

EF101 – Engineering Approach to Physical Phenomena  
**Lab Worksheet 1.1 Units and Measurement**  
 Fall, 2004

**Objectives**

- Introduce you to units of length, area, and volume
- Introduce you to the concept of measurement uncertainty
- Give you some estimation tools for future use

**Task 1.** Establish your pace length.

A section with a length of 50 ft is marked off on the lab floor. Pace this 3 times, each time recording the number of steps (paces) it takes you to cover the distance. Pace at a nice, relaxed, consistent clip, as if you're just casually walking. Record your measurements to the nearest 1/2 pace.

1) \_\_\_\_\_ paces    2) \_\_\_\_\_ paces    3) \_\_\_\_\_ paces    Average \_\_\_\_\_

Now calculate your pace length in feet and in meters. Express your answers in ft/pace and in m/pace.

Pace length: \_\_\_\_\_ ft                      \_\_\_\_\_ m

**Task 2.** Estimate an area.

Make an initial estimate of the floor area of Estabrook 111 by just looking around the room. Then, using your pacing as a measuring tool, estimate the floor area of the Physical Homework Laboratory. Neglect the small area near the door.

30 second estimate: \_\_\_\_\_ ft<sup>2</sup>                      \_\_\_\_\_ acres

Pacing estimate: \_\_\_\_\_ ft<sup>2</sup>                      \_\_\_\_\_ acres                      \_\_\_\_\_ m<sup>2</sup>

Now give an estimate of the uncertainty associated with that estimate (how much you think your estimate might be off)

Uncertainty estimate: \_\_\_\_\_ %

How did you arrive at this? How much would the neglected areas affect your final estimate?

**Task 3.** Estimate the height of Neyland Stadium

Height: \_\_\_\_\_ ft                      \_\_\_\_\_ m

**Task 4.** Estimate the volume of Estabrook 111.

Volume: \_\_\_\_\_ ft<sup>3</sup>                      \_\_\_\_\_ m<sup>3</sup>                      \_\_\_\_\_ gallons

**Task 5.** Other Estimates and Comparisons

Estimate the weight of an average car: \_\_\_\_\_ lb                      \_\_\_\_\_ N

Estimate the length of an average car: \_\_\_\_\_ ft                      \_\_\_\_\_ m

Which is heavier, 1 pound or 1 Newton? 1 pound or 1 kg?

Which is longer: 1 mile or 1 kilometer? 1 centimeter or 1/4 inch?