NAME _____ DATE _____

Scenario

A toy company claims to have developed two toy car models which they call A and B, where the average speed of each car is identical ($0.50 \pm 0.02 \frac{m}{s}$). Each group of students is given two toy cars (one of each model), metersticks, and stopwatches and is asked to test the toy company's claim.

Experimental Design

PART A: The students decide that they need to collect distance and time data for each car to test the company's claim. The students design a procedure.

Cross out any extraneous steps and order the remaining procedural steps:

_____ Turn the car on and release along the measured path.

_____ Gather equipment.

_____ Repeat to reduce error.

_____ Measure and record the time the car took to travel the 2 meters with a stopwatch.

_____ Measure a 2-meter-long path on the floor.

_____ Draw a data table in your notebook.

Data Analysis

PART B: Given is a data set collected by students in the class. Based on these data, what conclusion should the students make about the hypothesis that the two cars, A and B, have the same speed?

Lab Group Number	**CAR A** Speed	**CAR B** Speed
1	0.45 m/s	0.54 m/s
2	0.46 m/s	0.52 m/s
3	0.42 m/s	0.56 m/s
4	0.43 m/s	0.55 m/s
5	0.74 m/s	0.23 m/s
6	0.44 m/s	0.54 m/s
AVERAGE	**0.49 m/s**	**0.49 m/s**

_____ The cars have the same average speed.

_____ The cars have different average speeds.

Explain your choice in one short sentence.

Experimental Design

PART C: The students decide that additionally they want to test the toy company's claim that the car's speed is constant throughout the motion. How, if at all, does the experimental procedure from Part A need to be modified to verify that the car's instantaneous speed is constant?

_____ Angela thinks they should use a motion sensor to collect speed vs. time data. If the graph of speed vs. time is horizontal with a zero slope, the instantaneous speed is constant.

_____ Blake thinks that they should use photogates positioned at the beginning and end of the 2-meter-long track to determine the instantaneous speed of the cart. The students measure the length of the cart and divide this length by the time recorded by the photogate to determine the instantaneous speed.

Identify which student's procedure will provide evidence for the claim that the instantaneous speed of the cart is constant.