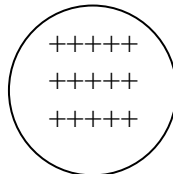


ST Pretest 3.2

1. When an object such as a bed sheet becomes statically charged, what kind of atomic particles is it either gaining or losing?

Electrons. Protons do not move in physical or chemical changes.

2. Use protons and electrons to explain what it meant by a statically charged object represented by the following:



3. A) If you connected the above to the ground, what would happen? What particles would move?

Electrons would move from the ground to the positive sphere. Again protons do not move, and keep in mind that the sphere still have electrons but also an excess of protons.

- B) What if the sphere was negatively charged? What would be different?

In such a case the electrons would repel themselves and the excess amount would move into the earth, where there is a lower charge density.

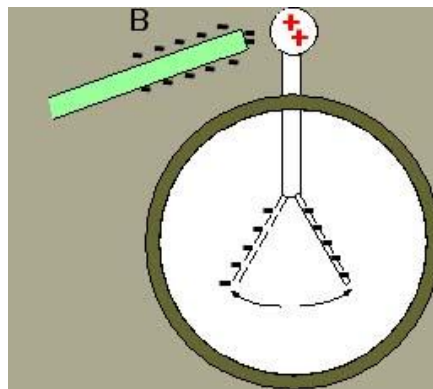
4. In the diagram below,
 - a. explain why the leaves of the electroscope are moving apart.

They both have the same charge.

- b. explain how the leaves both became negative, and why the metal sphere is positive.

The electrons from the sphere were repelled by the rod(B) and moved into the metal leaves(upside down V in diagram)

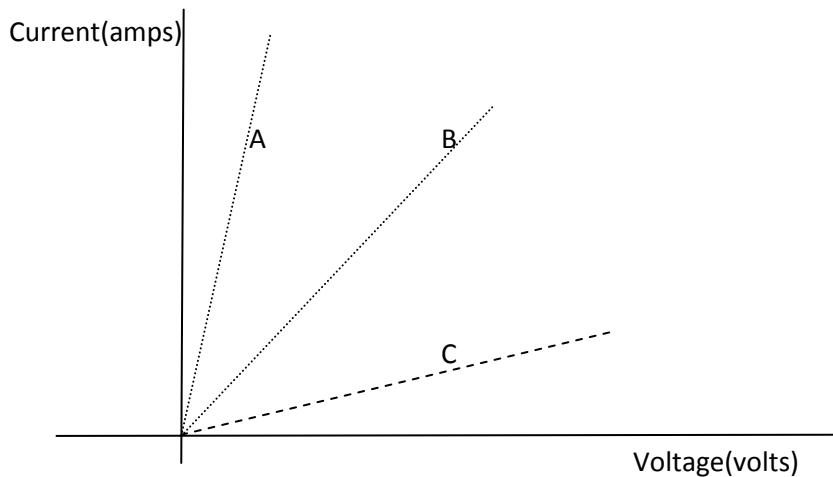
- c. explain what would happen if the rod actually touched the sphere. Use a drawing.



Show that the whole electroscope has a negative charge since the extra electrons have been allowed to leak into it.

5. Use a drawing to show how a positively charged balloon can get individual hairs to repel themselves.
6. For each set, choose the one which offers the *more* resistance
 - a. a wire 40 cm in length and 3 cm wide because it's narrower and crowds electrons more.
a wire 40 cm in length and 8 cm wide
 - b. a 20 cm wire made of Cu
a 30 cm wire made of Cu
 - c. a circuit operating at $-3\text{ }^{\circ}\text{C}$
one operating at $2\text{ }^{\circ}\text{C}$

7. Which straight line belongs to a resistor with the greatest conductivity? Why?



A's steeper slope indicates that we get lots of current from very little voltage.

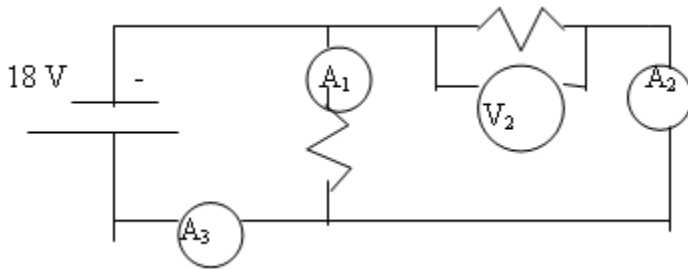
8. a) If the slope of line A was 0.80 S , what would the conductivity of the circuit be?

Conductivity = $G = 0.80\text{ S}$.

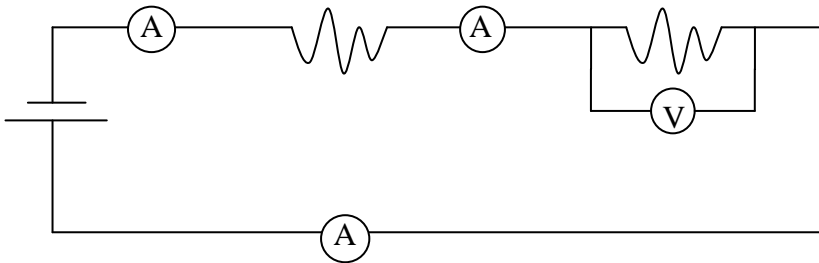
- b) Calculate the resistance of the circuit.

$R = 1/G = 1/0.80 = 1.25\ \Omega$.

9. Given:



- Circle the power supply. It's the the two line-symbol next to the 18 V.
- Is this a parallel circuit? Explain. Yes. There's a choice for electrons right above the A₁ point.
- What are the circled A's measuring? Current .
- If the resistor at A₁ was broken would electricity still flow in the rest of the circuit?. Show why or why not. Yes. The electrons would flow through the other path.
- Draw a series circuit with the same components.

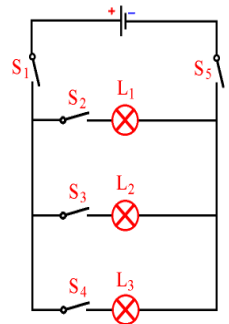


10. Which switches would you have to turn on to get lights L₁ and L₂ to work?

1, 2, 3, and 5.

11. The resistance of a certain battery-powered watch is 100 Ω. It requires 3V batteries. Calculate its power in kW.

$$\begin{aligned}
 V &= IR \\
 3 &= I(100) \\
 I &= 0.03A \\
 P &= VI \\
 &= 3(0.03) = 0.09W = 0.00009 \text{ kW.}
 \end{aligned}$$



12. Calculate the current drawn by a circuit with an overall resistance of 50 Ω and a power rating of 0.100kW.

$$\begin{aligned}
 P &= I^2R \\
 100 \text{ W} &= I^2(50) \\
 I^2 &= 2 \\
 I &= \sqrt{2} = 1.14 \text{ A}
 \end{aligned}$$

13. If a 240 V, 12 A heater is turned on for 2 minutes, how many joules of energy does it use up?

$$E = VIt = 240 (12)(120 \text{ s}) = 345600 \text{ J or } 345.6 \text{ kJ}$$