ANSWER KEY

DO NOT HAND OUT

A PREDICTIONS THAT EARN FULL MARKS

First leaf color	Accept any prediction with a reason; use the measured observations and temperature log rather than assuming an order.

B VARIABLES

Independent	Starting colored-water temperature: cold, room temperature and comfortably warm.
Dependent	Elapsed hours until dye first appears in leaves; visible dye height (cm) at 24 h.
Controlled	Three similar fresh-cut leafy stalks per condition, equal cup size and water/dye volumes, shared start and check times, light and location.

C SAMPLE DATA

All figures are illustrative, not observations or predictions. The temperature entries show how a warm start could drift toward room temperature; real readings must be measured. The time and height entries demonstrate retaining all three cups per group.

STARTING CONDITION · CUP	START °C	2 H °C	4 H °C	24 H °C	LEAF COLOR FIRST SEEN (H)	VISIBLE PATH AT 24 H (CM)
Cold · 1	8	15	18	22	**12**	**8**
Cold · 2	8	15	18	22	**14**	**7**
Cold · 3	8	15	18	22	**10**	**9**
Room · 1	22	22	22	22	**6**	**14**
Room · 2	22	22	22	22	**7**	**13**
Room · 3	22	22	22	22	**5**	**15**
Warm · 1	36	25	23	22	**4**	**18**
Warm · 2	36	25	23	22	**5**	**17**
Warm · 3	36	25	23	22	**3**	**19**

Calculate group mean as sum of three values ÷ 3 and range as highest minus lowest. Arrival values are elapsed hours; height is centimeters at 24 h. If no arrival by 48 h, record that text instead of inventing a time.

D MODEL CLAIM, EVIDENCE, REASONING

Claim: In this illustrative set only, the warm-start cups have the shortest mean leaf-arrival time and greatest mean visible height at 24 hours.
Evidence: Illustrative mean arrival times are 12 h cold, 6 h room and 4 h warm; illustrative mean heights are 8 cm, 14 cm and 18 cm. The example temperature logs show that starting values drifted toward room temperature.
Reasoning: The dye traces some water-conducting pathways, but visible height does not measure total water flow. The cups began at different temperatures but were not held at those temperatures for 24 hours, and cut stalks are a limited model of rooted plants.

E THINK FURTHER

A follow-up can use monitored water baths to hold each temperature more consistently, with adult supervision and no hot water.

F QUICK GRADING GUIDE

Credit the student's actual results even when the order differs. Require separate replicate values, units, mean/range calculations, temperature-drift notes and a conclusion limited to starting conditions.