NAME _____ DATE _____

Scenario

Blake is given the equipment listed below and asked to use it to obtain a precise value for the speed of sound in air.

_____ Meterstick _____ Stopwatch

_____ Sound intensity meter _____ Barrel filled with water

_____ Tuning forks (Each has its frequency printed on the handle.)

_____ Pipe (as long as the barrel is tall)

_____ Speaker who can generate a single tone (The tone can be varied, and the speaker displays the frequency.)

Experimental Design

PART A: Select equipment from the above list that Blake could use to determine the speed of sound in air.

PART B: Outline a procedure that Blake could follow to make a single set of measurements that can be used to calculate an estimate of the speed of sound in air. Include a labeled diagram of the experimental setup. Explain how the measurements can be used to make the calculation.

PART C: Explain how the procedure from Part B can be modified to obtain a much more precise value of the speed of sound in air. Explain how the data collected can be represented in a graph and how the graph can be used to obtain a precise value of the speed of sound.

PART D: Blake is informed that the speed of sound depends on the temperature of the air. Assuming that he has access to the thermostat controlling air-conditioning and heating for the laboratory, explain how the procedure outlined in Part B can be modified to determine how the temperature of air affects the speed of sound. Include any additional equipment needed that is not listed above.