Physics 235 Fall 2013: Exam 1
Form #1

You must enter your form number on your scantron to receive your score.

Please Print Your Name:_____

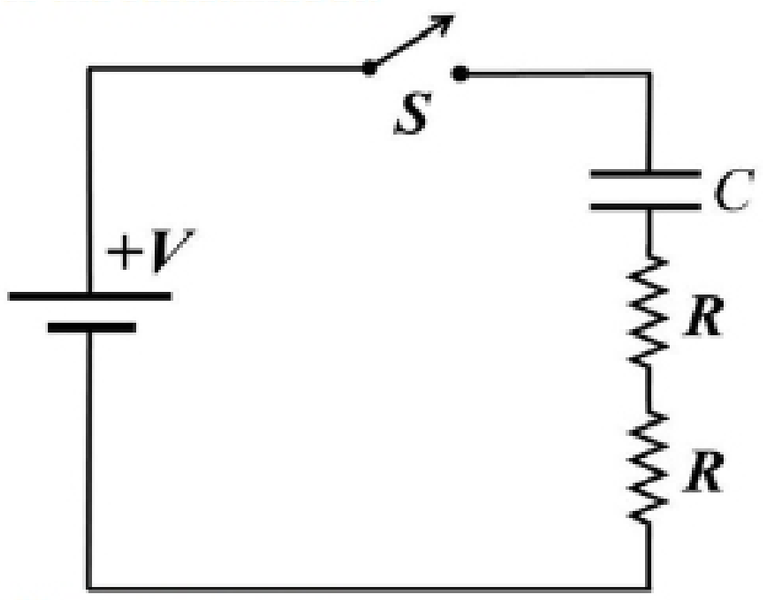
Instructions

1. Fill in your name above
2. Fill in your **name**, **ID number**, and **form number** on your scantron sheet
3. This will be a one hour and 50 minute (110 minute), closed book exam.
4. You may use a calculator, please do not share calculators.
5. The exam includes 20 multiple choice questions which will be machine graded. Each question is worth 5 points. No partial credit will be given.
6. For this exam, you can bring *one* 3×5" index card with any notes you wish to have. You may use a plastic ruler if you wish. You will also find all the physical constants that you might require listed below.
7. **Please take your exam booklet with you and keep it safe and unaltered.**

Constants you might need:

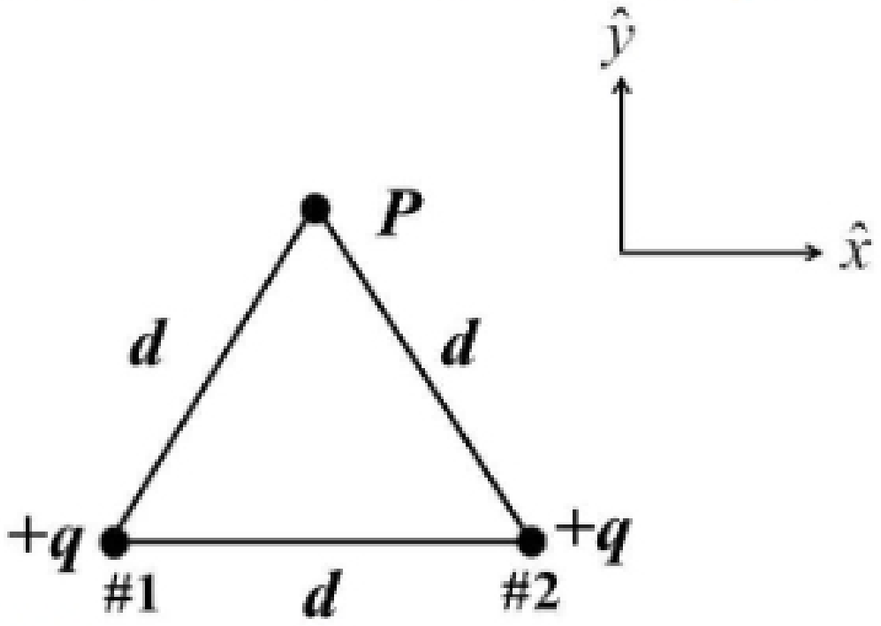
$k = 8.99\times10^{9}\ Nm^2/C^2$
$\varepsilon_0 = 8.85\times10^{-12}\ C^2/Nm^2$
$g = 9.8\ m/s^2$
$\mu_0 = 4\pi\times10^{-7}\ Tm/A$
Mass of the electron: 9.11×10^{-31} kg
Magnitude of the electron charge: 1.6×10^{-19} C
Mass of the proton: 1.67×10^{-27} kg
Atomic Mass Unit (1 amu): 1.66×10^{-27} kg
1 Gauss = 10^{-4} T
Speed of sound in air = 340 m/s
Threshold of hearing $I_0 = 10^{-12}\ W/m^2$
Speed of light in vacuum = 3.0×10^{8} m/s
$k_B = 1.38\times10^{-23}\ m^2kg/s^2K = 1.38\times10^{-23}$ J/K
$\sigma = 5.7\times10^{-8}\ W/m^2K^4$
0 °C = 273.15 K
1 electron volt (1eV) = 1.6×10^{-19} J
Astronomical Unit (1AU) = 1.5×10^{11} m
1 Light Year = 9.47×10^{15} m
1 Parsec = 3.3 Light Years

1. For the circuit shown $V = 50$ V and $C = 10\ \mu$F. The capacitor is initially uncharged. After the switch has been closed for 0.1s the voltage across the capacitor is 5 V. What is the resistance R?



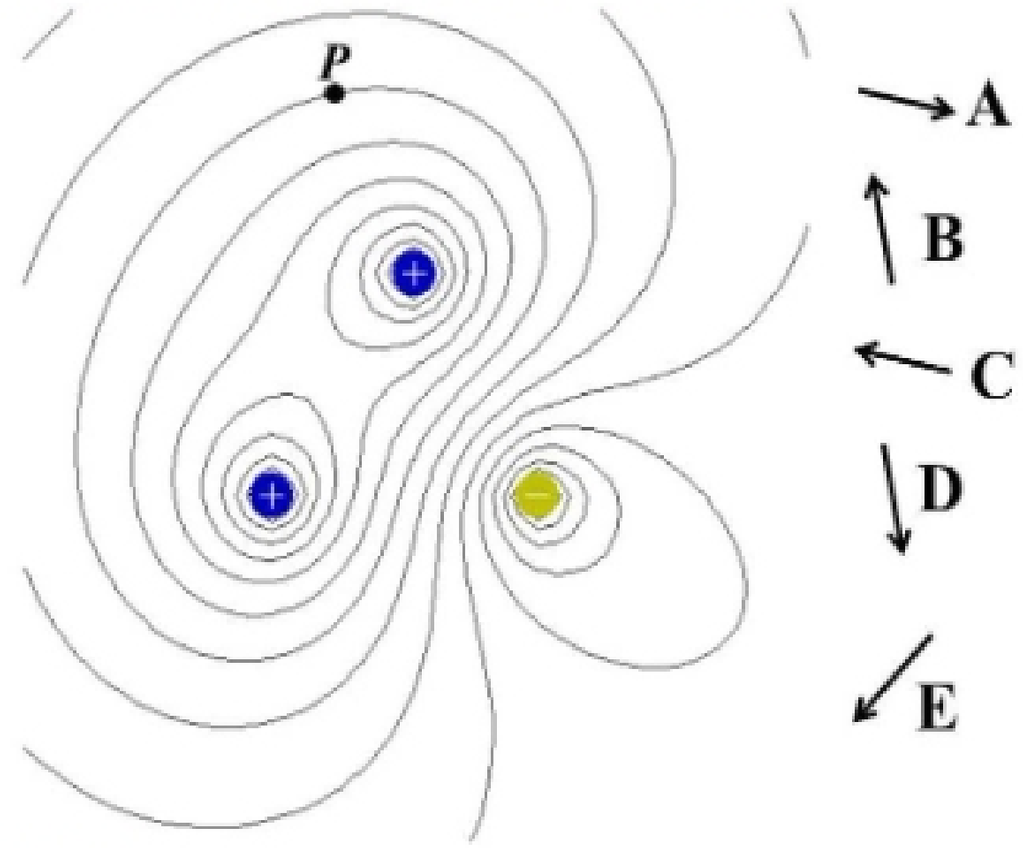
A) $R = 27\ \Omega$
B) $R = 540\ \Omega$
C) $R = 3{,}650\ \Omega$
D) $R = 4.75\times10^{4}\ \Omega$
E) $R = 4.96\times10^{6}\ \Omega$

2. Two equal charges $+q$ are arranged at the two corners of an equilateral triangle as shown. What is the Electric field at point P, located at the third corner of the triangle?



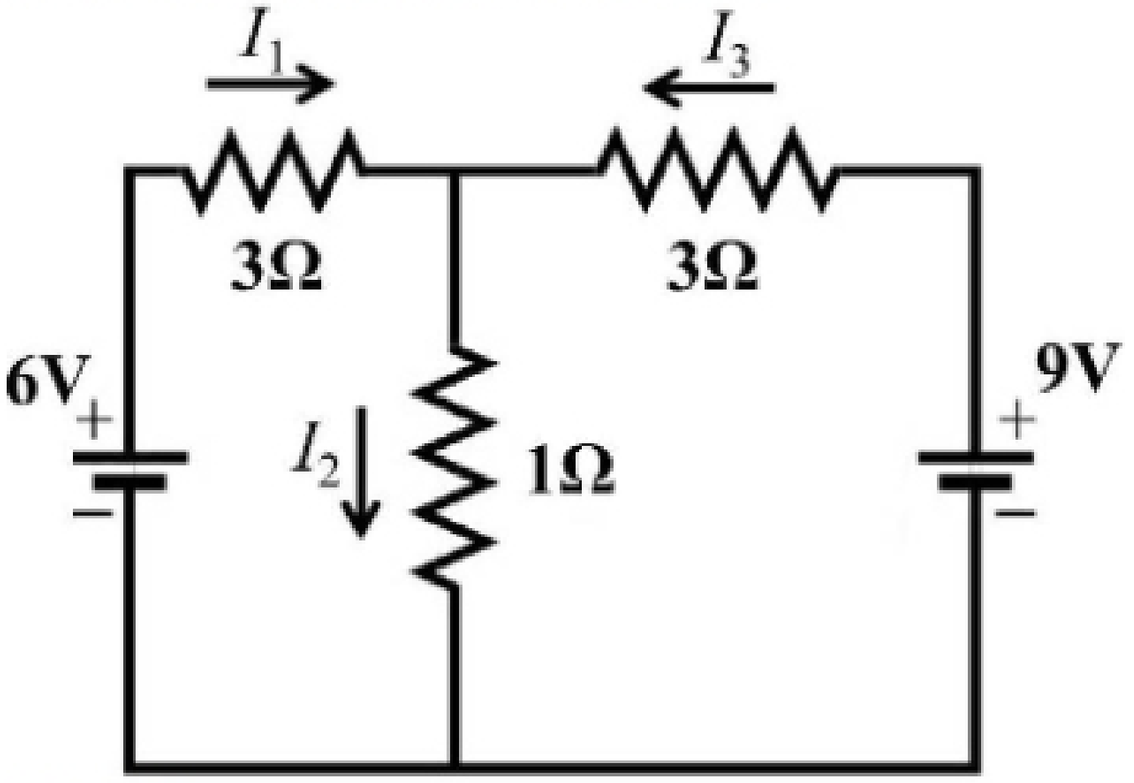
A) $\vec{E}_P = \sqrt{3}\frac{kq}{d^2}\hat{y}$
B) $\vec{E}_P = \frac{\sqrt{3}}{2}\frac{kq}{d^2}\hat{x}$
C) $\vec{E}_P = \frac{1}{2}\frac{kq}{d^2}\hat{y}$
D) $\vec{E}_P = \frac{\sqrt{3}}{2}\frac{kq}{d^2}\hat{x} + \frac{\sqrt{3}}{2}\frac{kq}{d^2}\hat{y}$
E) $\vec{E}_P = -\frac{1}{\sqrt{3}}\frac{kq}{d^2}\hat{y}$

3. Consider the equipotentitials shown for two positive charges and a negative charge located in the plane of the page. Which of the arrows shown best represents the direction of the electric field at point ***P***?



A) A
B) B
C) C
D) D
E) E

4. For the circuit shown the current I_3 is



A) 1 A
B) 2 A
C) 3 A
D) 4 A
E) 5 A