- The open loop frequency response of a 741 op-amp has a corner at $10Hz$ and $100dB$.

- The open loop gain decreases by $20dB$ for every factor of ten increase in frequency above $10Hz$.

- The frequency response of a real amplifier is determined by the lower of:−

  − The theoretical response set by the feedback components

  − The response of the op-amp.

Op-amps do not amplify signals at all frequencies with equal efficiency.

Spurious positive feedback from the output to the noninverting input can cause the amplifier to oscillate violently

The capacitor in the 741 diagram in Figure 35.5 reduces the high frequency gain of the op-amp.

100dB

Open loop
Voltage gain

741 Opamp

Slope = 20 dB / decade
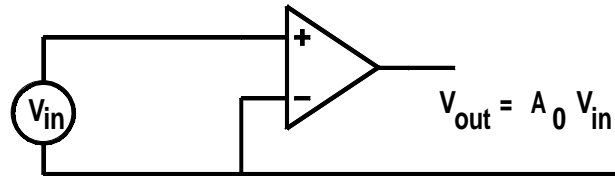
0dB

1   10^3 10^6 Frequency
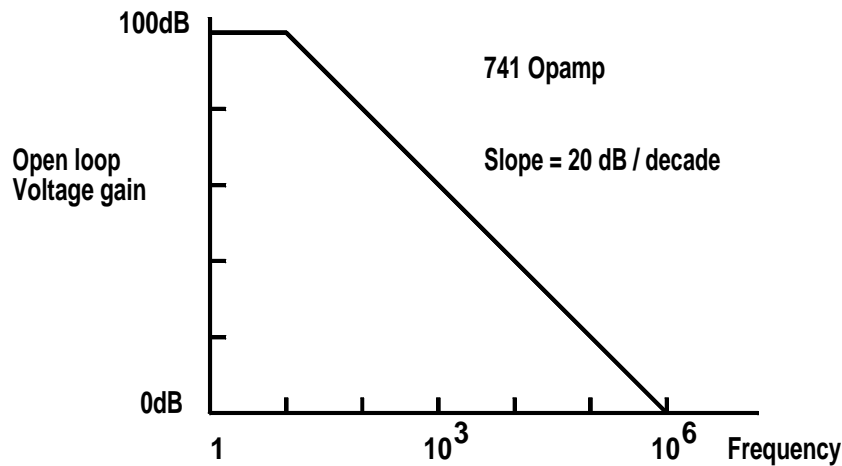
Open loop gain as a function of frequency for the 741.

Open loop gain is constant at $100dB$ from DC up to $10Hz$.

From $10Hz$ upwards in frequency, the gain decreases by $20dB$ for every factor of 10 increase in frequency,
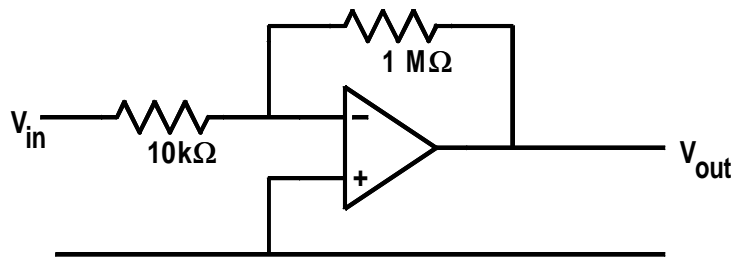
Gain is $0dB$ at a frequency of 10^6Hz.

The key feature is the corner at $10Hz$ and $100dB$.
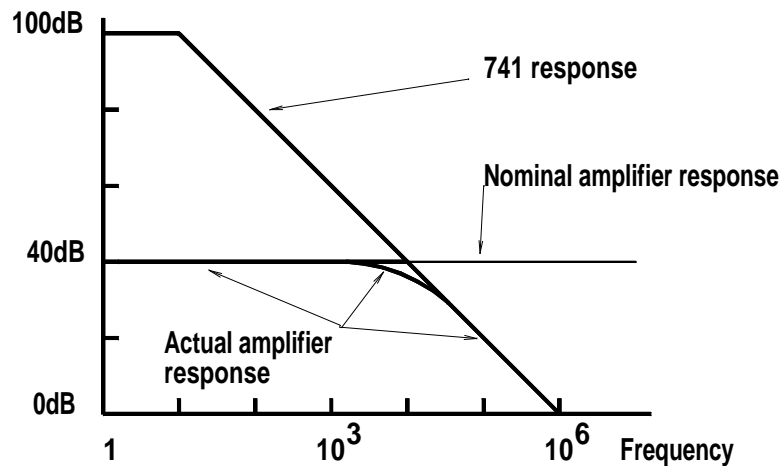
Circuit used to measure open loop gain.

Signal is applied directly between the two inputs to the op-amp without any negative feedback being used, hence the term open loop.

Inverting amplifier which has a gain of

$$A = 20 \log \left(\frac{1M\Omega}{10k\Omega} \right) = 40dB$$

In theory the gain is $40dB$ at all frequencies.

Concatenation of 741 response with amplifier response.

Draw a line corresponding to a nominal $40dB$ amplifier gain on the op-amp response curve.

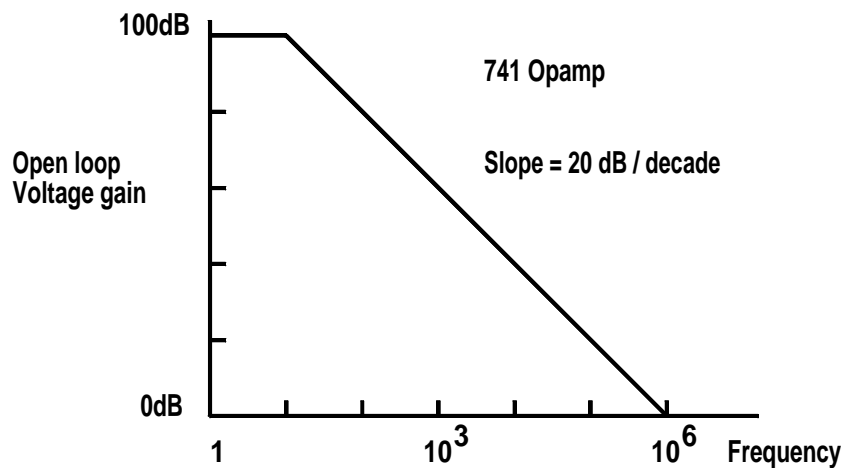Below $10^4 Hz$ there is gain to spare for negative feedback.

Above $10^4 Hz$ the amplifier response is limited by the op-amp response

Plot the gain as determined by the feedback components onto the op-amp response.
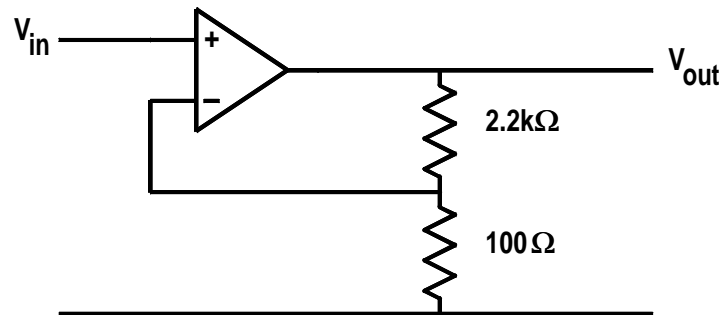Use the envelope of the lower of the two curves.

High gain gives low bandwidth.
low gain gives high bandwidth.

The op-amp frequency response affects the performance of the active filters.

Use a moderate gain so that the frequency response is determined by the filter design and not by the op-amp response.

V_{in} —— [+]

V_{out}

2.2kΩ

100Ω

Calculate the gain of the amplifier.

Sketch the frequency response for the amplifier.

Determine the bandwidth of the amplifier.