**OBSERVING AND DESCRIBING MOTION LAB**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Class: \_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_**

**Problem:** How can I use a frame of reference to describe motion?

**Materials:**

* Stop watch
* Meter stick
* Tape for marking

**Procedure:**

 Work in a group of five (or whatever is assigned by the teacher):

 1. Prepare a clear track 1 meter wide and 5 meters long. *Mark a starting line*

 *and a finish line.*

2. One group member will be in motion, *walking backwards from the starting*

 *line to the finish line.*

~The other group members will observe and measure the time and distance of the motion as indicated below. ~

* One group member will stand *behind the starting line to observe and time the walker*.
* One group member will stand *at the finish line to observe and time the walker*.
* One group member will stand *at the left sideline to observe and time the walker*.
* One group member will stand *at the right sideline to observe and time*

 *the mover.*

3. Each observer should start his or her stopwatch when the walker starts moving and stop when the walker reaches the finish line.

~The walking group member should record the times from each observer. ~

4. Repeat step 3 for a total of *three trials*, and record the time of the motion for each trial.

 5. After all three trials, each observing group member should draw a diagram

 in the appropriate box and briefly describe in words, the motion of the

 walker from their own frame of reference (f.o.r).

**Analysis:**

1. Why did each walker complete three trials?

2. Calculate the **average time** of motion for **each frame of reference position**.

 Starting line \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Finish Line \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Left sideline \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Right sideline \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Why do we average data?

4. Look at the average times you calculated. Is there a significant difference in the average times from the different frame of reference positions?

 yes no

5. Should there be a difference in average times from the different positions?

 yes no

6. Explain your answer to question 5.

7. If there is a significant difference in the average times, what might be the cause?

8. After examining your data, how does frame of reference have an affect on the

 time of motion? Explain.

9. What are some possible sources of error for this activity?

1. Think about what you have learned about motion and frame of reference:
* How we recognize frame of reference.
* Things that do and do not affect frame of reference.
* Things that frame of reference does and does not affect.
* Remember the terms position, distance, displacement.

 Then, in your own words, write a few sentences describing and defining frame of reference.

12. Describe how this activity about frame of reference relates to an experience you have had in the real world.