E4.4 Set the switching point

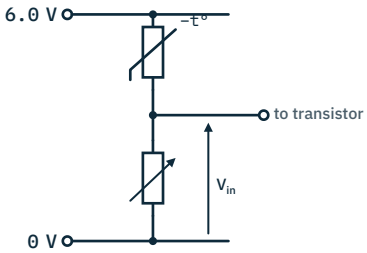
TASK

Use a variable resistor to set the temperature at which a fan circuit switches.

YOU NEED

- ☐ CircuitClass · circuits mode
- ☐ A thermistor with a temperature control, or a resistor set to the table values
- ☐ About 15 minutes

1 · Build



Build this divider

1. 6 V battery: long plate (+) to the top rail.
2. Thermistor at the top.
3. Variable resistor at the bottom, set to 1.0 kΩ.
4. Voltmeter across the variable resistor: this is V_{in}.

2 · Predict, then measure

Predict V_{in} at each temperature with R_{var} = 1.0 kΩ. Would a transistor switching at 0.7 V be on?

Temperature (R_{th})	Predicted V_{in} (V)	Measured V_{in} (V)	On? (≥ 0.7 V)
20 °C (12.5 kΩ)			
30 °C (8.0 kΩ)			
40 °C (5.3 kΩ)			

3 · Adjust

Now change R_{var} so V_{in} = 0.7 V at 20 °C. Record your setting.

R_{var} = _____ kΩ

EXTENSION · NEEDS CIRCUITCLASS VOLTAGE DIVIDER MODE

Plot V_{in} against temperature for R_{var} = 1 kΩ and 2.2 kΩ on one graph. Where does each line cross 0.7 V?