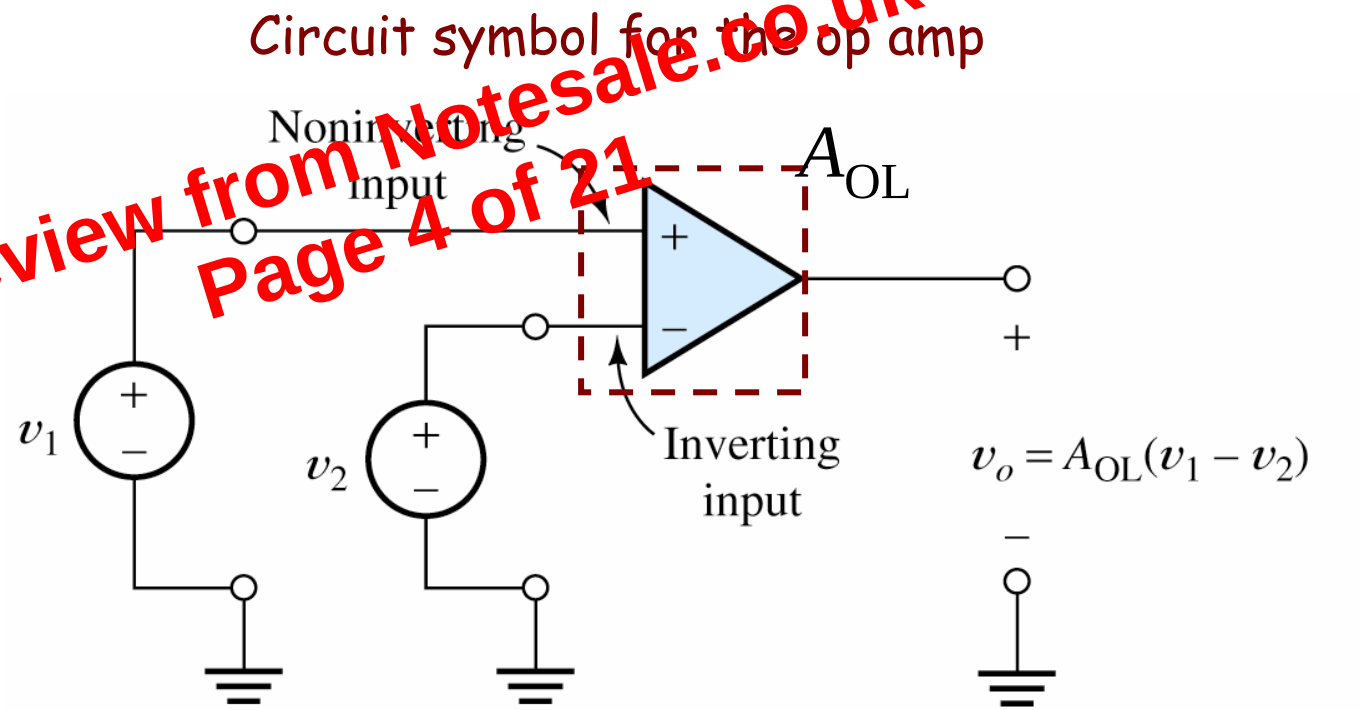
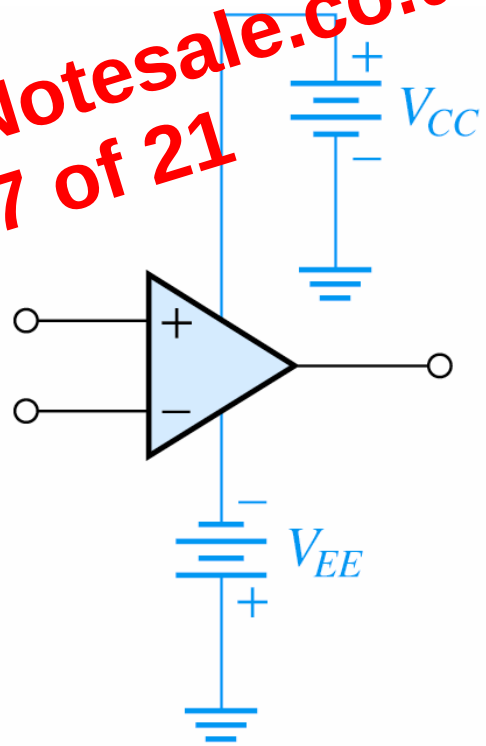
Ideal Operational Amplifiers



A_{OL} is the gain of the op amp without a feedback network
(OL → open-loop gain)

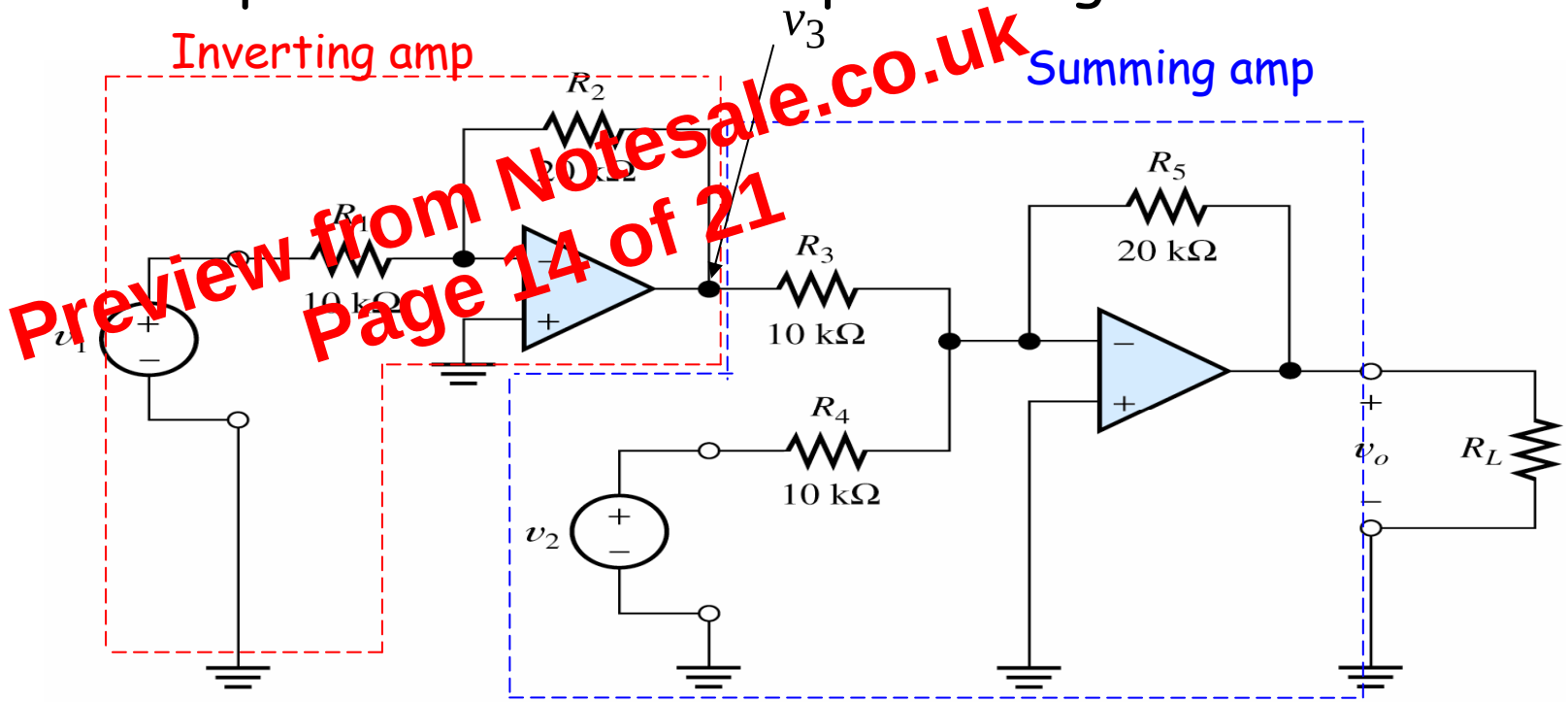
Power-Supply Connections



Op-amp symbol showing the dc power supplies, V_{CC} and V_{EE}.

Example

Find the expression for the output voltage



$$v_3 = -\frac{R_2}{R_1} v_1 = -\frac{20k}{10k} v_1 = -2v_1$$

$$v_o = -\frac{R_5}{R_3} v_3 - \frac{R_5}{R_4} v_2$$

$$= -2v_3 - 2v_2 = 4v_1 - 2v_2$$