

AP Physics 2

Quiz: Electrostatics, Form: **A**

Name: _____

Date: _____

Period: _____

Peer Reviewer: _____

Authentication Code: _____

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Section 1. Multiple Choice

Information:

Coulomb's Law: $F_e = \frac{kq_1q_2}{r^2}$

$$k = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$$

Charge of an electron: $-1.6 \times 10^{-19} \text{ C}$

Choose the best answer to each question.

1. If an object has a positive charge -
 - (a) It has gained extra protons.
 - (b) It has gained extra neutrons.
 - (c) It has gained extra electrons
 - (d) It has lost some of its electrons.
2. If the distance between two objects is doubled, the force between them is - ?
 - (a) Double the original force.
 - (b) The same as the original force.
 - (c) Half the original force.
 - (d) One fourth the original force.
3. When using Coulomb's law a **Negative** force indicates -
 - (a) The force is repulsive.
 - (b) The force is attractive.
 - (c) The force is to the left.
 - (d) The force is downward.
4. You calculate the charge of an object to be $-4.2 \times 10^{-20} \text{ C}$. You know that this answer is -
 - (a) wrong because charge cannot be negative.
 - (b) wrong because the charge is smaller than the elementary charge.
 - (c) wrong because the charge is faster than the speed of light.
 - (d) correct, because charges are made of electrons, which are negative.

5. How many electrons would need to be removed from an object for it to have a charge of 0.25 C?
- (a) 4×10^{-20} electrons
 - (b) 6.4×10^{-19} electrons
 - (c) 1.563×10^{18} electrons
 - (d) This is impossible, the object would need to have an excess of electrons.

Section 2. Free Response

6. An astronaut has designed a new way to butter his pancakes while in space. He is able to cause a pancake to have a charge of $1.6 \times 10^{-6}\text{C}$, and a blob of butter ($m=0.002\text{kg}$) to have a charge of $-2.7 \times 10^{-6}\text{C}$. The butter and pancake start off 2 m apart and the pancake is held in place.
- (a) What is the electrostatic force that the butter feels?
 - (b) What is the acceleration of the butter? (Hint: $F = ma$)
 - (c) How long will it take for the butter to collide with the pancake?
(Hint: $d = v_i t + \frac{1}{2}at^2$)

Answer Key for Exam A

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