

Read before comparing

Target: Read temperature and change accurately before explaining a result. Prerequisites: read a small table, subtract whole numbers and recognize °C. Warming means final temperature is higher; cooling means it is lower. Check the same row and time interval.

Data P · Two 100 g water samples in a 22°C room; matching cups, lids and reading method. W and Z are sample names.

Water readings at start and 10 minutes

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Sample	Start (°C)	After 10 min (°C)
W	11	15
Z	11	13

K1-P1. What quantity and unit are recorded? What interval is compared?

K1-P2. How much did each sample change? Did it warm or cool?

Trace start → final. For cooling, find how far the temperature fell. You may use a number line or answer aloud.

Model · Read the whole record

Question: Which sample warmed less during these 15 minutes? Read one complete column before comparing samples.

Data M · X and Y each contain 100 g water starting at 10°C in a 22°C room. Cups, lids, measurement method and exposure match. This is one illustrative trial of two complete setups.

Water temperatures over time

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Time (min)	Sample X (°C)	Sample Y (°C)
0	10	10
5	13	11
10	15	12
15	17	13

K1-M1. Name the measured quantity and units. Give two observations without a cause.

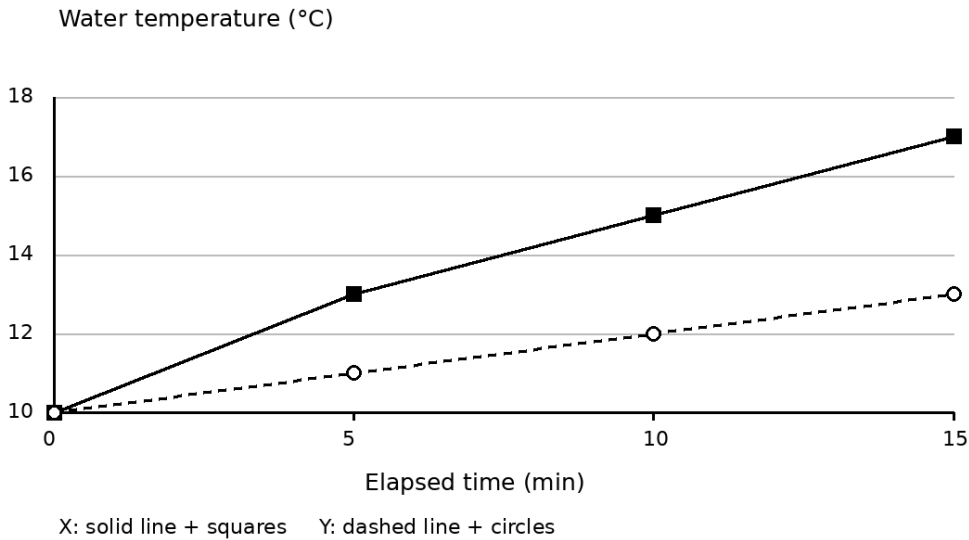
K1-M2. Calculate each 0-to-15-minute change. Which sample warmed less?

K1-M3. Is “Y became cooler” accurate? What can this record tell us, and what cannot it explain?

A final value is a reading. A change compares the start and finish for that sample. The next page shows the same record as a graph.

The same record as a graph

Data M again · Same 100 g samples, 10°C start, 22°C room, matching cups/lids, method and 15-minute exposure. This graph repeats the model record; it is not a second trial.



Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Equal-interval time axis 0, 5, 10, 15 min; temperature axis 10–18°C. Solid line with square points: X = 10, 13, 15, 17°C. Dashed line with circle points: Y = 10, 11, 12, 13°C. The text table on the previous page is equivalent.

K1-V1. Read X at 10 minutes and Y at 15 minutes. Identify each axis and its unit.

K1-V2. Does the graph provide new measurements? Explain how its time spacing matches the table.

You may use the model table instead of the graph. Drawing a graph is not required to show the science.

Guided practice · Cooling

Data G · K and L each contain 100 g water starting at 32°C in a 22°C room. Cups, lids, 15-minute exposure and reading method match; two complete setups, one trial. This is a paper task.

Warm water readings over time

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Time (min)	Sample K (°C)	Sample L (°C)
0	32	32
5	29	30
10	27	29
15	25	28

K1-G1. Compare start and finish for K and L. State direction and size of each change.

K1-G2. Which setup shows less cooling? Why would choosing the lowest final value miss this goal?

K1-G3. Which statement is an observation: “K is 25°C at 15 minutes” or “K loses energy only by conduction”? Explain.

Independent task · New readings

Use the table without repeating the model answer. You may explain aloud, use a labeled diagram or write.

Data I · All samples have 100 g water in a 25°C room, matching cups/lids and measurement method. Each is read after 20 minutes. S has a different starting temperature. This is one trial.

Initial and final water readings

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Sample	Start (°C)	After 20 min (°C)
Q	14	18
R	14	21
S	20	22

K1-I1. Name quantity, units and interval. Find each change and say whether it warmed or cooled.

K1-I2. Which is cooler at the end, Q or S? Which changed less? Explain why these are different questions.

K1-I3. What comparison of Q and R is supported? Can the lower change of S identify a better thermal protector? Give a limit.

Reteach · Keep readings in one row

Data A · Equal 100 g water samples in a 24°C room; matching cups, lids and method. Same 10-minute interval.

Start and finish

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Sample	Start (°C)	After 10 min (°C)
E	12	16
F	12	19

K1-A1. Trace E from start to finish, then F. Calculate each increase. Check a fictional answer: “E changed by 7°C because $19 - 12 = 7$.”

Fresh check

Data Ac · Fresh equal 100 g samples in a 22°C room; matching cups, lids, method and 10-minute interval. Paper cooling task.

New cooling readings

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Sample	Start (°C)	After 10 min (°C)
J	28	25
K	28	26

K1-A2. Find both changes, name the direction and explain which row you used.

Reteach · A value is not a change

Data B · Two 100 g samples in a 24°C room, matching cups/lids, method and 15-minute exposure. Their starts differ.

Different starting temperatures

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Sample	Start (°C)	After 15 min (°C)
U	14	19
V	18	21

K1-B1. Which has the warmer final value? Which warmed more? Explain why the larger final value need not mean a larger increase.

K1-B2. Does this comparison isolate a protector effect? Explain using the starting conditions.

Fresh check

Data Bc · Fresh equal 100 g samples starting together in a 22°C room; cups, lids, method and 15-minute interval match. Paper task.

New cooling readings

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Sample	Start (°C)	After 15 min (°C)
C	32	29
D	32	27

K1-B3. Find each fall. Which better limits cooling in this record? Use change as well as the endpoint.

Later check · A changed direction

Data T · Fresh equal 100 g samples in a 22°C room; matching cups/lids, method and 15-minute exposure. This is one paper cooling comparison.

New warm-water readings

Constructed teaching data: these values were invented for this activity, not collected in an experiment.

Sample	Start (°C)	After 15 min (°C)
M	32	28
N	32	30

K1-T1. Read the labels and calculate both changes with direction.

K1-T2. Which setup better limits cooling here? Give a matched comparison and one limit.

K1-T3. A fictional response says, “A sample at 20°C has twice the total energy of one at 10°C.” Does a Celsius reading support this? Explain.