On the interval (a, b), suppose that $y_p(x)$ is a particular solution of

$$y''(x) + p(x)y'(x) + q(x)y(x) = g(x)$$

and that $y_1(x)$ and $y_2(x)$ are linearly independent solutions of the corresponding homogeneous equation. Then every solution of

$$y''(x) + p(x)y'(x) + q(x)y(x) = g(x)$$

has the form

$$y(x) = y_p(x) + c_1y_1(x) + c_2y_2(x).$$

On the interval (a, b), suppose that $y_{p_1}(x)$ is a solution of

$$y''(x) + p(x)y'(x) + q(x)y(x) = g_1(x)$$

and $y_{p_2}(x)$ is a solution of

$$y''(x) + p(x)y'(x) + q(x)y(x) = g_2(x).$$

Then $y(x) = Ky_{p_1}(x) + My_{p_2}(x)$ is a solution of

$$y''(x)+p(x)y'(x)+q(x)y(x) = Kg_1(x)+Mg_2(x).$$

This is called the *superposition principle*.