

14 Temperature scales – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
thermometer	_____	_____	_____
resistance	_____	_____	_____
thermodynamic temperature	_____	_____	_____
kelvin	_____	_____	_____
absolute zero	_____	_____	_____

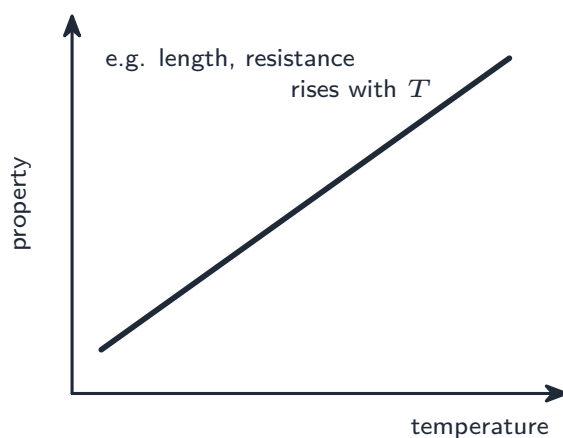
Recall

A **thermometer** measures temperature using a property that changes with it. Physicists use an absolute scale that starts at the coldest temperature possible.

New ideas

Read these first. Each idea has a short worked example. Then do the Practice.

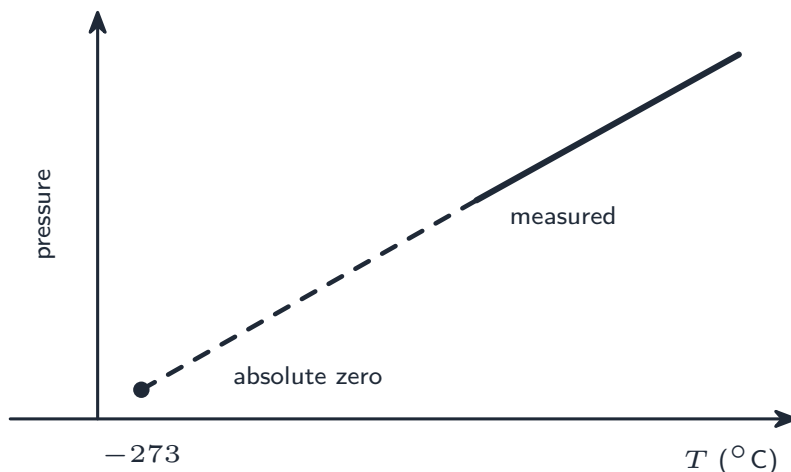
■ 1 How a thermometer works



Any property that changes in a repeatable way with temperature can make a thermometer – the length of a liquid column, the **resistance** of a metal, the e.m.f. of a thermocouple.

Worked example. In a liquid-in-glass thermometer the column gets longer as it warms. We mark two fixed points (say melting ice = 0 and steam = 100) and divide the gap evenly, so any column length now reads as a temperature.

■ 2 Absolute zero



The **thermodynamic temperature** scale uses the **kelvin** (K). Its zero is **absolute zero** ($0\text{ K} \approx -273\text{ }^{\circ}\text{C}$) – the lowest possible temperature. To convert: $T(\text{K}) = \theta(^{\circ}\text{C}) + 273$.

Worked example. Room temperature $27\text{ }^{\circ}\text{C}$ is $T = 27 + 273 = 300\text{ K}$. Going the other way, 250 K is $\theta = 250 - 273 = -23\text{ }^{\circ}\text{C}$.

Watch out: to convert to kelvin you *add* 273 – you do not multiply. And a temperature *difference* is the same number in K and °C (a rise of 10 °C is a rise of 10 K).

Practice

Try these in order.

14.1 What kind of property can make a *thermometer*? [1]

14.2 Give one example of such a property. [1]

14.3 What is the unit of *thermodynamic temperature*? [1]

14.4 Convert 27 °C to kelvin. [1]

14.5 Convert 350 K to degrees Celsius. [1]

14.6 What is *absolute zero* in degrees Celsius (roughly)? [1]

14.7 A gas is warmed and its temperature rises by 20 °C. By how many kelvin does it rise? Explain. [2]

14.8 Challenge. Explain why the kelvin scale is more convenient than the Celsius scale for the gas laws (think about what value each scale gives at the coldest possible temperature). [2]
