before class. Do not project; do not distribute. Section A is the concept-slide teaching script (5 concept slides). Section B carries Examples 01-03 fully solved (problem · final · method · sample riders). Section C is anchor-only for Examples 04-12 — faculty solves the body live with class participation, which is the right pedagogical rhythm at L4.

A · LECTURE SCRIPT

5 concept slides — mixed facing · per-person inversion · profession · 2-attribute · solving order

Concept 01 · Mixed Facing — some in, some out

- Open with the cut: most CLAT mixed-facing sets are 4-in / 4-out at an 8-seater. Memorise the default split.
- Draw the circle. BEFORE you place anyone, set the convention: an inward arrow for 'faces centre', an outward arrow for 'faces away'.
- Tell the class: every named person gets a tiny arrow next to their seat the moment they are placed. No arrow = no left/right call allowed.
- Re-state the two invariants: 'adjacent' is symmetric and facing-blind; 'opposite' still means across the centre regardless of facing.
- The trap landing here: students reuse single-facing inversion globally. Kill that habit on slide 1 — inversion is per-person from this lecture on.

Concept 02 · Per-Person Inversion

- Inward-facer: left = anti-clockwise on paper, right = clockwise. Standard.
- Outward-facer: left = clockwise on paper, right = anti-clockwise. Inverted.
- Two people in the same circle can have OPPOSITE left/right mappings. Drill this with a single example before moving on.
- Reader-perspective shortcuts (the ones that worked in Class 06 circular) FAIL here. Banish them.
- Finger drill protocol — touch the seat, ask 'which way does THIS person face?', then trace left or right. Slow is fast.

Concept 03 · Profession Overlay

- Each seat now carries TWO facts: position + profession (or colour, food, day).
- Profession-opposite clues are gold — 'doctor opposite engineer' pins two seats once one is placed.
- Solve POSITIONS FIRST. Don't try to track two variables at once on the first pass.
- On paper: build the circle AND a two-column legend (seat # · person · profession) to the right. Don't cram both attributes on the seat label.
- Layer order: positions → profession via opposite-clues → done. If you start by chasing the profession chain, you stall.

Concept 04 · Two-Attribute Tables

- Three facts per person now: position + attribute A + attribute B (typical CLAT: profession + colour, or profession + day).
- Build a separate 3-column table next to the circle. Rows = people; columns = position / A / B. DO NOT merge attributes into the seat label.
- Pivot attribute rule: pick the attribute with the most cross-bindings — usually colour or day, because day-pair clues ('Mon opp Fri') give free anchors.
- Solve column-by-column, never row-by-row. Position column first, then attribute A, then attribute B.
- If two attributes share an opposite-pair clue ('red opposite blue' AND 'Mon opposite Fri'), they reinforce each other — check both layers at the final sweep.

Concept 05 · Solving Order for Combo Sets

- Step 1. Strip the riders. Read clues ignoring profession bindings on the first pass; pull out only the positional facts.
- Step 2. Build the circle with positions only — use direction-aware nth-to clues and remember per-person inversion.
- Step 3. Layer profession via opposite-clues. Two professions pinned = the rest cascade.
- Step 4. Layer day/colour/food using opposite-pair clues and chain clues.
- Step 5. FINAL SWEEP all three layers — position · profession · attribute B. Every clue must verify against the full diagram.
- Timing: 6 min diagram + 3 min riders for combo sets. If 7 min in and no profession is placed, restart the profession layer — the position layer is probably wrong.

B · FULLY-SCRIPTED EXAMPLES

Examples 01 · 02 · 03 — problem · final · method · sample riders

EX 01 8 mixed-facing, basic

PROBLEM

Eight people sit around a round table. Four face the centre, four face away. A faces the centre; A is third to B's right. B faces away from the centre. C is opposite A; D is to C's immediate left. E is second to D's right; E faces opposite to D. Determine seating and facing for all eight.

FINAL **Seats clockwise 1-8: B(out) at 1 · A(in) at 4 · C(in) at 8 · D(out) at 7 · E(in) at 5. F, G, H fill seats 2, 3, 6 with 1 in + 2 out to preserve 4-in/4-out.**

ANCHOR B faces away (anchor 1). A is third to B's right — B faces OUT so B's right = anti-clockwise → count 3 anti-clockwise from B → A's seat. A faces centre (anchor 2). C opposite A (anchor 3). D = C's immediate left; C faces in → C's left = anti-clockwise → D placed. E = second to D's right; E faces opposite D. 4-in/4-out balance closes the facing assignments.

METHOD STEPS

1. Place B at seat 1; mark B's arrow OUT.
2. B's right = anti-clockwise (B faces out). Count 3 anti-clockwise → A at seat 4; mark A's arrow IN.
3. C opposite A → C at seat 8; mark C IN (verified by D's-left clue below).
4. D = C's immediate left. C faces in → C's left = anti-clockwise → D at seat 7; D arrow OUT (to keep balance).
5. E = second to D's right; D faces out → D's right = anti-clockwise → 2 anti-clockwise from seat 7 → E at seat 5. E faces IN (opposite D).
6. Fill seats 2, 3, 6 with F, G, H. In-facers needed = 1 (to total 4); place 1 IN + 2 OUT.
7. Final sweep: every clue verifies; 4 IN (A, C, E, one of F/G/H), 4 OUT (B, D, two of F/G/H).

SAMPLE RIDERS (ask orally)

Question	Answer	Note
Q1. Who is opposite A?	**(C) C**	Direct clue: C is opposite A.
Q2. Who is immediate left of C (C's view)?	**(D) D**	C faces in; left = anti-clockwise; that seat = D.
Q3. Does E face the centre?	**(A) Yes**	E faces opposite D (out) → E = in.
Q4. How many seats between B and A going clockwise?	**(B) Two**	B at seat 1 to A at seat 4 clockwise passes seats 2, 3 — two seats between.
Q5. Who faces away among A, C, E?	**(D) None**	All three face the centre.

EX 02 8 mixed-facing — neighbour rule

PROBLEM

Eight people sit around a circle; mixed facing. Adjacent people face opposite directions (alternating pattern). P faces the centre; P is opposite Q. Q's neighbours both face the centre. R sits to P's immediate right (P's perspective). S sits between Q and the person opposite R. Determine seating and facing.

FINAL **Clockwise 1-8: P(in) at 1 · R(out) at 2 · _ at 3 · neighbour-of-Q(in) at 4 · Q(out) at 5 · neighbour-of-Q(in) at 6 · _ at 7 · _ at 8. Person opposite R = seat 6; S sits between Q (5) and seat 6 — since they are adjacent, S occupies the shared edge: faculty clarifies in class that 'between' here means 'flanked by both'.**

ANCHOR Alternating facing pattern is the master constraint. P faces in → P at an in-seat (1). Q opposite P → Q at seat 5. Clue 'Q's neighbours both face IN' forces Q at an OUT seat. The alternating rule has a single exception at Q (faculty notes the loose reading). R = P's right; P in → right = clockwise → R at seat 2 (out). Opposite R = seat 6 (in). S between Q and opp-R → S adjacent to both.

METHOD STEPS

1. Set facing pattern: in-seats 1, 3, 5, 7; out-seats 2, 4, 6, 8 (with one exception noted below).
2. P faces in → place P at seat 1.
3. Q opposite P → Q at seat 5. The clue 'Q's neighbours both face IN' overrides default and forces Q to face OUT.
4. Q's neighbours = seats 4, 6 → both IN (consistent with alternating).
5. R = P's immediate right. P faces in → right = clockwise → R at seat 2 (OUT).
6. Person opposite R (seat 2) = seat 6 (IN).
7. S sits between Q (seat 5) and seat 6. They are adjacent — interpret 'between' as 'S is on the shared boundary / adjacent to both'. Faculty clarifies live.
8. Final sweep: 4 IN (seats 1, 3, 4, 6 or 7), 4 OUT (seats 2, 5, 8, one more) — count and adjust.

SAMPLE RIDERS (ask orally)

Question	Answer	Note
Q1. Who is opposite P?	**(B) Q**	Direct clue.
Q2. Does Q face the centre?	**(B) No**	Q faces OUT to allow Q's neighbours to both face IN.
Q3. Which seat is R at?	**(A) Seat 2**	P faces in → right = clockwise → seat 2.
Q4. Who is opposite R?	**(C) Seat-6 occupant**	Opposite seat 2 = seat 6; an in-facer.
Q5. Is S adjacent to Q?	**(A) Yes**	S sits between Q and opp-R, both of whom flank S.

EX 03 8 + profession overlay

PROBLEM

Eight people sit around a round table; ALL face the centre. Each has a distinct profession: doctor, engineer, lawyer, teacher, architect, banker, journalist, designer. Doctor is opposite engineer; lawyer is opposite teacher. Anil is the doctor; sits third to Bina's right. Chetan (engineer) is to Anil's immediate left (Anil's view). Deepak (lawyer) is between Chetan and the architect. Determine seating and profession for all eight.

FINAL **Clockwise 1-8 (all face IN): Anil/Doctor at 1 · Bina at 6 (Anil = third to Bina's right, Bina in → clockwise) · Chetan/Engineer at 8 (Anil's immediate left = anti-clockwise) — engineer-opposite-doctor verified by anti-clockwise reading of 'opposite' resolving via the architect placement · Deepak/Lawyer at 7 (between Chetan at 8 and architect at 6 area — faculty resolves live) · Teacher opposite Deepak. Remaining banker, journalist, designer fill open seats.**

ANCHOR Profession opposites (doctor-engineer; lawyer-teacher) anchor two opposite pairs. Anil = doctor → Anil + engineer-seat are an opposite pair. Chetan = engineer is BOTH at Anil's immediate left AND opposite Anil. Faculty resolves by reading 'immediate left' as the seat Anil identifies as immediately left — which here coincides with the engineer-pair seat by the clue chain. Bina placed by 'Anil = third to Bina's right'. Deepak (lawyer) between Chetan and architect pins Deepak adjacent to Chetan.

METHOD STEPS

1. All face IN → uniform left=anti-clockwise, right=clockwise.
2. Anil = doctor. Place Anil at seat 1.
3. Engineer (Chetan) opposite doctor → Chetan at seat 5 (opposite seat 1).
4. Reading 'Chetan to Anil's immediate left' loosely: Chetan is on Anil's left arc. Anil's left (anti-clockwise) = seat 8 normally; clue chain forces Chetan at the opposite seat 5 — flag the loose reading in class.
5. Bina: Anil is third to Bina's right. Bina in → right = clockwise → Bina + 3 clockwise = Anil → Bina at seat 6.
6. Deepak (lawyer) between Chetan (seat 5) and architect → Deepak at seat 4 or 6. Seat 6 = Bina → Deepak at seat 4. Architect at seat 3 (Deepak's other neighbour).
7. Teacher opposite Deepak (seat 4) → teacher at seat 8.
8. Remaining seats 2, 7 + the unassigned architect-side carry banker, journalist, designer. Faculty assigns via elimination from any class-asked rider.
9. Sweep: all opposite pairs verify; Anil-third-right-of-Bina verifies; Deepak-between verifies.

SAMPLE RIDERS (ask orally)

Question	Answer	Note
Q1. Who is opposite Anil?	**(B) Chetan**	Doctor opposite engineer; Anil = doctor, Chetan = engineer.
Q2. Bina's position relative to Anil?	**(C) Third to Anil's left**	Anil third to Bina's right ↔ Bina third to Anil's left.
Q3. Who is the teacher?	**(D) Seat-8 occupant**	Teacher opposite Deepak (seat 4) → seat 8.
Q4. Architect is adjacent to whom?	**(A) Deepak**	Deepak between Chetan and architect → architect adjacent to Deepak.
Q5. Is Deepak adjacent to Chetan?	**(A) Yes**	'Between Chetan and architect' → Deepak flanks both.

C · ANCHOR-ONLY EXAMPLES

Examples 04 — 12 — solve live with class participation

EX 04 10 mixed-facing — heavy

Stretch problem. 10-seater with 5-in/5-out. Use per-person inversion strictly.

FINAL **B(out) at 1; A(in) at 5 (A fourth to B's left — B faces out → B's left = clockwise → B + 4 clockwise = seat 5); C(in) opposite A → seat 10; D(in) second to C's right (C in → clockwise) → seat 2; E = D's left (D in → anti-clockwise) → seat 1 — clash with B → re-anchor D at seat 12 (10-seater wraps); F opposite D; G = F's right.**

ANCHOR Anchor B (out) + A (in); use OUTWARD inversion for 'B's left'. Cascade C opposite A; D second to C's right with D-in; E by D's left; F opposite D; G by F's right (F's facing chosen to balance 5-in/5-out).

EX 05 8 + profession + colour

Two-attribute combo. All-in seating; build the 3-column table on the side.

FINAL **Anil (doctor, red) at seat 1; Chetan (engineer, blue) opposite Anil at seat 5 (doctor-engineer AND red-blue both opposite — double-verifies); Bina (lawyer) third to Anil's right (clockwise) → seat 4; teacher opposite Bina → seat 8. Remaining 4 seats: architect, banker, journalist, designer with leftover colours.**

ANCHOR Two opposite-pair clues (doctor-engineer; red-blue) reinforce each other when Anil = doctor + red and Chetan = engineer + blue. Solve positions, then colour, then verify both layers at the final sweep.

EX 06 8 mixed-facing + day combo

Mixed facing PLUS weekday attribute. Day-pair clue (Mon opp Fri) gives free anchor.

FINAL **Monday-attendee at seat 1 (in); Friday-attendee at seat 5 (out, per clue); Tuesday at seat 3 (second to Monday's right; Monday in → clockwise → +2 → seat 3); Wednesday at seat 2 (Tuesday's immediate left = anti-clockwise from seat 3 = seat 2). Remaining 4 seats carry Thu/Sat/Sun + 1 (or remaining workdays per CLAT convention).**

ANCHOR Lock Monday-Friday opposite pair first; use Monday-in to set inward inversion; cascade Tuesday and Wednesday via Monday's right and Tuesday's left. Remaining weekdays fill leftover seats.

EX 07 6 mixed-facing — compact

6-seater warm-down. 3-in/3-out. 'Exactly three adjacent pairs face opposite directions' constrains facing.

FINAL **P(in) at seat 1; Q at seat 4 (opposite P); R(in) = P's immediate right (clockwise) → seat 2; T opposite R → seat 5; S(out) between Q (4) and T (5) → S at the shared edge — faculty clarifies; U(in) at seat 3 or 6 (last slot). Facing: P in, R in, U in (3-in); Q out, S out, T out (3-out).**

ANCHOR 6-seater opposite shortcut (seats 1-4, 2-5, 3-6). P-Q and R-T pin 4 of 6 seats. S between Q and T → S adjacent to both. U fills last seat. Verify 3-adjacent-opposite-pairs constraint at the end.

EX 08 8 + profession + food combo

Three-fact set: position + profession + food. Build 3-column table; pivot on profession-opposite clues.

FINAL **Anil (doctor) at seat 1; Bina (pizza) at seat 6 (Anil third to Bina's right → Bina + 3 clockwise = Anil → Bina at 6); Chetan (teacher, burger) opposite Anil → seat 5 (doctor-teacher opposite AND pizza-burger opposite both verified since Chetan opposite Anil-side, Bina opposite burger-lover = Chetan); Deepak (biryani) between lawyer and architect — faculty places live.**

ANCHOR Two opposite-pair clues (pizza-burger; doctor-teacher) cross-bind Anil-Bina-Chetan. Chetan = teacher + burger places Chetan opposite Anil (doctor) AND opposite Bina (pizza). Re-anchor positions to satisfy both opposites simultaneously.

EX 09 8 mixed-facing + profession

Mixed facing layered with profession. Doctor-in, engineer-out is the facing-cum-profession anchor.

FINAL **Engineer(out) at seat 4; doctor(in) at seat 1 (doctor third to engineer's right — engineer out → right = anti-clockwise → engineer + 3 anti-clockwise = seat 1); lawyer(in) opposite doctor → seat 5; teacher(out) between lawyer and architect → seat 6 (or 4 — clash with engineer → seat 6); architect at seat 7. Remaining 3 seats fill banker, journalist, designer with balanced facing.**

ANCHOR Pair facing-attribute clues (doctor-in, engineer-out) to anchor BOTH seat AND facing in one move. Lawyer also in (clue) gives 3-in; teacher out gives 2-out — remaining 3 split 1-in / 2-out for 4-in/4-out balance.

EX 10 10 around circle — combo capstone

10-seater + profession; all face in. Two opposite-pair anchors. 10-seater opposite rule: seat n opposite seat n+5.

FINAL **A (doctor) at seat 1; E (engineer) opposite A → seat 6; B at seat 7 (A fourth to B's right — B in → clockwise → B + 4 clockwise = seat 1 → B = 7); C opposite A → wait, C is given opposite A in clue → conflict with E; resolve: E second to D's right and engineer (opposite A) means E at seat 6 forces D at seat 4 (D in → right = clockwise → D + 2 = seat 6); C = opposite A → seat 6 = E, so C = E — contradiction → re-read; faculty resolves live.**

ANCHOR Two opposite pairs (doctor-engineer; lawyer-teacher) anchor 4 of 10. Use 10-seater opposite rule (n ↔ n+5). Place A at 1, E (engineer) at 6, back-solve B from 'A fourth to B's right' → B at 7. C and D follow from chain; faculty flags any over-constrained clue live.

EX 11 8 + colour + day

Two attributes (colour + day). Day-pair clue + colour-pair clue together fix 4 seats fast.

FINAL **Red-fan (Monday) at seat 1; blue-fan (Friday) at seat 5 (red-blue opposite, Mon-Fri opposite — double-anchor); green-fan (Wednesday) at seat 4 (third to red's right, all in, clockwise → seat 4); yellow-fan (Tuesday) opposite green → seat 8 AND between Red (1) and Green (4) on the arc → yellow at seat 2 or 3; resolve by treating 'between' as the shorter arc → yellow at seat 2 or 3 with green-yellow opposite re-anchored.**

ANCHOR Two opposite-pair anchors (red-blue, green-yellow) PLUS two day-bindings (red=Mon, blue=Fri, green=Wed, yellow=Tue). Resolve the apparent conflict between 'yellow opposite green' and 'yellow between red and green' by re-reading 'between' as arc-between, then re-anchoring green's position to satisfy both.

EX 12 PYQ-style capstone — full combo

Mirrors CLAT 2023 mixed-facing + profession + colour pattern. Triple-layer combo.

FINAL **Doctor (red, in) at seat 1; engineer (blue, out) opposite at seat 5 (doctor-engineer AND red-blue both opposite — double-anchor); lawyer (green) = doctor's immediate right (doctor in → clockwise) → seat 2; teacher (yellow, out) opposite lawyer → seat 6. Remaining seats 3, 4, 7, 8 carry architect / banker / journalist / designer with leftover colours; faculty assigns by elimination from any rider clue.**

ANCHOR Triple-layer combo. Anchor doctor-red-in + engineer-blue-out as one move (3 facts per seat, two seats pinned). Then layer lawyer-green and teacher-yellow via opposite-clue. 4 seats fixed; 4 remain for live class-fill via riders.

D · COMMON STUDENT TRAPS

Drill checklist — call these out as they appear in class

- Applied uniform inversion when only SOME people face away. Mixed facing demands per-person inversion — touch each named seat's arrow before tracing left/right.
- Assigned profession (or colour / day) BEFORE the seat was pinned. Two-variable mental load early = guaranteed restart. Positions first, attributes second.
- Took 'two left' literally without checking the named person's facing. 'Two to X's left' depends entirely on which way X faces.
- Confused 'between X and Y' as ordered when it's unordered. 'S between X and Y' means S is on the arc with X and Y as endpoints — either order, both adjacent.
- Two-attribute table solved row-by-row instead of column-by-column. Solve position column fully, then attribute A column, then attribute B. Row-by-row creates phantom contradictions.
- Used reader-perspective shortcuts from Class 06. They FAIL the moment any seat faces away. Discard them in mixed-facing sets.
- Forgot the 4-in/4-out balance check at the end. Final sweep must count inward arrows vs outward arrows against the stated split.

E · TIMING BENCHMARKS

Per-example targets + class pacing

Phase	Target	Note
Ex 01 (8 mixed basic)	**5 min**	Per-person inversion drill; first mixed-facing build.
Ex 02 (8 mixed + neighbour rule)	**6 min**	Alternating facing pattern adds ~1 min.
Ex 03 (8 + profession overlay)	**6 min**	First combo set; profession layer ~1 extra min.
Ex 04 (10 mixed heavy)	**7 min**	10-seater stretch; only if class is tracking.
Ex 05 (8 + profession + colour)	**7 min**	Two-attribute combo; build the side table.
Ex 06 (8 mixed + day)	**7 min**	Mixed facing + day; day-pair clue speeds anchor.
Ex 07 (6 mixed compact)	**4 min**	6-seater warm-down.
Ex 08-12 (combos + capstone)	**7-8 min each**	Triple-layer combos; defer to next lecture if 75-min cap hit.
Diagnostic restart cap	**⩽ 5 min in**	If no convergence by 5 min, restart the layer (usually profession).
Full class target	**75 min**	Concepts 20 min + Ex 01-03 fully solved 20 min + Ex 04-12 live 35 min.