Monster Truck Lab

Name_____ Date_____ Period_____

Purpose: The purpose of this lab is to determine the relationship between the position achieved and time traveled in a toy monster truck.

Procedure:

Forward Motion:
•Run your monster truck in the forward direction beginning at position 0 cm. Record five different pairs of position and time data.

Backward Motion:
•Run your monster truck in the reverse direction beginning at position 100 cm. Record five different pairs of position and time data.

Data:

Forward (0 cm -> 100 cm)		**Backward (100 cm -> 0 cm)**	
Time (s)	**Position (cm)**	**Time (s)**	**Position (cm)**
0	0	0	100

Evaluation of Data:

Follow the directions on the "How to Use Logger Pro" handout and graph your data (follow all the steps through #9). You will make 2 graphs, one for the forward data and one for the backward data.; put time on the x-axis and position on the y-axis. **DO NOT print out the graph until you are approved to do so by your teacher**. Once your graphs have been approved, print a copy for each person in your group.

Using the handout, "How to Calculate the Slope of a Line," calculate the slope of the line for each graph by hand to verify that Logger Pro has correctly calculated the slope. To get full credit you must do this **exactly as shown on the handout**. To see if you have done it correctly your work should look similar to the back of the "How to Calculate the Slope of a Line," below number "5."

Forward Motion Graph

Record the following information from your graph (that was calculated by the computer). Be sure to include units.

Forward Motion (as calculated by your computer): Slope_____ Y-intercept_____

Develop a mathematical model for the relationship for the position and time of your monster truck's motion. Follow the format on the "How to Make a Mathematical Model" worksheet.

STEP ONE

STEP TWO (Be sure to explain why you keep or eliminate the Y-intercept)

STEP THREE (Box your final model)

Backward Motion Graph

Record the following information from your graph(that was calculated by the computer). Be sure to include units.

Backward Motion (as calculated by your computer): Slope_____ Y-intercept_____

Develop a mathematical model for the relationship between the position and time of your monster truck's motion. Follow the format on the "How to Make a Mathematical Model" worksheet.

STEP ONE

STEP TWO (Be sure to explain why you keep or eliminate the Y-intercept)

STEP THREE (Box your final model)

Monster Truck Rally

1. Using your **forward model**, calculate where your monster truck will be after 25 seconds. Show work.

2. Measure the distance calculated above in question 1 and place a piece of masking tape on the floor where you think your truck will be, based on your calculations. After you run your truck, record the distance the front of your truck was from the masking tape (the distance you "missed the mark"). If you were short of the mark use -, if beyond the mark use +.

Distance from mark:_____

2. Explain clearly why you may have missed the mark. Think about everything you did and write a clear explanation that might explain what happened.

Questions

1. What does the slope of the position-time graph represent? Explain how you know this.

2. What does the sign of the slope represent? Explain how you know this.

3. What does the y-intercept of the line represent? Explain how you know this.

4. What is the general model that describes the relationship between position and time? What does each variable represent?

5. A toy monster truck (truck A) has a velocity of 12 cm/s. If is starts at 0 cm, what position will it have after 63 seconds? (Show all your work)

6. On a second trial, the truck (truck A) started at position 10 cm (it got a 10cm head start), and ended at 75 cm. How many seconds did the truck travel? (Show all your work)

7. Another student started her truck (truck B) at the zero position and allowed it to travel for 14 seconds. The truck's new position was 220 cm. What was the velocity of the truck? (Show all your work)

8. If the two trucks were in a race (truck A and truck B), who would win? How do you know?

Conclusion (Claim, Evidence, Reasoning)

a. What **claim** can you make involving position and time now that you have finished the lab?

b. What **evidence** did you gather that supports this **claim**?

c. Use **reasoning** to link the **evidence** to the **claim.**