8 The variation with temperature of the resistance of a thermistor is shown in Fig. 8.1.

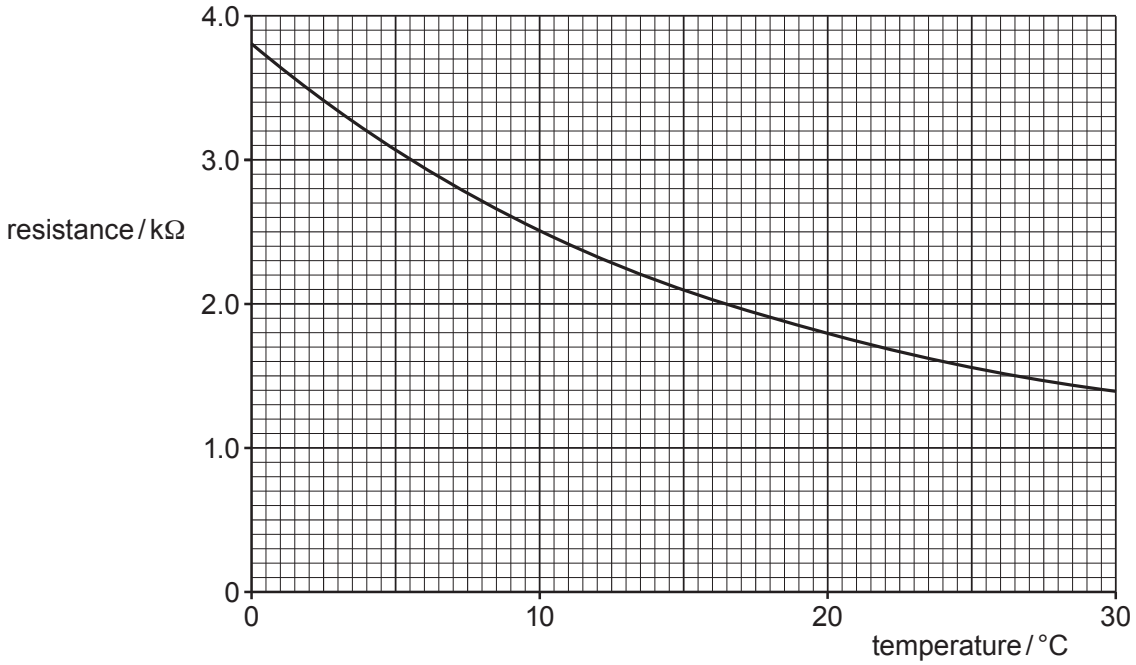

Fig. 8.1

A student includes the thermistor and an ideal operational amplifier (op-amp) in the circuit of Fig. 8.2.

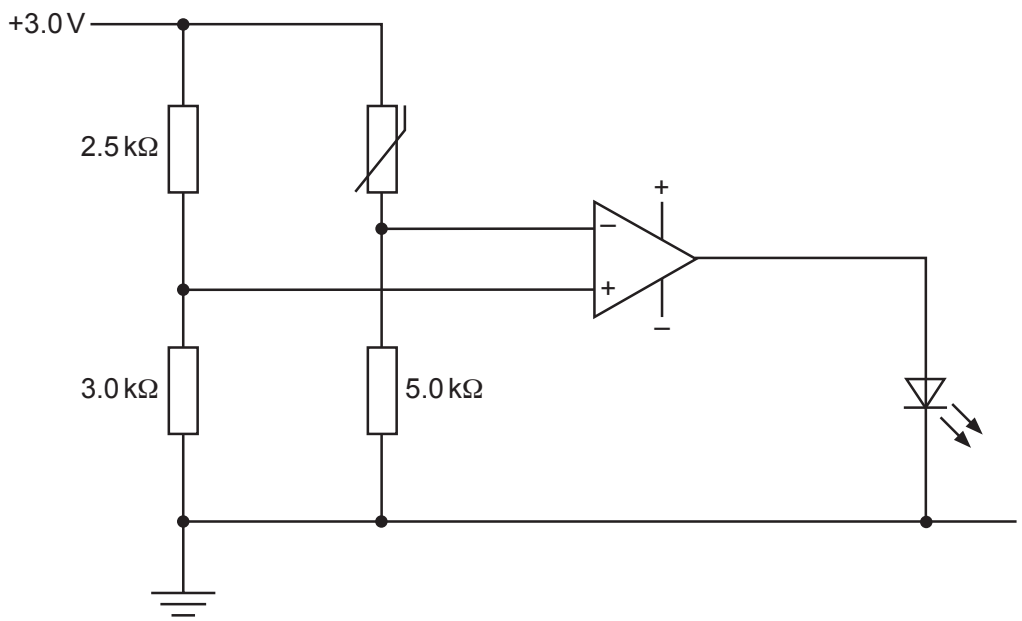

Fig. 8.2

(a) Calculate the potential V^+ at the non-inverting input of the op-amp.

V^+ = ... V [2]

(b) At 10 °C, the resistance of the thermistor is 2.5 kΩ.

State and explain whether the light-emitting diode (LED) is emitting light.

.....

.....

..... [2]

(c) Explain why the student's circuit will not indicate any change in temperature above 0 °C.

.....

.....

..... [2]

(d) The resistor of resistance 5.0 kΩ is changed to a resistor of resistance R so that the LED switches on or off at a temperature of 20 °C.

Determine R in kΩ.

R = ... kΩ [3]

[Total: 9]