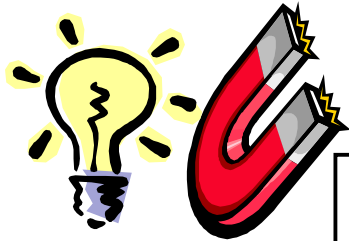


Science 10-Electricity & Magnetism

Activity 3

Activity 3D—Voltage of Electrical Cells in Series and in Parallel



10

Name _____

Due Date _____

Show Me Hand In

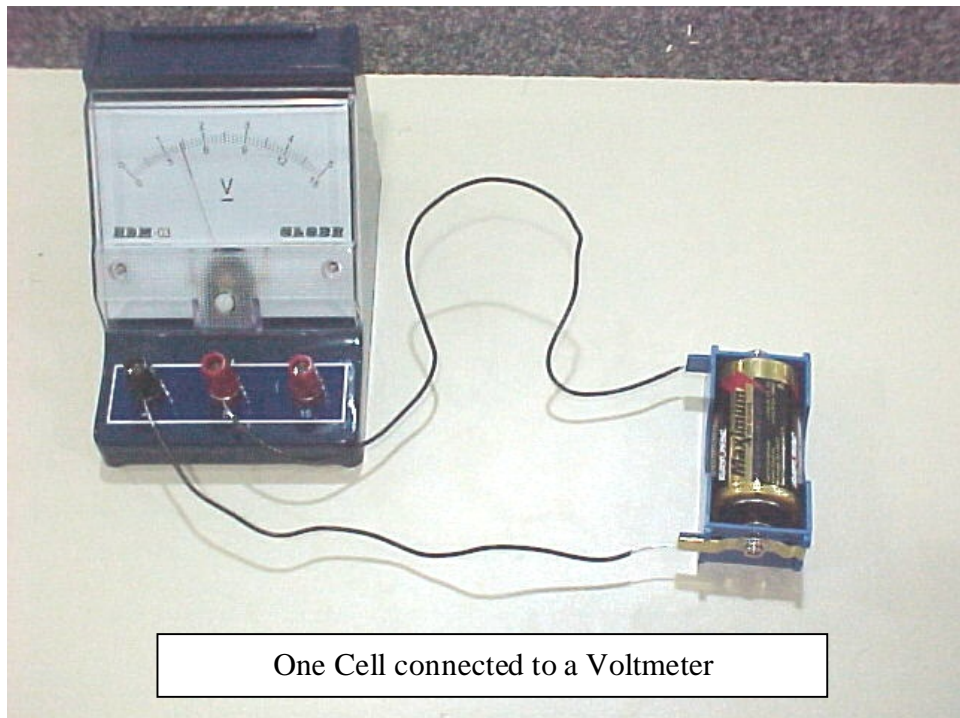
Correct and Hand In Again By _____

Purpose:

To see how connecting cells in **series** and in **parallel** affects the total voltage.

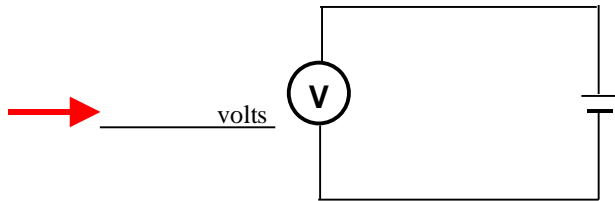
Procedure:

1. Connect a single cell to a voltmeter as shown in the diagram. Make sure the negative end of the cell is connected to the black terminal on the voltmeter. If the voltmeter has different ranges, choose a range of around 5 to 15 volts. Your teacher will explain how the ranges on your voltmeters work:



One Cell connected to a Voltmeter

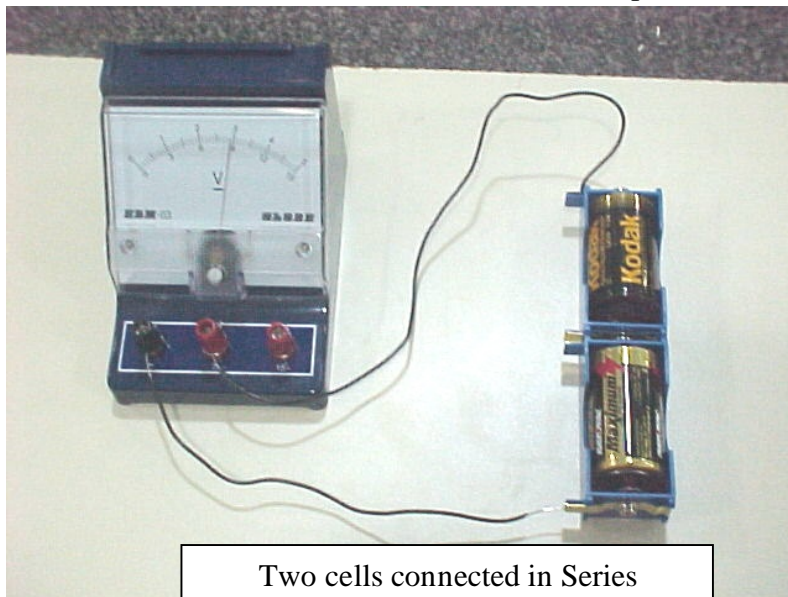
2. Read the voltage given on the voltmeter to the nearest 0.2 volts. Record it next to the voltmeter on the conventional circuit diagram given here:



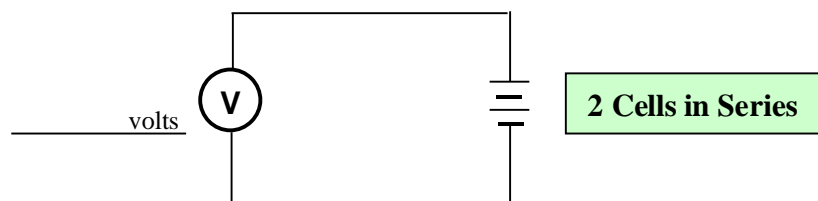
3. Now predict what the voltage will be if you connect **two cells in series**. (You will not lose marks for a wrong prediction!)

I predict the voltage will be _____ volts.

4. Next, connect **two cells in series** (+ - + -) as shown in the picture below:



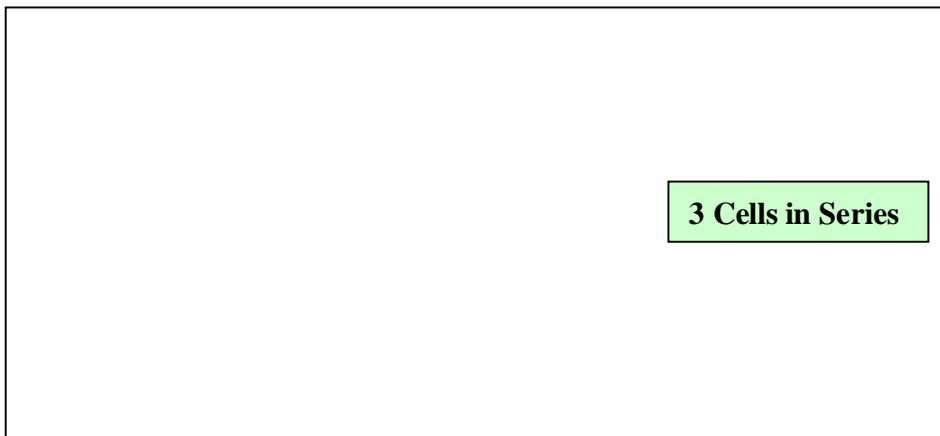
5. Record the voltage next to the voltmeter on the following conventional circuit diagram:



6. Now predict what the total voltage would be if you connected **3 cells in series**.

I predict the voltage would be _____ volts.

7. Using a ruler, draw a neat conventional circuit diagram showing **three** cells in **series** and a voltmeter:

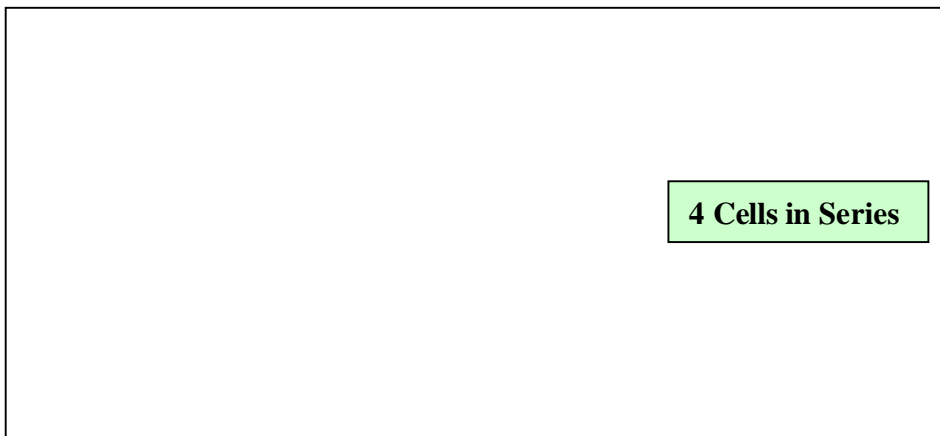


8. Connect **three** cells in **series**. Measure the total voltage and record it next to the voltmeter in your conventional circuit diagram right above this.
NOTE: If the needle on the voltmeter is near the top of your scale, you will have to switch to a higher scale before you take the next reading!

9. Now predict what the total voltage would be if you connected **4** cells in series.

I predict the voltage would be _____ volts.

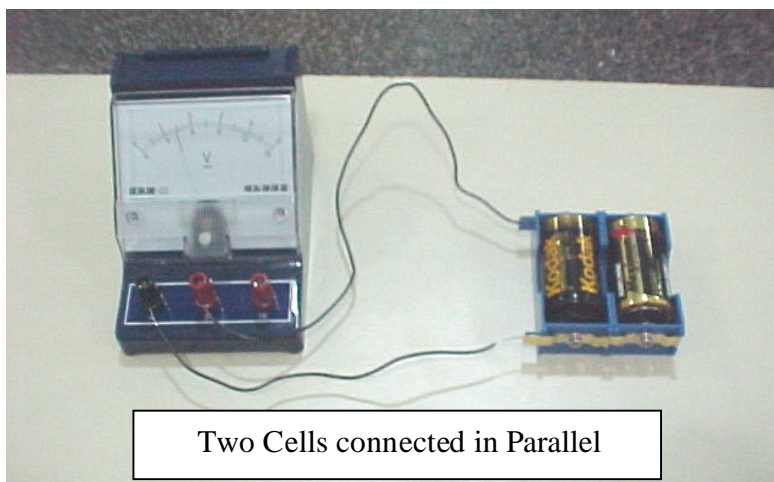
10. Using a ruler, draw a neat conventional circuit diagram showing **four** cells in series and a voltmeter:



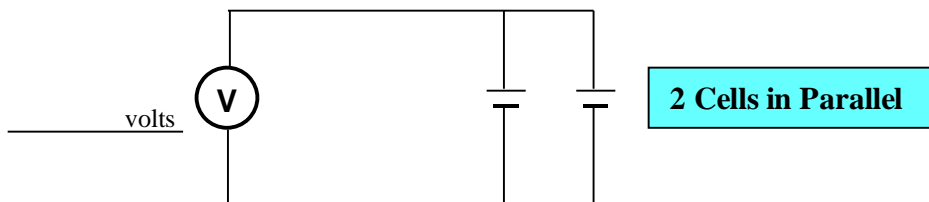
11. Connect **four** cells in **series**. Measure the total voltage and record it next to the voltmeter in your conventional circuit diagram right above this.

From the observed results, suggest a way you can calculate the total voltage of a given number of cells in series assuming each cell is 1.5 volts.

12. Now connect **two** cells in **parallel** as shown in the following picture. Make sure the positive wire is connected to the terminal with a **low** voltage range again. (eg. 5 volts)



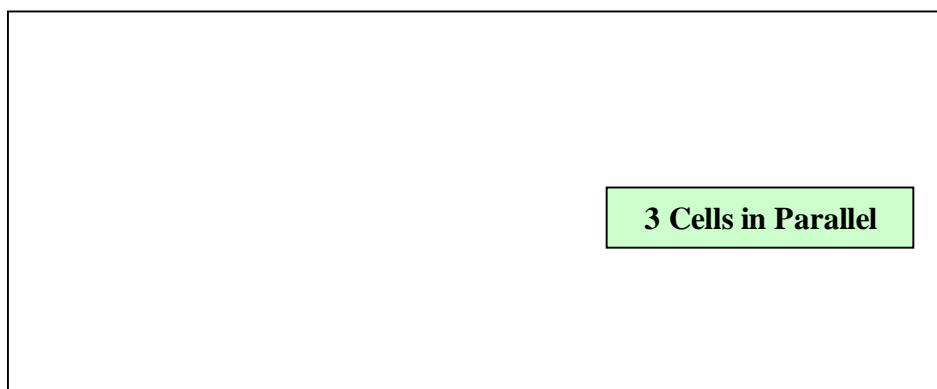
13. Measure the voltage and record it next to the voltmeter in the following circuit diagram:



14. Now predict what the total voltage would be if you connected **3** cells in **parallel**.

I predict the voltage would be _____ volts.

15. Using a ruler, draw a neat conventional circuit diagram showing **three** cells in **parallel** and a voltmeter:

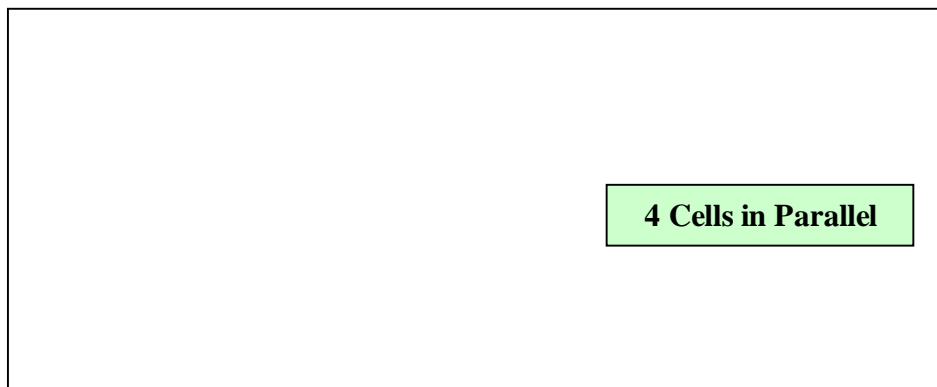


16. Connect **three** cells in **parallel**. Measure the total voltage and record it next to the voltmeter in your conventional circuit diagram right above this.

17. Now predict what the total voltage would be if you connected **4 cells in parallel**.

I predict the voltage would be _____ volts.

18. Using a ruler, draw a neat conventional circuit diagram showing **four cells in parallel** and a voltmeter:



19. Connect **four cells in parallel**. Measure the total voltage and record it next to the voltmeter in your conventional circuit diagram right above this.

From the observed results, suggest a way you can calculate the total voltage of a given number of cells in parallel assuming each cell is 1.5 volts.

20. Take your equipment apart and put all the cells, cell holders, voltmeters and wires in the places designated by your teacher.

Questions:

1. Use the data from the observations to fill in the following table:

Number of Cells	Series or Parallel	Total Voltage (volts)
1	--	
2	Series	
3	Series	
4	Series	
2	Parallel	
3	Parallel	
4	Parallel	

Come up with a rule for finding the **total voltage** when you connect a number of cells in **Series**. (**NOTE:** The actual voltages may be not follow your rule **exactly** due to uncertainty in the voltmeter, batteries being weak or human error.)

*To find the total voltage of cells in **Series**:*

Come up with a rule for finding the **total voltage** when you connect a number of cells in **Parallel**. (NOTE: The actual voltages may be not follow your rule **exactly** due to uncertainty in the voltmeter, batteries being weak or human error.)

To find the total voltage of cells in **Parallel**:

2. Assuming that the voltage of each cell in the following diagrams is **1.5 v**, calculate the voltage which would be read on each voltmeter shown. Write the voltage value in the space beside each voltmeter.

