ANSWER KEY

DO NOT HAND OUT

A PREDICTIONS THAT EARN FULL MARKS

Fastest temperature	Accept any prediction supported by reasoning. Compare it with the actual repeat trials; warm water often gives faster visible spreading, but currents can change results.

B VARIABLES

Independent	Measured water temperature: cold, room-temperature and comfortably warm.
Dependent	Seconds from the end of a matched pour until the first color front reaches the center, for two trials per temperature.
Controlled	Twelve-candy count and ring, level plate, 100 mL volume, same five-second gentle pour and clean dry plate for each trial.

C SAMPLE DATA

Illustrative times, not measured results or targets. They show an order-of-magnitude pattern of minutes in cooler water and under a minute in warm water for fronts traveling across a plate; all six times fit the 25–30 minute class period. Pouring, plate diameter, candy spacing and water movement can shift the result substantially.

WATER TEMPERATURE (°C)	TRIAL 1 (S)	TRIAL 2 (S)	FIRST FRONT REACHED CENTER?
Cold · 10°C	150	**180**	**Yes**
Room · 22°C	90	**110**	**Yes**
Warm · 38°C	45	**55**	**Yes**

Confirm the table contains two seconds readings and a center status for each temperature. A different order is acceptable if it matches observations and students discuss currents, ring placement and plate level.

D MODEL CLAIM, EVIDENCE, REASONING

Claim: In these illustrative trials, color reached the center sooner in warmer water.
Evidence: Cold trials took 150 and 180 seconds, room-temperature trials took 90 and 110 seconds, and warm trials took 45 and 55 seconds; each reached the center.
Reasoning: Warm water often speeds candy-coating dissolution and molecular spreading, consistent with indirect evidence related to particle motion. The setup also permits currents, and dissolved candy dye is not a pure substance changing state.

E THINK FURTHER

Record the plate angle and pour method, then repeat with a gentle center pour to see whether the temperature pattern remains when obvious currents are reduced.

F QUICK GRADING GUIDE

Grade from students' own time records and repeat comparison, not the illustrative values. Require correct units and recognition that water currents and dissolving limit claims about diffusion or MS-PS1-4 alignment. Test candy is not for eating.