Phys2020: Exam 1. Feb 12, '15. 7:30-9:15 PM

Your Name (please print neatly!) _____

Student ID # _____

TA's name (**Circle one!!**)

Oscar Henriksson Adam Higuera Ian Leahy

Nick Pellatz Devin Rourke Keith Tauscher

Day your lab meets (**Circle one!!**) Tue Wed Thu

Time your lab starts (**Circle one!!**) 8 10 12 2

For grader use

A	
B	
C	
D	

Please follow these instructions before you start the exam!

☐ Fill in the lines above, and *circle* your TA + the day and time of your lab.

☐ Write in ***and*** *bubble in* your name *and* your ID # on the bubble sheet!

☐ Write ***and*** *bubble* the exam version **(X)** in the space (top left of the bubble sheet.)

Double check all the above! Then, please wait until a TA announces you may begin.

There are 14 **multiple choice questions** followed by 3 pages of **long answer questions**

For **Multiple choice questions:** Please BUBBLE IN your answer on the bubble sheet. Answers circled on this sheet will NOT be used for grading purposes!! Use a #2 pencil. Erase mistakes carefully. If you can't thoroughly erase, ask for a fresh bubble sheet. At the end, *check* that you have bubbled in *one* answer only, for all questions.

Multiple choice problems are 4 pts each (56 pts total).

Long answer questions: Write **on this exam** (not the bubble sheet). Please write neatly! Long answer problem parts are worth 4 pts * 4 parts = 16 pts total.

PLEASE turn in your exam in the **proper pile** up front! Ask if it's confusing - thanks!

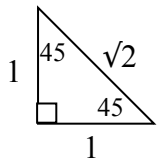
"On my honor, as a University of Colorado at Boulder student, I have neither given nor received unauthorized assistance on this work"

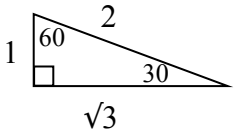
Signature _____

This exam is double sided, please look at the backs of pages!

Useful constants:

k = 9×10^9 N m^2/C^2,
e = 1.6×10^{-19} C,





On this exam, please neglect gravitational forces unless we explicitly say otherwise.

Some Units:
Units of [force] = [N] = [kg*m/s^2],
Units of [energy, or work] = [J] = [N*m] = [kg*m^2/s^2]

Useful Formulas:

Newton's Second Law
$\vec{F}_{net} = m\vec{a}$
Work = $\vec{\mathbf{F}} \cdot \vec{\mathbf{d}}$,

Coulomb's Law
$|F_{elec}| = \frac{k|q_1||q_2|}{r^2}$

Electric Fields
$\vec{E} = \frac{\vec{F}}{q}$
Special cases of the above: $\left|E_{near\ a\ point\ charge}\right| = \frac{k|q|}{r^2}$
For uniform fields (or short distances), $\left|\vec{E}\right| = \left|\frac{\Delta V}{\Delta d}\right|$

Electric Potential (or "Voltage")
$\Delta V = \frac{\Delta PE}{q}$
Special cases of the above: $V_{near\ a\ point\ charge\ q} = \frac{kq}{r}$,
$\Delta V_{in\ uniform\ field} = -Ed$ (where d is the distance parallel to the electric field)

Capacitors
$Q = C\Delta V$, $C_{parallel\ plate} = \frac{A}{4\pi k\, d}$, stored energy in capacitor: $U = \frac{1}{2}C(\Delta V)^2 = \frac{1}{2}\frac{Q^2}{C} = \frac{1}{2}Q\Delta V$