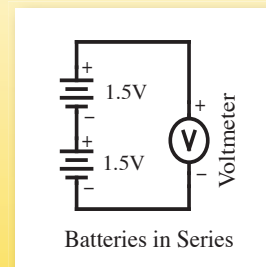
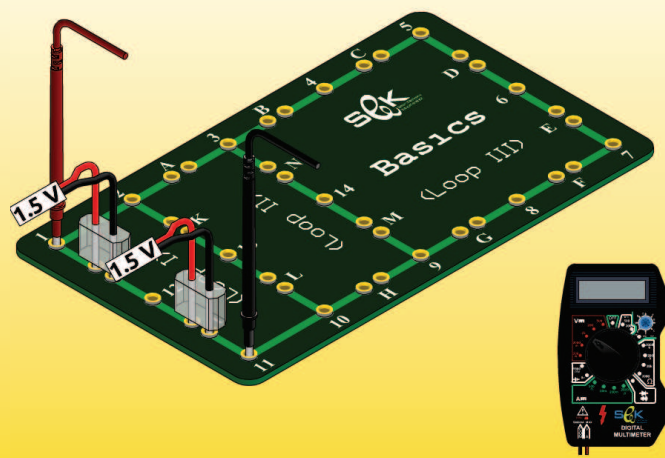


## Experiment No. (6) Connecting Batteries in Series and Parallel



### Objectives:

1. The student will be able to connect Batteries in Series and Parallel.
2. The student will investigate the advantages of connecting Batteries in Series and Parallel.
3. The student will be able to measure the output voltage of connecting Batteries in Series and Parallel.

### Apparatus:

- Basics Board
- Voltage Source (PSB Board)
- DMM
- Jumpers
- Connection Wires

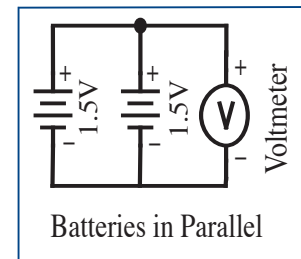
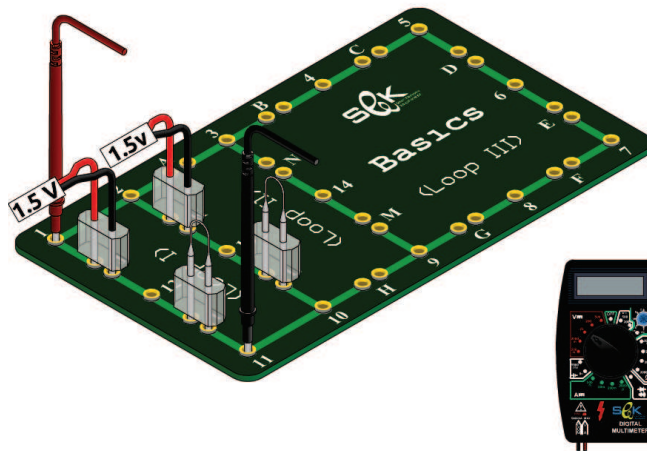
### Procedure and Conclusions:

#### Connecting Batteries in Series:

1. Connect (1.5 volt) from PSB board to pair (J) using a connection wire in a way that the positive terminal (red wire) of the connection wire will be towards point (1).
2. Use another connection wire to connect (1.5 volt) from PSB board to pair (I) in a way that the positive terminal (red wire) of the connection wire will be towards point (12).
3. Set the mode of the DMM to (DVC) (range 20). Using the DMM probes, measure the voltage difference ( $V_1$ ) between points (1) & (12), voltage difference ( $V_2$ ) between points (11) & (12) and voltage difference ( $V_{out}$ ) between points (1) & (11).

- Voltage difference between points (1 & 12), ( $V_1$ ) = ....volt, voltage difference between points (11 & 12), ( $V_2$ ) = ....volt, voltage difference between points (1 & 11), ( $V_{out}$ ) = .... volt.
- We conclude that identical batteries in series produce a voltage equal to ..... multiplied by the voltage of each individual battery.
- Batteries in series need to be connected with the positive end of one battery to the ... **positive / negative** ... end of the next battery.

### Connecting Batteries in Parallel:



4. Take the connection wire off the pair (I) and insert it at the pair (K) in a way that the positive terminal (red wire) will be towards point (2).
5. Insert jumpers at the pairs (L) and (I)
6. Use the DMM to measure the voltage difference between the points (1) and (11).
  - Voltage difference between points (1 & 11) = .... volt.
  - We conclude that batteries in parallel produce a voltage equal to.....
  - Batteries in parallel need to be connected with the positive end of one battery to the ... **positive / negative** ... end of the other battery.



### Discussion

1. What is the advantage of connecting batteries in Series?
2. What is the advantage of connecting batteries in Parallel?
3. Why it's not advisable to connect batteries of unequal voltages in parallel?