

Linear Programming

CBSE Class 12 Maths · Knowledge organiser

KEY DEFINITIONS

Objective function

The linear function $Z = ax + by$ to be maximised or minimised.

Constraints

The linear inequalities the variables must satisfy.

Feasible region

The region where all the constraints hold; the optimum is at a corner point.

KEY FORMULAS

Maximise/minimise $Z = ax + by$ subject to linear constraints, $x, y \geq 0$

Corner point method: the optimum occurs at a corner of the feasible region. Bounded region: both max and min exist

Unbounded: M is the max only if $ax + by > M$ has no point in the feasible region (use $< m$ for the min)

YOU SHOULD BE ABLE TO...

- Use LP vocabulary, test points against constraints, formulate a simple LPP and read optimal values from given corner points.
- Draw feasible regions, find corner points algebraically and solve bounded and unbounded problems, including the half-plane check.
- Write full-mark 5-mark LPP answers from a word problem: formulation, labelled graph, corner-point table and conclusion.
- Handle parameters in the objective function, multiple optimal solutions and existence questions for unbounded regions.

WORKED EXAMPLE

Maximise $Z = 2x + 5y$ with $x + y \leq 5$, $y \leq 3$, $x, y \geq 0$:
corners $(0, 0)$, $(5, 0)$, $(2, 3)$, $(0, 3)$, $Z = 0, 10, 19, 15$;
maximum 19 at $(2, 3)$.

COMMON MISTAKES

- ✗ Missing a corner (e.g. where a constraint meets an axis) or including an intersection point that violates another constraint.
- ✗ Declaring a maximum/minimum on an unbounded region without the half-plane check.
- ✗ Shading the wrong side of a line — always test a point.
- ✗ Forgetting the non-negativity constraints, or units and the final interpretation in word problems.