

Charge It! Math Worksheet Answers

It is more convenient to write very small and very big numbers in terms of different units. For example, rather than saying 365 days, we say one year. Rather than saying 3,600 seconds, we call it one hour.

The charge on an electron is $-0.000\,000\,000\,000\,000\,000\,16\text{ C}$. The charge on a proton is $+0.000\,000\,000\,000\,000\,000\,16\text{ C}$. It is more convenient to write very small and very big numbers using scientific notation. In scientific notation, the charge on an electron is $-1.6 \times 10^{-19}\text{ C}$ and the charge on a proton is $+1.6 \times 10^{-19}\text{ C}$.

To determine the charge on an object when given the number of **excess** electrons or **unbalanced** protons, use the following equations:

$$\text{charge} = \# \text{ of excess electrons} \times (-1.6 \times 10^{-19}\text{ C/electron})$$

$$\text{charge} = \# \text{ of unbalanced protons} \times (1.6 \times 10^{-19}\text{ C/proton})$$

Using your calculator, determine the following amounts.

1. What is the charge on an object that has 1,000,000 unbalanced protons?

$$1,000,000 \text{ protons} \times (1.6 \times 10^{-19}\text{ C/proton}) = 0.000000000000016\text{ C} = 1.6 \times 10^{-13}\text{ C}$$

2. What is the charge on an object that has 6,000,000 excess electrons?

$$6,000,000 \text{ electrons} \times (-1.6 \times 10^{-19}\text{ C /electron}) = -0.000000000000096\text{ C} = -9.6 \times 10^{-13}\text{ C}$$

To determine the number of **excess** electrons or **unbalanced** protons when given the charge on an object, use the following equations:

$$\# \text{ excess electrons} = \frac{\text{charge}}{-1.6 \times 10^{-19} \text{ C / electron}}$$

$$\# \text{ unbalanced protons} = \frac{\text{charge}}{1.6 \times 10^{-19} \text{ C / proton}}$$

3. How many unbalanced protons are there in an object with a charge of $48 \times 10^{-19} \text{ C}$?

$$48 \times 10^{-19} \text{ C} \div (1.6 \times 10^{-19} \text{ C /proton}) = 30 \text{ C unbalanced protons}$$

4. How many excess electrons are there in an object with a charge of $-800 \times 10^{-19} \text{ C}$?

$$-800 \times 10^{-19} \text{ C} \div (-1.6 \times 10^{-19} \text{ C /electron}) = 500 \text{ C excess electrons}$$