Physics 235 Winter 2013: Exam #3
Form #1

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 1 hour 50 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 *three* 3x5" cards with any notes you wish to have. You will also find all the physical constants that you might require listed below.

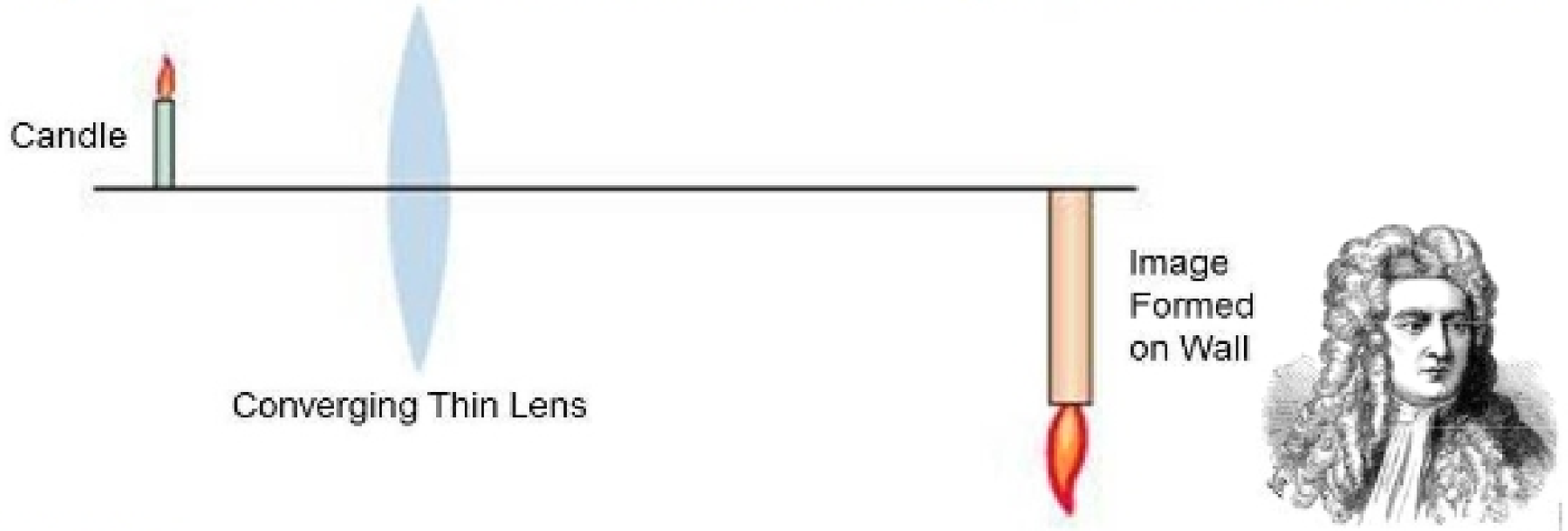
Constants you might need:

$k = 8.99 \times 10^{9}\ Nm^2/C^2$
$\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/Nm^2$
$g = 9.8\ m/s^2$
$\mu_0 = 4\pi \times 10^{-7}\ Tm/A$
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
$k_B = 1.38 \times 10^{-23}\ m^2kg/s^2K = 1.38 \times 10^{-23}$ J/K
Astronomical Unit (1AU) = 1.5×10^{11} m

1. Unpolarized light falls on a linear polarizer with its optic axis aligned vertically. It then passes through a second polarizer with its optic axis aligned at 45 degrees to the vertical and finally through a third polarizer with its optic axis aligned at 60 degrees to the vertical. What is the ratio of the intensity of the light emerging from the third polarizer to the intensity of the light entering the first?

A) 0.17
B) 0.23
C) 0.37
D) 0.61
E) 0.77

2. Sir Isaac Newton has just finished grinding a new converging thin lens. He finds that he can project an inverted real image of a candle onto a wall when the distance from the candle to the lens is 35 cm and the distance from the lens to the wall is 53 cm. He then places the lens a distance of 30 cm from the wall. What distance from the lens must he now place the candle to again form a real inverted image that is in focus on the wall?



A) 8 cm
B) 29 cm
C) 18 cm
D) 71 cm
E) 56 cm