

Instructor(s): *P. Hirschfeld*PHYSICS DEPARTMENT
EXAM I

PHY 2005, Spring 2016

February 10, 2016

Name (print, last first): _____ Signature: _____

*On my honor, I have neither given nor received unauthorized aid on this examination.***YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.**

- (1) **Code your test number on your answer sheet (use lines 76–80 on the answer sheet for the 5-digit number).** Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY.** Code your UFID number on your answer sheet.
- (2) Print your name on this sheet and sign it also.
- (3) Do all scratch work anywhere on this exam that you like. **Circle your answers on the test form.** At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout.
- (4) **Blacken the circle of your intended answer completely, using a #2 pencil or blue or black ink.** Do not make any stray marks or some answers may be counted as incorrect.
- (5) **The answers are rounded off. Choose the closest to exact. There is no penalty for guessing. If you believe that no listed answer is correct, leave the form blank.**
- (6) Hand in the answer sheet separately.

Physical Constants:

$g = 9.8 \text{ m/s}^2$	$m_e = 9.11 \times 10^{-31} \text{ Kg}$
$m_p = 1.67 \times 10^{27} \text{ Kg}$	$e = 1.6 \times 10^{-19} \text{ C}$
constant k in Coulomb's Law: $k = 8.99 \times 10^9 \text{ Nm}^2/\text{C}^2$	
$\mu_o = 4\pi \times 10^{-7} \text{ N/A}^2$	$\epsilon_o = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$

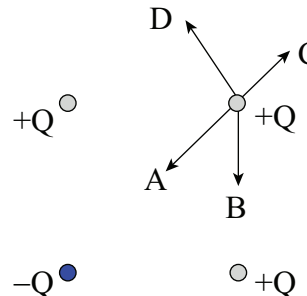
1. Each of three objects has a net charge. Objects A and B attract one another. Objects B and C also attract one another, but objects A and C repel one another. Which one of the following table entries is a possible combination of the signs of the net charges on these three objects?

	A	B	C
(1)	+	-	+
(2)	-	-	+
(3)	0	+	-
(4)	+	+	-
(5)	+	+	+

2. A conducting sphere has a net charge of $-4 \times 10^{-17} \text{ C}$. How many excess electrons are on the surface of the sphere?

(1) about 250 (2) about 100 (3) about 3×10^{36} (4) about 5×10^{17} (5) about 2.5×10^{17}

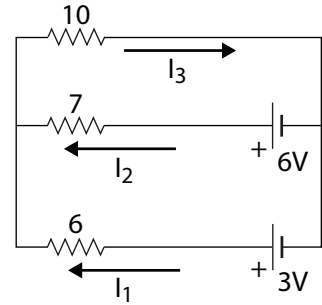
3. There are four charges arranged at the corner of a square as shown in the figure. Which of the vectors represents the net force acting on the charge correctly?



- (1) C
- (2) A
- (3) B
- (4) D
- (5) not enough information.

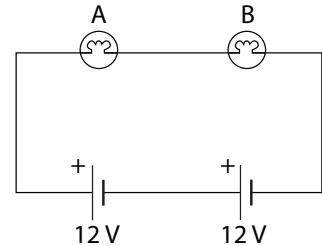
10. Using Kirchoff's rules for junctions and loops, the following equations are set to solve the circuit shown in the figure. Choose one equation which describes the circuit **incorrectly**.

- (1) $7I_2 + 6I_1 = 9$
- (2) $7I_2 + 10I_3 = 6$
- (3) $6I_1 + 10I_3 = 3$
- (4) $7I_2 - 6I_1 = 3$
- (5) $I_1 + I_2 = I_3$

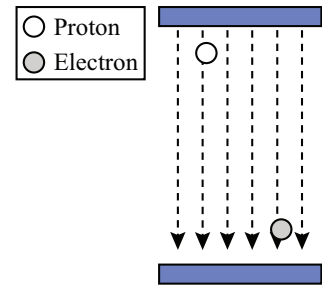


11. Two identical light bulbs (A and B) are connected as shown in the figure. Each light bulb produces 14.4 W of power. What is the resistance of each bulb (in Ω)?

- (1) 10
- (2) 14.4
- (3) 57.6
- (4) 1.2
- (5) 144



12. A uniform electric field is set between two conducting plates as shown in the figure. An electron and a proton are released from their initial positions as indicated in the figure. Which of the following statements are *wrong*?
- (A) Both electron and proton will move toward the plate farthest away from their current positions.
 - (B) Both electron and proton will move in the direction that the electric potential decreases.
 - (C) During the motion, the potential energy of the electron will increase.
 - (D) During the motion, the potential energy of the proton will decrease.
 - (E) During the motion, the kinetic energy of the electron and proton will increase.



- (1) B, C
- (2) A, B, C
- (3) D, E
- (4) A, C
- (5) C, D, E