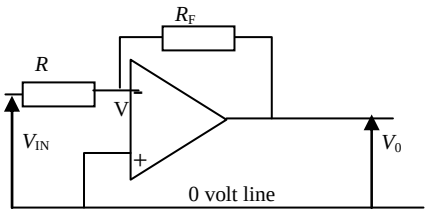
Extension Worksheet – Option F, Worksheet 4, HL only

1 The diagram shows an inverting op-amp.



The op-amp operates with a power supply of $\pm 6.0\,\text{V}$ and $R_F = 80\,\text{k}\Omega$ and $R = 16\,\text{k}\Omega$.

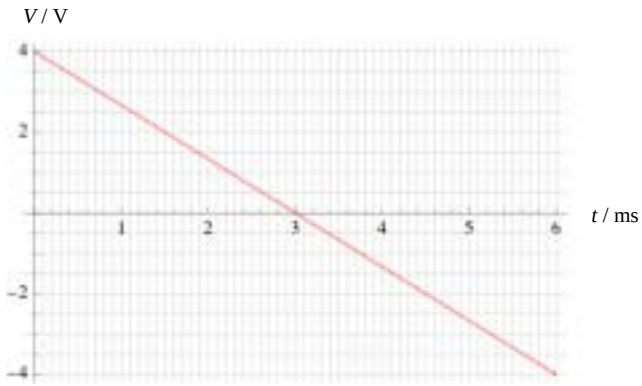
a Determine the closed loop gain of the op-amp. [1]

b Calculate the output voltage when $V_{IN} = -0.60\,\text{V}$. [2]

c Calculate the input voltage for which positive saturation is achieved and hence state the output when $V_{IN} = -2.0\,\text{V}$. [2]

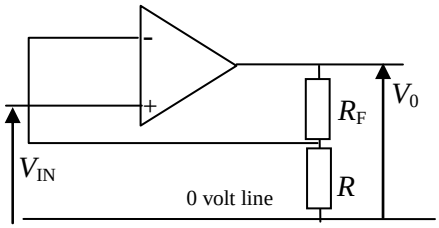
d Determine the current in the R_F resistor when $V_{IN} = +1.2\,\text{V}$. [2]

e The graph below shows how the input signal varies with time. Sketch a graph to show how the output voltage varies with time.



[3]

2 The diagram shows a non-inverting op-amp.



The op-amp operates with a power supply of $\pm 6.0\,\text{V}$ and $R_F = 120\,\text{k}\Omega$ and $R = 20\,\text{k}\Omega$.

a Determine the closed loop gain of the op-amp. [1]

b Calculate the output voltage when $V_{IN} = -0.50\,\text{V}$. [2]

c Calculate the input voltage for which positive saturation is achieved and hence state the output when $V_{in} = +3.0\,\text{V}$. [2]

3 Outline the use of the Schmitt trigger in digital signal transmissions. [3]