

## Activity: Relative Mass

### Purpose

The purpose is to determine the relative mass of different kinds of hardware and to learn to count by massing.

### Data

Hardware	Mass (g)
Empty vial	
Vial + Washers	
Vial + Hex Nuts	
Vial + Bolts	

### Calculations

*Set up the calculations on the back of this paper. Be sure to label your quantities!*

1. A box of hardware contains 100 pieces. Assuming there are 25 pieces in each vial, calculate the mass of a box of each kind of hardware. Express these values in units of g/box.
2. If you had 1.00 kg of each kind of hardware, how many boxes of each would you have?
3. You learned that a barrel of the 1" bolts had a mass of 65.2 kg. The mass of the barrel was 9.6 kg. How many boxes of bolts are in the barrel?
4. Someone at the Home Depot tells you that a 2" bolt is 6.75 times as heavy as a washer. What would be the mass of a box of such bolts?
5. Suppose that you were given the job of shipping 25,000 hex nuts to a customer. How many boxes of hex nuts would this be? All you have is a hanging scale and a barrel of hex nuts. Describe how you could determine the proper number of pieces without physically counting them out.

## Conclusion

Do you agree or disagree with the following statement? Support your answer.

*“You can count by weighing.”*

## Extension

Each vial contains the same number of pieces of hardware. Calculate the *relative* mass of each kind of hardware. Divide each mass by the mass of the smallest. (The smallest will be 1.00)

*Relative mass:* Nuts \_\_\_\_\_ : Bolts \_\_\_\_\_ : Washers \_\_\_\_\_

Suppose that the washer represented an atom of the element carbon. From your relative masses, determine the elements that would be represented by the nut and the bolt.