

Science 10-Electricity & Magnetism

Activity 4 (2007)

Activity 3E—Investigating Electric Current



10

Name _____

Due Date _____

Show Me Hand In *Correct and Hand In Again By* _____

Purpose:

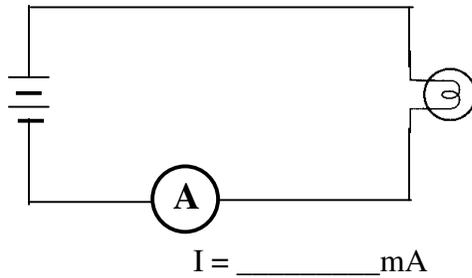
To use an ammeter to measure electric current in circuits with lamps connected in series and in parallel.

Procedure:

1. Connect two cells in series along with a light bulb and an ammeter as shown in the following picture:



Make sure the **negative** end of the batteries is connected to the **black** terminal on the ammeter. The wire from the **positive** end **MUST** be connected to the **lamp**. The wire from the other terminal on the lamp should be connected to the middle red terminal (eg. the 500 mA range). **Read** the current (I) on the meter in milliamperes (mA) and record it on the schematic diagram on the next page.



A circuit with 2 cells in Series, an Ammeter and a Lamp.

How many **pathways** are there for the electrons to travel in this circuit? _____

- Predict what will happen to the current reading on the ammeter if you add another lamp in series:

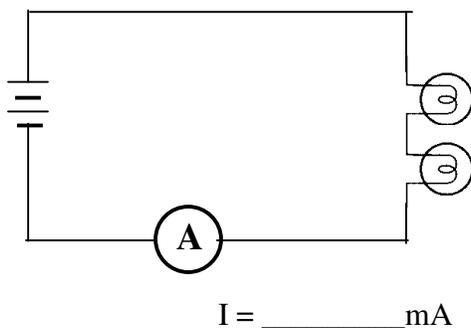
I predict that the current will go _____ if another lamp is added in series.

- Leave your batteries and ammeter the way they are and connect another cell in **series** as shown in the following picture:



A circuit with 2 lamps in Series

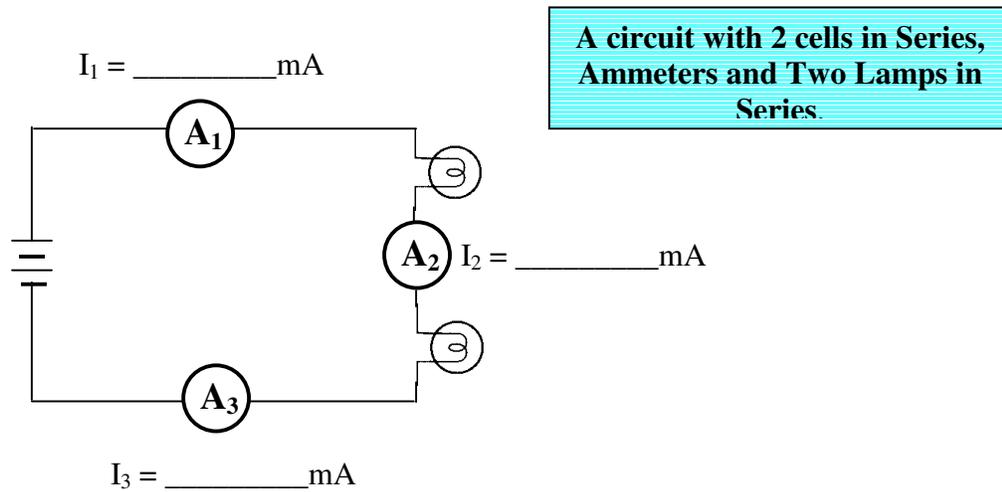
Read the current (I) on the ammeter and **record** it next to the ammeter on the following schematic diagram:



A circuit with 2 cells in Series, an Ammeter and Two Lamps in Series.

How many **pathways** are there for the electrons to travel in this circuit? _____

4. Now go to STATION 4. The following circuit is set up. Record the current readings on the three ammeters (A_1 , A_2 , and A_3) on the diagram here.



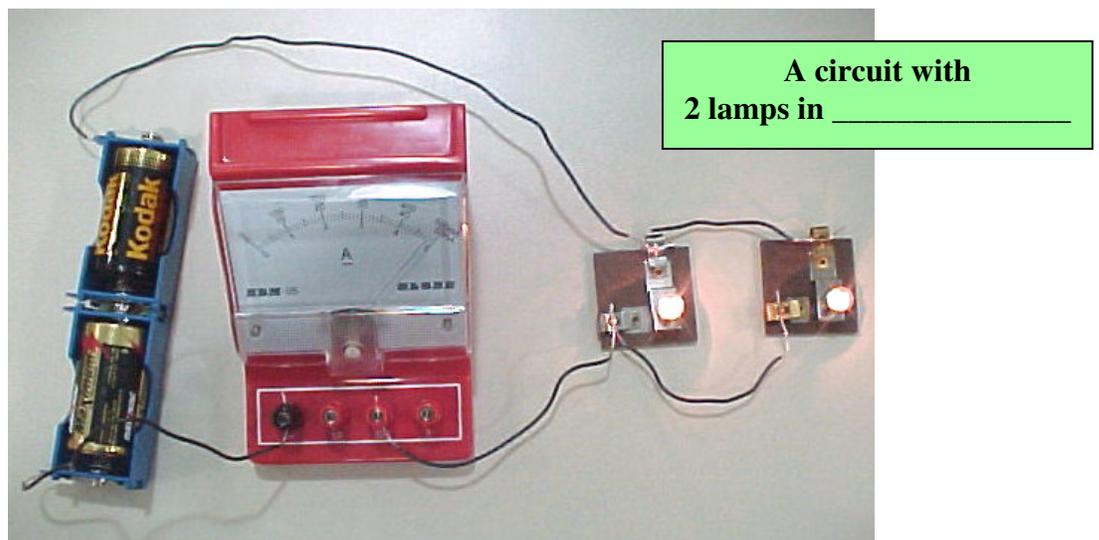
How do the three readings compare? _____

How many **pathways** are there for the electrons to travel in this circuit? _____

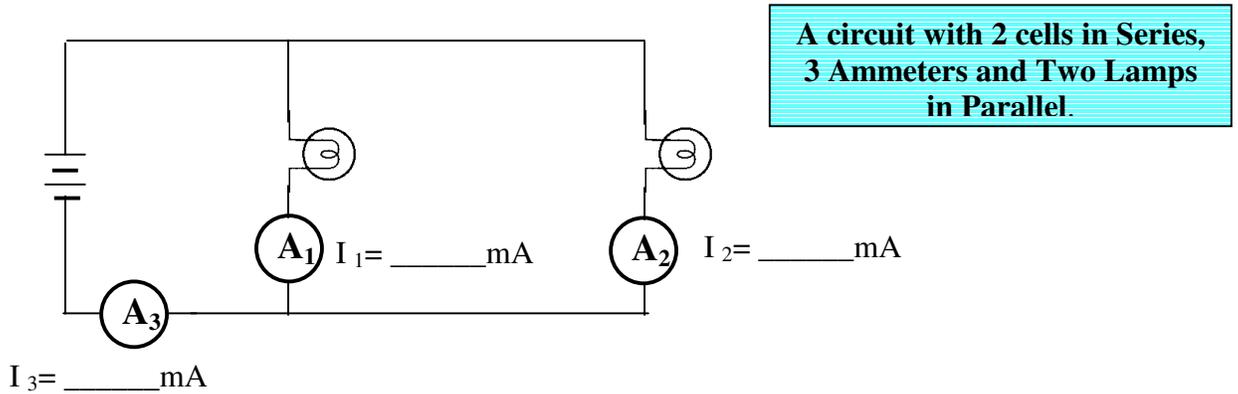
Summarize what you learned about the current in a series circuit (with one pathway) ?

*In a **series** circuit, the current _____
at any location in the circuit.*

5. In the following diagram, the two lamps are connected in _____



6. **Go to STATION 6.** Record the readings on ammeters A_1 , A_2 and A_3 on the following diagram:



Which ammeter has the greatest amount of current, A_1 , A_2 or A_3 ? _____

How many **pathways** are there for the electrons to travel in this circuit? _____

Add up the currents $I_1 + I_2$: _____ mA + _____ mA = _____ mA

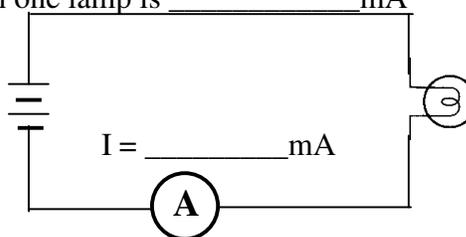
How does the sum of $I_1 + I_2$ compare with the current I_3 ? _____

Write an equation relating I_1 , I_2 and I_3 : _____

7. Go back to the top of page 2 in this lab and find the current you recorded for one lamp.

The current going through one lamp is _____ mA

A circuit with 2 cells in Series, an Ammeter and one Lamp.



In Procedure 6, one lamp was replaced by **two lamps in parallel**. What is the current reading in Ammeter A_3 in Procedure 6 (near the top of this page) _____ mA.

When one lamp is replaced by two lamps in parallel, the total current in the circuit (increases/decreases) _____

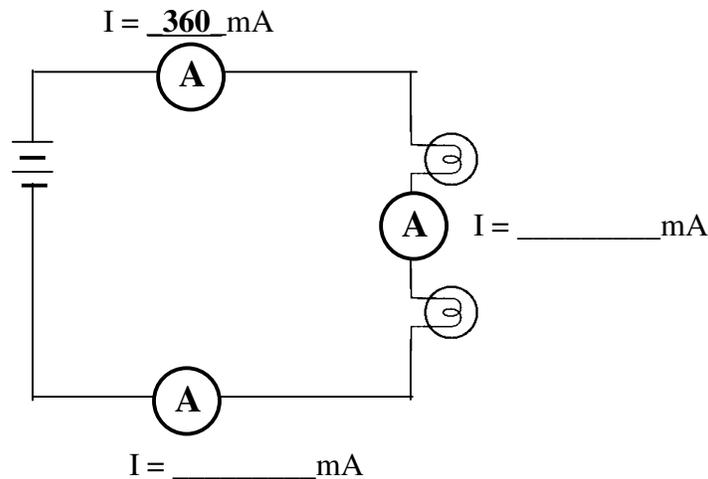
Questions:

1. When one lamp is replaced by two lamps in **series**, the current _____creases.
2. When two lamps are in series, the number of pathways for the electron flow is _____.
3. When one lamp is replaced by two lamps in **parallel**, the total current _____creases.
4. a). Draw a schematic circuit diagram for a circuit with **two** cells in **series** and **three** lamps in **parallel**. Put an ammeter between the cells and the first lamp.

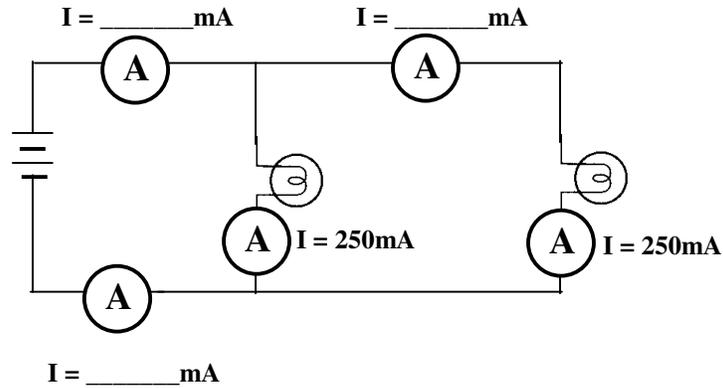
b) How many conducting pathways are there in this circuit? _____

5. Look at the following circuit diagram. From the readings shown on the ammeters, write the current reading you would expect on the ammeter without the reading shown.

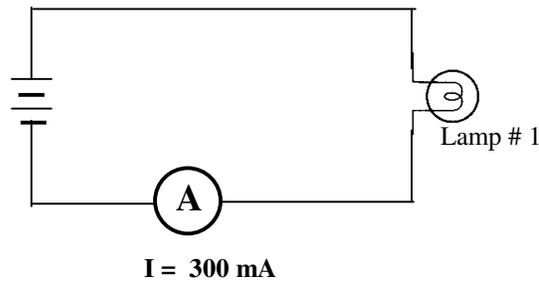
a)



b)



6. Consider the following circuit:



a) What will happen to the current in ammeter “A” (*increase/decrease/no change*) if another lamp is added to Lamp #1 in **series**? The current will _____

b) What will happen to the current in ammeter “A” (*increase/decrease/no change*) if another lamp is added to Lamp #1 in **parallel**? The current will _____

7. Adding more lamps in **series** _____ **creates** the current going through the battery in the circuit.

8. Adding more lamps in **parallel** _____ **creates** the current going through the battery in the circuit.