ANSWER KEY

DO NOT HAND OUT

A PREDICTIONS THAT EARN FULL MARKS

Milk with most movement	Accept any of whole, 2%, skim or no clear winner if the student gives a testable reason. The expected result is to compare observations, not assume a ranking.

B VARIABLES

Independent	Milk type: whole, 2% or skim.
Dependent	Active-motion time under the five-second stop rule (60-second cap), 1–5 pattern rating, and descriptive notes.
Controlled	Milk volume/depth, plate, temperature, dye colors/count/positions, soap amount, swab and touch point.

C SAMPLE DATA

Invented values for practicing mean and range only; these are not target results or predictions. Actual motion varies with temperature, milk, plate and contact. No milk is guaranteed to win.

MILK TYPE	TRIAL TIMES (S)	PATTERN SCORES (1-5)	MEAN TIME / RANGE
Whole	20 / 21 / 19	**4 / 4 / 4**	**20 s / 2 s**
2%	22 / 21 / 23	**4 / 4 / 4**	**22 s / 2 s**
Skim	14 / 15 / 13	**2 / 2 / 2**	**14 s / 2 s**

Verify each mean by dividing the three times by 3; range = maximum minus minimum. Confirm the same stop rule and rating anchors were used in every trial.

D MODEL CLAIM, EVIDENCE, REASONING

Claim: In this illustrative sample, whole and 2% milk show similar average times and scores, while skim is lower; a class claim must use its own nine trials.
Evidence: The example means are 20 s, 22 s and 14 s; each range is 2 s. The first two score 4 on every trial and skim scores 2, but these numbers were invented for calculation practice.
Reasoning: Soap changes surface conditions and interacts with milk components. Fluid movement carries the food coloring, so the streak pattern is evidence of motion, not a direct measurement of fat or a chemical color change.

E THINK FURTHER

Use fresh matched samples of one milk type, change only the soap amount and compare duration and the same anchored intensity scale.

F QUICK GRADING GUIDE

Use the observation-detail, classification, explanation and communication rows. Do not grade a student's choice of strongest milk; grade whether the scale and evidence are used consistently.