



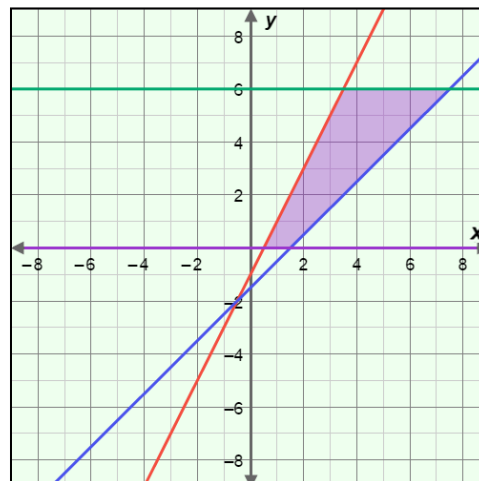
Vocabulary: Linear Programming



Vocabulary

- **Constraints** – a system of linear inequalities whose graph forms the feasible region for an objective function.
 - The constraints of the feasible region in the graph to the right are:

$$\begin{aligned} 2x - y &\geq 1 \\ x - y &\leq 1.5 \\ y &\leq 6 \\ y &\geq 0 \end{aligned}$$



- **Feasible region** – the set of coordinates that satisfy all constraints to an objective function.
 - The purple shaded area in the graph to the right is a feasible region.
 - The feasible region shown in the graph has finite area so it is said to be *bounded*.
 - A feasible region with infinite area is said to be *unbounded*.
- **Linear programming** – the process of finding the maximum or minimum of a linear objective function for a region defined by linear inequalities.
- **Objective function** – the function to be optimized in linear programming.
- **Optimize** – to find the maximum or minimum value of a function.
 - The maximum or minimum of a linear objective function will always occur at a vertex of the feasible region.
 - Suppose the objective function $f(x, y) = x + y + 1$ has the constraints graphed above. To optimize the function, evaluate it for the coordinates of each vertex of the feasible region (see table to the right).

x	y	$f(x, y)$
3.5	6	10.5
0.5	0	1.5
7.5	6	14.5
1.5	0	2.5

The maximum value is 14.5, at (7.5, 6), and the minimum value is 1.5, at (0.5, 0).

