Checking a Temperature Probe on Reversal

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A lab uses two temperature probes to monitor a stirred water bath. The fast reference probe gives the bath's temperature at each reading. A slower probe has a thick protective cover. Heat must pass through the cover before the sensor can respond. A probe passes the lab's operating rule only if each reported temperature differs from the reference by at most 1.0 °C.

Bath condition	**Reference probe (°C)**	**Covered probe (°C)**
Warming	30.0	27.0
Held at 30.0 °C	30.0	30.0
Cooling	30.0	33.0

1 Which condition gives a passing covered-probe reading under the rule?

(1) Warming only

(2) Held at 30.0 °C only

(3) Cooling only

(4) All three conditions

2 Calculate the signed error of the covered probe during warming and during cooling. Define error as covered minus reference. [1]

Answer and work

3 A technician proposes adding 3.0 °C to every covered-probe reading. Use the record to decide whether that correction would meet the rule during both changing conditions. [1]

Answer and work

The lab can install a thinner cover made of the same material. The lab wants to check whether it improves the probe's response while the bath temperature is changing.

4 Describe how to compare the thin and thick covers under the same warming and cooling conditions. State how the lab would decide whether the thin cover meets the rule. [1]

Answer and work