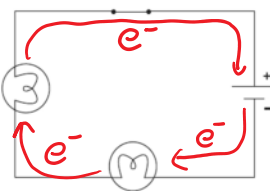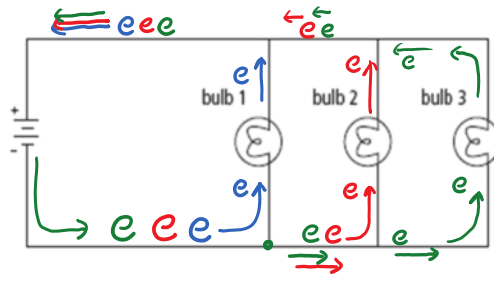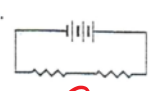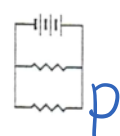# Printout

Science 9 – 3-4 C2: Series vs. Parallel Circuit Part 1

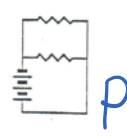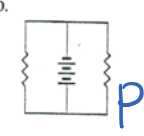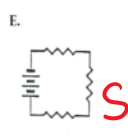| In a circuit, devices (such as light bulbs or batteries) can be placed in two different ways.	
SERIES	**PARALLEL**
• When devices are placed in series, the current must go through __each devices__ one by one • In this circuit, there is only __one path__ and the __electrons__ goes through the two light bulbs in the series.	• When devices are placed in parallel, there are 2 or __more pathways__ for the electron current to travel • it __spit__ and some of it goes through one device, and some of it goes through the other(s).

Decide whether each circuit is **S**eries, **P**arallel, or a **C**ombination of the two.
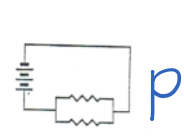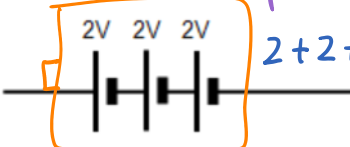
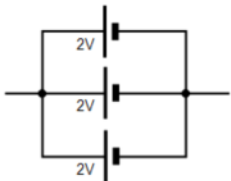A. S   B. P   C. P   D. P   E. S   F. P

Series and Parallel Combinations of Cells

• When cells are connected in __Series.__, we can find the total amount of voltage by just __add__ them together.

power!!!

2V 2V 2V   2+2+2 = 6V

In Series

$$V_T = V_1 + V_2 + V_3 + ...$$

• When cells are combined in __parallel__, the voltage __will not__ increase but the amount of charge (current) does.
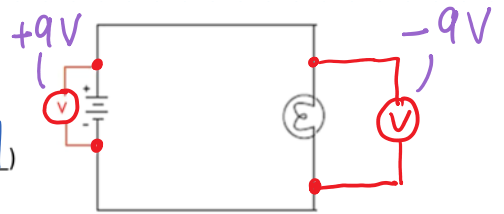
2V
2V
2V

$V_{Total} = 2V$ but it will last ~3 times longer

• The advantage of the parallel circuit is that although the output voltage is the same as that of a single cell, the battery formed from the group of cells contains __more energy.__ and so will supply current for longer.

• Voltage is measured by a device called a __Voltmeter__

+9V   −9V

- Voltage is measured by a device called a **Voltmeter**
- The symbol for the device is ──Ⓥ── on a circuit diagram
- The voltmeter is always connected across the device in (**parallel**)
- This is to measure the Voltage (Energy) difference between 2 points
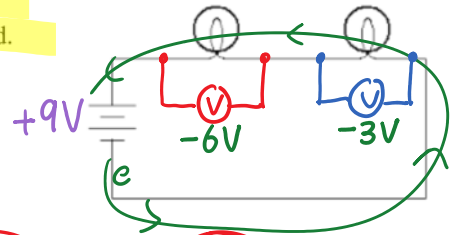
+9V   −9V

Measuring Voltage in Series

- When electrons go through a cell they **gain Energy**, we call this Voltage Gain
- AS electrons go through a load such as a light bulb they **lose Energy**, we call this Voltage Drop
- In an ideal situation the total voltage gained from the battery should **Equal** to the total voltage dropped from all the loads combined.

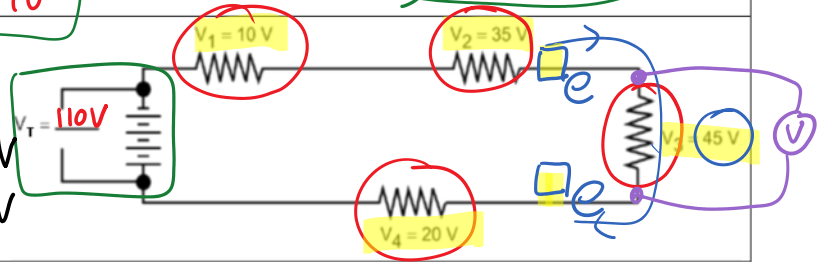$$V_{Total} = V_1 + V_2 + V_3 + \ldots\ldots$$
Series

HW: WB P. 140

+9V   −6V   −3V

Example 1)

What is V_T?

Total Voltage = 10V + 35V + 45V + 20V

$$V_T = \boxed{110V}$$

$V_T = 110V$

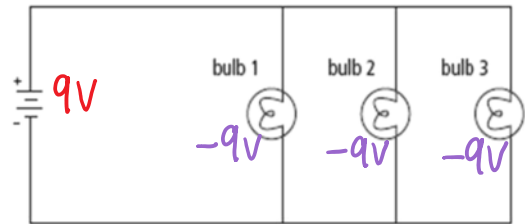$V_1 = 10\ V$ $V_2 = 35\ V$ $V_3 = 45\ V$ $V_4 = 20\ V$

Measuring Voltage in Parallel

- When electrons go through devices in parallel they **Split** at the junction point.
- Each load in parallel will receive the **Same** amount of energy/Voltage.

$$V_{Total} = V_1 = V_2 = V_3 \ldots$$

9V   bulb 1   bulb 2   bulb 3
−9V   −9V   −9V

Example)

If $V_1 = 10\ V$, Calculate V_T, V_2 and V_3

$V_T = 10V$

bulb 1   bulb 2   bulb 3

$V_1 = 10\ V$ $V_2 = 10\ V$ $V_3 = 10\ V$