ANSWER KEY

DO NOT HAND OUT

A PREDICTIONS THAT EARN FULL MARKS

Tablet amount	Accept a reasoned prediction that a larger amount may bubble longer, or a prediction of uncertainty because dissolution rate also varies with piece size.

B VARIABLES

Independent	Effervescent tablet amount: 1/4, 1/2 or one whole tablet.
Dependent	Seconds from tablet-water contact until no new bubbles appear for 10 seconds.
Controlled	Bottle size, 50 mL water, 100 mL oil, coloring, tablet brand, starting temperature and open upright setup.

C SAMPLE DATA

These nine times and summary values are invented solely to demonstrate calculations; they are not measurements, target answers, or a predicted trend. Mean = the three times divided by three; range = longest minus shortest. Actual results depend on tablet formulation, portion mass and shape, liquids, bottle geometry and timing judgment.

TABLET AMOUNT	TRIAL 1 (S)	TRIAL 2 (S)	TRIAL 3 (S)	MEAN (S)	RANGE (S)
1/4 tablet	46	51	45	**47**	**6**
1/2 tablet	58	41	63	**54**	**22**
Whole tablet	48	70	59	**59**	**22**

Require all three repeats per amount and seconds as the unit. Use the exact 10-second no-new-bubbles rule; accept a pattern that is flat, overlapping or non-monotonic when supported by the data.

D MODEL CLAIM, EVIDENCE, REASONING

Claim: In the invented practice set, mean bubbling duration differed among tablet amounts, with overlapping ranges.
Evidence: The illustrative means are 47, 54 and 59 seconds; their ranges are 45–51, 41–63 and 48–70 seconds.
Reasoning: More tablet provides more reactive material, while piece geometry can affect dissolving rate. Overlap shows why repeated observations and an explicit endpoint are more useful than assuming a fixed order.

E THINK FURTHER

Compare equal tablet masses broken into different-sized pieces while matching all liquids and bottles; keep the same endpoint to investigate surface area and dissolving rate.

F QUICK GRADING GUIDE

Require units and a comparison based on student measurements. Accept non-monotonic results with a setup-based explanation. Require the bottle to remain open and upright, no tasting and teacher-directed disposal of oil-containing liquid rather than drain disposal.