

## Modeling atomic dimensions Activity

Name Class Set

Date \_\_\_\_\_

**Purpose:** To compare more comprehensible measurements to the atomic dimensions.

**Materials:** Balance, pencil, paper, calculator, string, meter ruler, spherical object with a radius between 12 mm and 25 mm.

**Formulas required:**

- **Mass proton = Mass neutron = Mass electron x 1,840**
- **Nuclear mass = Mass protons + Mass neutrons = Mass number of Atom (A)**
- **Radius of the sphere =  $c / 2\pi$**
- **Atomic radius = Nuclear radius x  $1 \times 10^4$**

**Procedure:**

- 1) Find the mass of the spherical object (in g), which will now represent an **electron**.  
Mass =
- 2) Calculate the mass of the nucleus of a Carbon-14 atom based on the mass of the electron found in step 1. Note: C-14 indicates the sum of all neutrons and protons in the atomic nucleus.  
Mass (in grams) =
- 3) Find the radius of the object, which will now represent the **nucleus of the atom** (in cm) by measuring its circumference (c) and using the formula  **$r = c / 2\pi$**   
Nuclear radius =
- 4) Calculate the atomic radius =

**Post- lab activities:**

- 1) How many times is the atomic radius greater than the nuclear radius?
- 2) How many times is the mass number of your atom greater than the electron's mass?
- 3) Estimate how far (in yards) from your nucleus you would have to walk to reach the electron located in the outermost level of your atom. Show your work  
(1 yard = 36 inches; 1 inch = 2.54 cm)