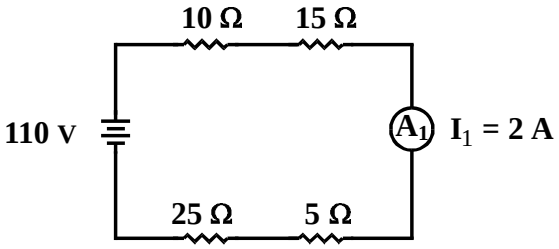
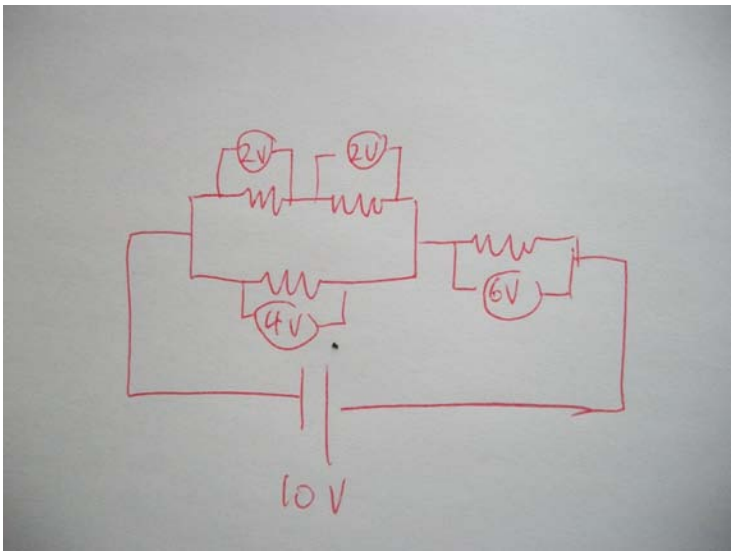
STE Pretest 3.2

1. Which resistor will experience the biggest drop in voltage? Why?



The one with the biggest resistance will experience the biggest voltage drop because V= IR and each resistor in series has the same current.

2. A) V_1 = 2.0 V, V_2= 4.0 V, V_3 = 2.0 V, V_4 = 6.0 V, V_T = 10.0V. All resistors are identical. Draw the circuit.



b) If 3.0 A flows through R_1, how much current flows through R_4?

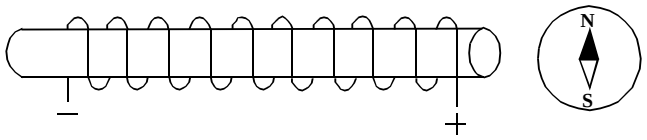
Each resistor = 2/3 Ω. (use V= IR)

In parallel: Req = $((4/3)^{-1} + (2/3)^{-1})^{-1}$ = 4/9 Ω.

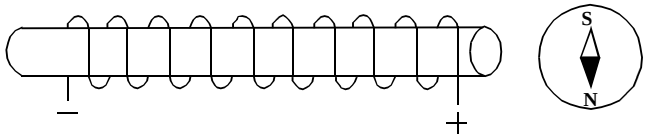
R_T = 2/3 Ω+ 4/9 Ω = 10/9 Ω.
$V_T = I_T R_T$
$10 = I_T 10/9$
I_T = 9 A

3. A compass is placed at one end of a solenoid. (2 marks)
In which illustration is the compass needle pointing in the proper direction?

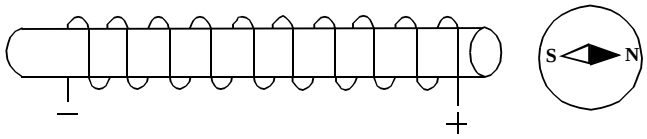
A)



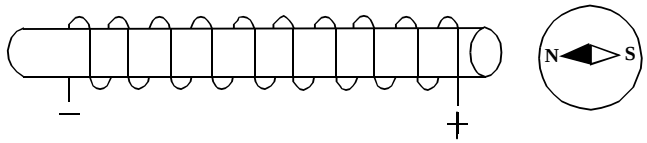
B)



C)



D)



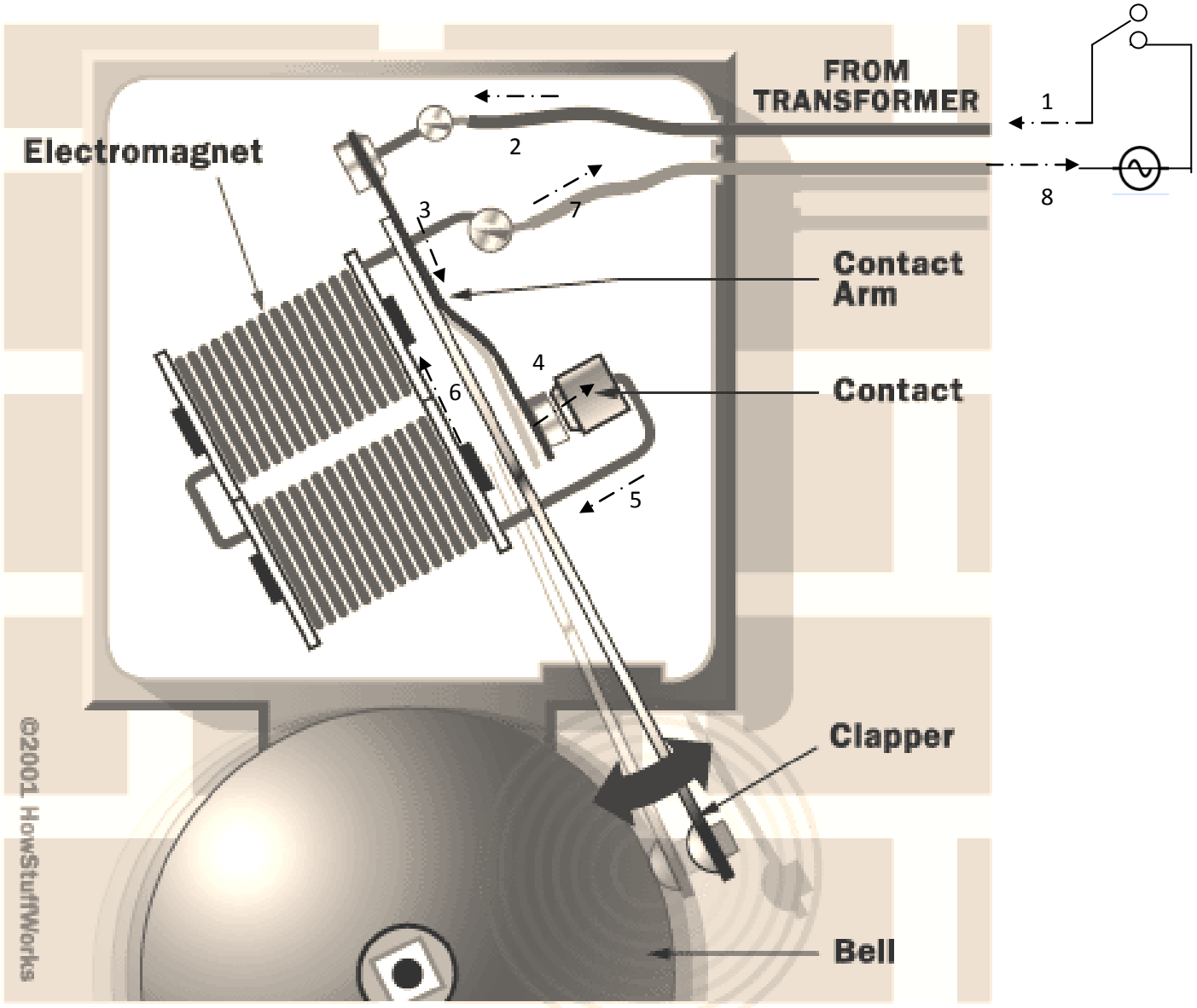
D

4. How can the electromagnets in no. 3 be strengthened? List two ways.

Create more loops or increase current/voltage.

5. Redraw a solenoid, showing two different ways by which the magnetic field direction can be reversed.

(1) Reverse the current
(2) Draw S-shaped loops instead of Z-shaped ones but keep the (-) on the left.



The above model of a doorbell uses an electromagnet and a contact arm. The electron flow is revealed by the 8 numbered broken-lined arrows in the diagram.

6. What must you do to make the clapper hit the bell?_____Turn on switch by pressing near number 1_
7. Why does your action make the clapper move?_____The current induces a magnetic field in the electromagnet which makes it pull the clapper towards thebell.
8. Aside from the obvious one, there is another "switch" that makes sure that the clapper does not get stuck to the bell when the electromagnet attracts the clapper arm. Where is it, and explain how it works? It's at position number 4. As the clapper gets attracted towards teh bell, it also breaks the circuit so that the electromagnet loses its magnetism and lets go of the clapper.

9. Show the difference in the type of bonding formed by oxygen when

   (A) It reacts with an alkaline earth metal and

   Oxygen gains a pair of electrons form each atom of an alkaline earth metal leading to an ionic bond:

   (B) When it reacts with carbon.

   Two oxygens will each form two covalent bonds with one carbon.

10. Why does 28.0 grams of nitrogen gas contain 1 mole of molecules but two moles of atoms? Show work?

    Nitrogen gas = N_2 = 28.0 g/mole, so that is 28/28 = 1 mole of N_2 molecules.

    Each mole of N_2 molecules contains two moles of N atoms.

11. If an iceberg's weight is given by F = $m_i g$ and the buoyant force is equal to the weight of the displaced water, show mathematically that

    The displaced water's volume = $\frac{\rho_i}{\rho_w} V_i$

Since the iceberg is floating, its weight exactly balances the buoyant force:

$$F_w = F_i$$

$M_w g = M_i g$ but mass = volume*density, where density is symbolized by ρ

$$V_w \rho_w g = V_i \rho_i g$$

$$V_w = \rho_i / \rho_w \, V_i$$