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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 C. The charge on a proton is +0.000 000 000 000 000 000 16 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 -1.6×10^{-19} C and the charge on a proton is $+1.6 \times 10^{-19}$ 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 protons x (1.6×10^{-19} C/proton) = 0.00000000000016 C = 1.6×10^{-13} C

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

6,000,000 electrons x (-1.6×10^{-19} C/electron) = -0.00000000000096 C = -9.6×10^{-13} C

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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 x 10^{-19} C?

48 x 10^{-19} C ÷ (1.6 x 10^{-19} C/proton) = 30 unbalanced protons

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

-800 x 10^{-19} C ÷ (-1.6 x 10^{-19} C/electron) = 500 excess electrons