UNIVERSITY OF ALABAMA
Department of Physics and Astronomy

Quiz 5: Resistance is Futile

$$\mathscr{P} = I\Delta V = I^2 R = \frac{\Delta V^2}{R} = [\text{Watts}]$$

$$\Delta V = IR = [\text{Volts}] = [\text{Amps}][\text{Ohms}]$$

junction: $\quad I_{in} = I_{out}$

loop: sum of all V's is zero

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} \quad \text{par}$$

$$R_{eq} = R_1 + R_2 \quad \text{ser}$$

1. In the circuit diagram below, the resistors represent light bulbs. In these three circuits, all the batteries are identical and have negligible internal resistance, and all the light bulbs are identical. Rank all 5 light bulbs (A, B, C, D, E) in order of brightness from brightest to dimmest.

- ○ $A = B = C > D = E$
- ○ $A = D = E > B = C$
- ○ $A > B = C = D = E$
- ○ $A > B = C > D = E$
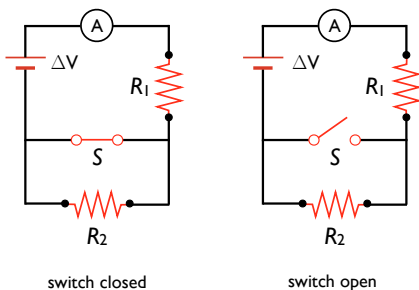- ○ $A > D = E > B = C$
- ○ $D = E > A > B = C$
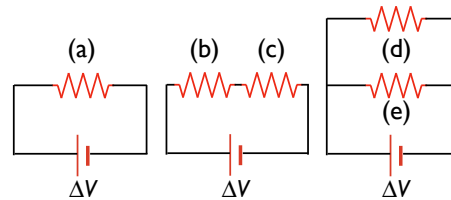
2. In the diagram above, which bulbs have the same **voltage**?

- ○ A=B=C, D=E
- ○ B=C=D=E
- ○ A=D=E, B=C
- ○ all bulbs have different voltages

3. If the current carried by a conductor is doubled, what happens to the average time between collisions?

- ○ Nothing.
- ○ It doubles.
- ○ It decreases by two times.
- ○ It increases by 4 times.
- ○ It decreases by 4 times.

switch closed   switch open

4. Refer to the figures at left. What happens to the reading on the ammeter when the switch S is opened?

- ○ the reading goes up
- ○ the reading goes down
- ○ the reading does not change

5. Kirchhoff's rules result from two basic physical laws. What are they?

- ○ Conservation of Energy and Charge quantization
- ○ Conservation of Energy and Conservation of Momentum
- ○ Conservation of Charge and Conservation of Energy
- ○ Coulomb's law and Conservation of Charge