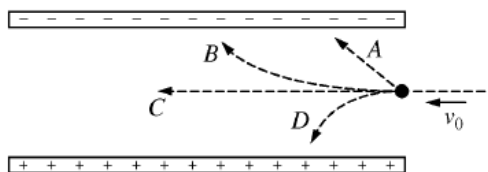


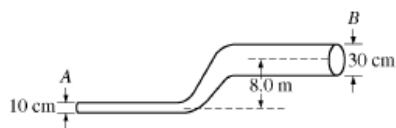
AP2 – Multiple Guess PREX #5 (COMPREHENSIVE)

Directions: Do this during class today; **TRY NOT TO WORK TOGETHER**. I'll forward solutions later today. We will review this on Friday & your Comp Exam will be MONDAY 12/21/2015. NOTE: #'s out of order since I'm C&Ping...



1. A proton is traveling to the left when it enters the space between two oppositely charged parallel plates, as shown above. Which of the four labeled paths will the proton take?

- (A) A
- (B) B
- (C) C
- (D) D



Note: Figure not drawn to scale.

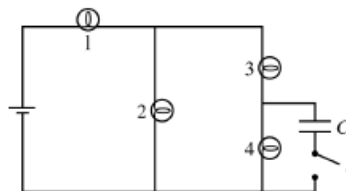
10. Water is flowing with a speed of 9.0 m/s through a pipe of diameter 10 cm. The pipe widens to 30 cm as it goes up an 8.0 m step, as shown in the figure above. If the pressure at point A is 2.0×10^5 Pa, what is the pressure at point B? (The density of water is 1.0×10^3 kg/m³.)

- (A) 1.2×10^5 Pa
- (B) 1.6×10^5 Pa
- (C) 2.4×10^5 Pa
- (D) 3.2×10^5 Pa



14. An object with charge $+q$ passes to the right of one pole of a magnet and at a particular instant is moving with a velocity \vec{v} toward the bottom of the page, as shown in the figure above. The force exerted on the object by the magnet at that instant is directed into the page. What is the direction of the force exerted on the magnet by the object?

- (A) Out of the page
- (B) Toward the right
- (C) Toward the top of the page
- (D) No direction; the force is zero.



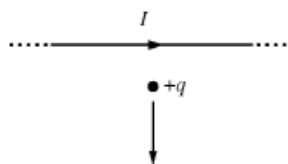
The circuit shown above contains four identical lightbulbs with constant resistance, a capacitor C , which is initially uncharged, and a switch S . The switch is initially open.

5. Which of the following correctly ranks the potential differences ΔV_1 , ΔV_2 , ΔV_3 , and ΔV_4 across the bulbs while the switch is open?

- (A) $\Delta V_1 = \Delta V_2 = \Delta V_3 = \Delta V_4$
- (B) $\Delta V_1 > \Delta V_2 = \Delta V_3 = \Delta V_4$
- (C) $\Delta V_1 > \Delta V_2 > \Delta V_3 = \Delta V_4$
- (D) $\Delta V_1 > \Delta V_2 > \Delta V_3 > \Delta V_4$

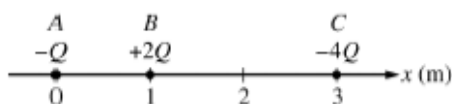
12. A slab of metal and a slab of wood are placed in a classroom and allowed to sit undisturbed for a long time. A student then places one hand on the metal and the other hand on the wood. Which of the following describes the student's perception of the temperatures of the slabs and their actual temperatures?

- (A) The metal slab feels colder to the student because it is at a lower temperature.
- (B) The metal slab feels colder to the student because it conducts thermal energy away from the student's hand faster, but the slabs have the same temperature.
- (C) The metal slab feels warmer to the student because it conducts thermal energy to the student's hand faster, but the slabs have the same temperature.
- (D) Both slabs feel the same to the student because they are at the same temperature.



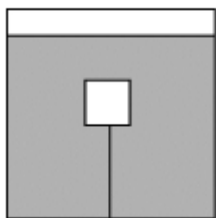
18. The figure above shows a long conducting wire that lies in the plane of the page and carries an electric current I toward the right. At the instant shown, a positive point charge $+q$ is in the plane of the page and moving toward the bottom of the page. What is the direction of the magnetic force on the point charge at that instant?

- (A) Into the page
- (B) Out of the page
- (C) Toward the right
- (D) Toward the left



19. The figure above shows three point charges located on an x -axis. Which of the following ranks the magnitude of the net electric force, F , on each point charge due to the other charges?

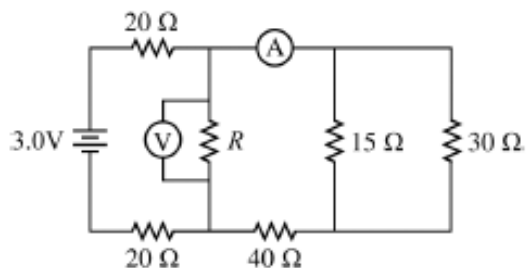
- (A) $F_A = F_C > F_B$
 (B) $F_B > F_C = F_A$
 (C) $F_A = F_B > F_C$
 (D) $F_A > F_C > F_B$



20. A block is submerged in a container of liquid and held under the surface of the liquid by a string connected to the bottom of the container, as shown in the figure above. The tension in the string is not zero. How does the buoyant force F_B exerted by the liquid on the block compare to the block's weight w ?

- (A) $F_B < w$
 (B) $F_B = w$
 (C) $F_B > w$
 (D) Either $F_B < w$ or $F_B > w$, depending on the density of the liquid.

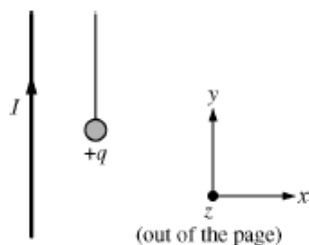
Questions 37-38 refer to the following material.



In the circuit shown above, the current through the ammeter is 20 mA and the voltmeter indicates 1.0 V.

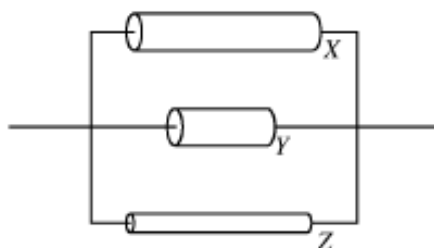
37. What is the current through the $40\ \Omega$ resistor?

- (A) 7.5 mA
 (B) 10 mA
 (C) 20 mA
 (D) 40 mA



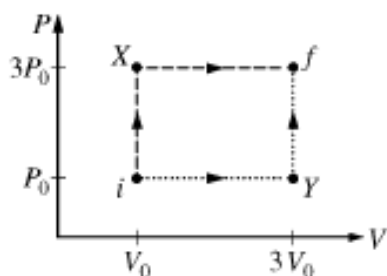
31. The figure above shows a long, straight wire that has a steady current I in the $+y$ -direction. A small object with charge $+q$ hangs from a thread near the wire. A student wants to investigate the magnetic force on the object due to the current but is not able to observe or measure changes in the tension in the string. Of the following actions that the student can take, which will allow the student to observe a reaction of the object due to the magnetic force on it?

- (A) Holding the object motionless
 (B) Moving the object in a circle that is centered on the wire and in the x - z plane
 (C) Moving the object in the $-x$ -direction
 (D) Moving the object in the $+y$ -direction



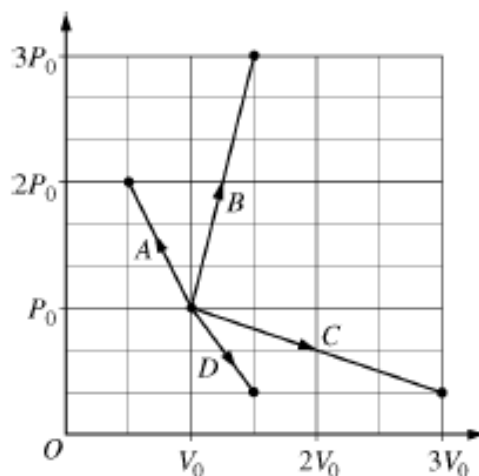
39. The figure above represents a section of a circuit containing three resistors, X, Y, and Z, of different sizes but made of the same material. Which of the following correctly ranks the current in the resistors?

- (A) $I_Z > I_X > I_Y$
 (B) $I_Z = I_X > I_Y$
 (C) $I_Y = I_X = I_Z$
 (D) $I_Y > I_X > I_Z$



47. A sample of an ideal gas can be taken from state i to state f via two processes, as shown in the above graph of pressure P versus volume V . In one process the gas goes through state X , and in the other process the gas goes through state Y . Which of the following will be the same for both processes? Select two answers.

- (A) The change in the internal energy of the gas
- (B) The temperature of the gas at the end of the process
- (C) The thermal energy transferred to the gas by heating
- (D) The work done on the gas



48. Identical samples of gas initially have pressure P_0 , volume V_0 , and temperature T_0 . In some experiments, students take samples through each of the processes shown in the graph above. The final temperature is equal to the initial temperature for which of the processes? Select two answers.

- (A) A
- (B) B
- (C) C
- (D) D