

4. 15 points

A world-class runner can complete a 100 m dash in about 10 s. Past studies have shown that runners in such a race accelerate uniformly for a time t and then run at constant speed for the remainder of the race. A world-class runner is visiting your physics class. You are to develop a procedure that will allow you to determine the uniform acceleration, a , and an approximate value of t for the runner in a 100 m dash. By necessity your experiment will be done on a straight track and include your whole class of eleven students.

- a) By checking the line next to each appropriate item in the list below, select the equipment, other than the runner and the track that your class will need to do the experiment.

Stopwatches Tape measures Rulers Masking tape

Metersticks Starter's pistol String Chalk

- b) Outline the procedure that you would use to determine a and t , including a labeled diagram of the experimental setup. Use symbols to identify carefully what measurements you would make and include in your procedure how you would use each piece of the equipment you checked in part (a).
- c) Outline the process of data analysis, including how you will identify the portion of the race that has uniform acceleration, and how you would calculate the uniform acceleration.