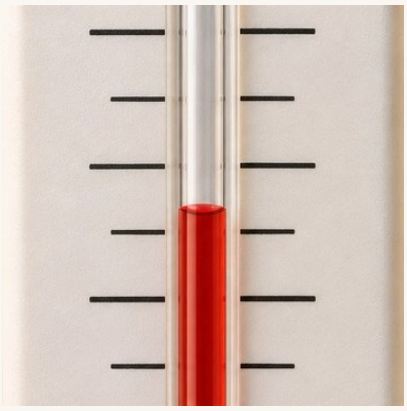
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Temperature







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Temperature

Two hands tell different stories



THE IDEA

Your hands remember what they touched. After cool water, a lukewarm bowl can feel warm. After warm water, that same bowl can feel cool.

Heat can flow into one hand and out of the other. Let a thermometer settle in the bowl to get a reading everyone can compare.

CHECK YOUR THINKING

What settles a disagreement about the bowl?

A. A vote on which hand felt warmer.

B. A thermometer reading with its unit.

B. A thermometer reading with its unit.

WORK THROUGH A CASE

Two hands give opposite reports about the same lukewarm bowl. Why is repeating the vote a poor test?

The hands began at different temperatures. Heat can flow into the cooler hand and out of the warmer hand. A thermometer allowed to settle in the bowl provides one comparable measurement.

Temperature

Read the liquid while it is still in the sample



THE IDEA

Which part of the thermometer senses the water? The bulb in the picture sits under the water, clear of the base and sides. This helps it sense the water's temperature.

A steady liquid column is read at eye level. The mark beside its top gives the temperature. What could happen if the bulb were lifted first? In the air, the reading could start to change.

CHECK YOUR THINKING

From 20 °C to 30 °C there are five equal spaces. What is one space?

A 2 °C.

B 5 °C.

A. 2 °C.

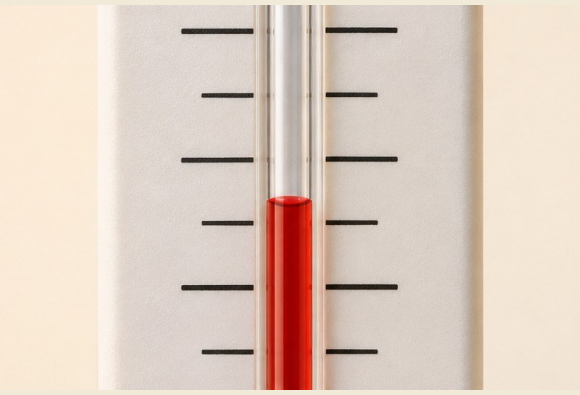
WORK THROUGH A CASE

In the image, trace the space around the red bulb. Why does it matter what the bulb touches?

The bulb exchanges heat with its surroundings. Touching a hot vessel base can pull its reading towards the base temperature. Keep it immersed clear of the glass, wait for a steady level and read at eye level.

Temperature

A reading with enough detail



THE IDEA

How much can you read between two marks? Imagine the neighbouring marks are 24 °C and 26 °C. If the column ends halfway between them, about 25 °C is a sensible estimate.

The scale cannot justify 25.000 °C. Include the unit: °C for Celsius, °F for Fahrenheit and K for kelvin. An infrared thermometer senses radiation from a distance. Old glass thermometers can contain toxic mercury.

CHECK YOUR THINKING

Which record matches the detail you can see?

A About 25 °C.

B Exactly 25.000 °C.

A. About 25 °C.

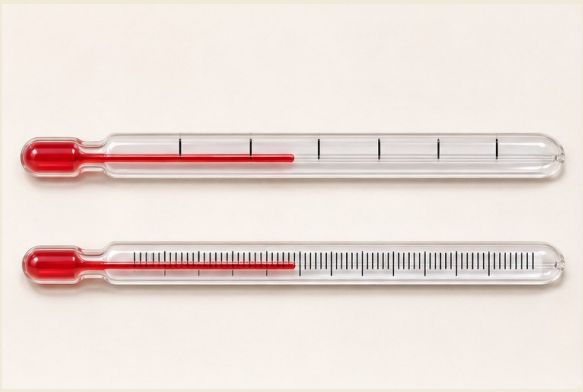
WORK THROUGH A CASE

The liquid ends halfway between 20 °C and 30 °C on a scale divided into five equal gaps. What can you justify?

Each gap represents 2 °C. Halfway is approximately 25 °C, between the 24 and 26 °C marks. The estimated position cannot justify writing several extra decimal places.

Temperature

How small a change can you read?



THE IDEA

Count spaces, not marks. Suppose 20°C and 30°C have five equal spaces between them.

The gap is 10°C. Each space is 10 ÷ 5 = 2°C. Three spaces above 20°C means 26°C.

CHECK YOUR THINKING

What does each space represent in the worked example?

A 2°C

B 5°C

A. The interval is 10°C across five equal spaces: 10 ÷ 5 = 2°C.

A RELATED EXAMPLE

Read a weather diary

Which day had the widest temperature range? Here are readings from the same shaded spot. Monday: 19 to 31 °C. Tuesday: 22 to 32 °C. Tuesday has the higher maximum. Which day has the larger range? Monday spans 12 °C and Tuesday spans 10 °C.

Temperature

The thermometer touches the wall



THE IDEA

Which temperature did the bulb sense? One bulb sits in the middle of the water. The other touches the still-warm glass wall. Both readers look straight across at their scales.

Why might they get different readings? The bulb touching the wall also senses heat from the glass.

CHECK YOUR THINKING

What should change to measure the water more reliably?

A Keep the bulb immersed and clear of the vessel.

B Press the bulb more firmly onto the wall.

A. Contact with the warm glass can affect the reading.

LOOK AGAIN

Which bulb is sensing water away from the wall?

Place the thermometer's sensing part in the liquid, away from the container. Contact with a warmer or cooler wall can shift the reading.

ONE LAST CHALLENGE

What would you check before choosing an instrument?

You want to measure the temperature of hot water. Two thermometers are designed for taking body temperature.



THE REVEAL

Its range and whether it is designed for immersion.

Use a suitable laboratory thermometer or probe. A clinical or forehead thermometer may be unsuitable.

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