

Core practical 12: Calibrate a thermistor in a potential divider circuit as a thermostat**Objectives**

- To research temperature scales
- To determine the temperature variation of a thermistor
- To design a potential divider circuit that can be used to control temperature

Safety

- Although you are not assessed against CPAC 3 here, you should carry out this work with due attention to safety. You should produce an appropriate risk assessment.
- Thermistor should not exceed its voltage rating.

All the maths you need

- Recognise and make use of appropriate units in calculations.
- Use ratios, fractions and percentages.
- Use calculators to find and use power, exponential and logarithmic functions.
- Use an appropriate number of significant figures.
- Identify uncertainties in measurements and use simple techniques to determine uncertainty when data are combined by addition, subtraction, multiplication, division and raising to powers.
- Substitute numerical values into algebraic equations using appropriate units for physical quantities.
- Use logarithms in relation to quantities that range over several orders of magnitude.
- Translate information between graphical, numerical and algebraic forms.
- Plot two variables from experimental or other data.
- Understand that $y = mx + c$ represents a linear relationship.
- Determine the slope and intercept of a linear graph.
- Interpret logarithmic plots.
- Use logarithmic plots to test exponential and power law variations.

Equipment

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|---------------------------|--|
| • thermistor | • Bunsen burner, tripod, gauze and heatproof mat |
| • ohmmeter | • ice |
| • alcohol thermometer | • variable resistor |
| • beaker containing water | |
| • power supply unit (PSU) | |

Procedure**Research**

1. Find out how fixed points are used in the construction of a temperature scale.
2. Find out how the resistance of a negative temperature coefficient (NTC) thermistor varies with temperature and compare this to other thermometric properties.
3. Explain why temperature scales depend on the type of thermometer being used.
4. Devise a plan to measure the resistance of a thermistor over the range 0–100 °C. Your plan should include a risk assessment and you should consider how you will make your results as accurate as possible.