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: $F_e = \frac{kq_1q_2}{r^2}$ $k = 9 \times 10^9 Nm^2/C^2$
Charge of an electron: -1.6×10^{-19}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 -4.2×10^{-20}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 1.6×10^{-6}C, and a blob of butter (m=0.002kg) to have a charge of -2.7×10^{-6}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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