

STE

Lab Exam Study Guide

1. You will be given a mystery box with four IDENTICAL resistors. You will not be able to see the actual circuit. There will just be eight holes, two for each of the resistors, and you will have to measure the voltage for each resistor.

With the 4 measurements, you have to draw a circuit diagram that is consistent with the results.

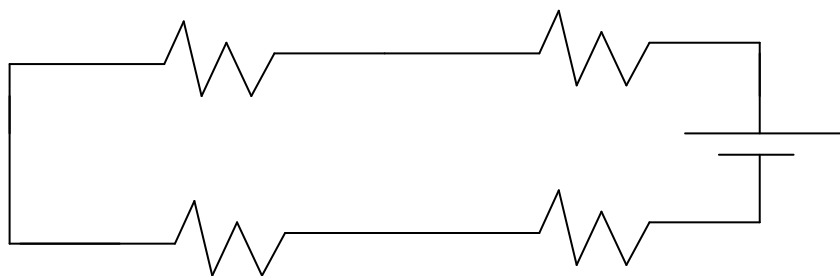
Example 1 Let's say the voltage of the power source = 4.0 V. This will not be your choice. During the exam, you will be asked to set it at a certain voltage.

The following measurements are obtained:

V_1	1.00 V
V_2	1.00 V
V_3	1.00 V
V_4	1.00 V

Draw the circuit and show why $V_4 = V_1$

ANSWER Connect all four in series.

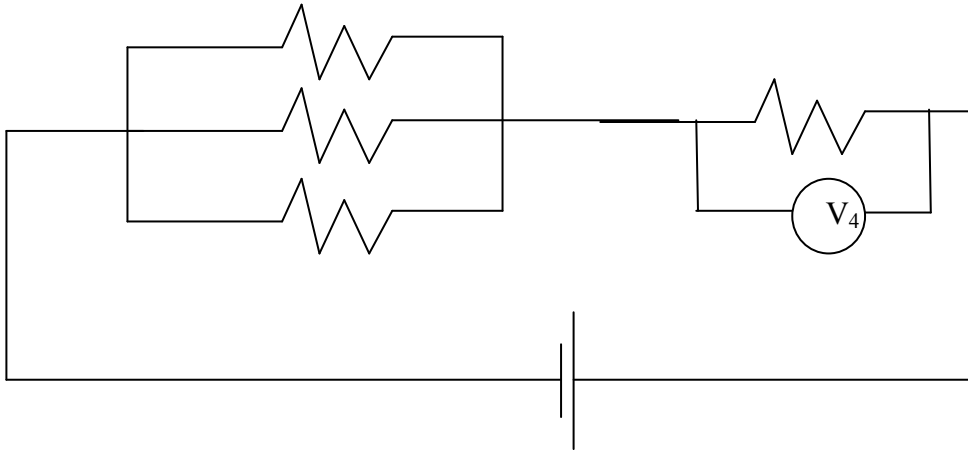


Since the current is constant and the resistors are all the same then all individual voltages are equal to each other.

Example 2 Let's say the voltage of the power source = 12.0 V

V_1	3.00 V
V_2	3.00 V
V_3	3.00 V
V_4	9.00 V

Draw the circuit and show why V_4 is triple the value of V_1



Since this is an overall series circuit, the current passing through R_4 is equal to the current just before it splits at the parallel part. But the parallel part only has $1/3$ of the resistance compared to R_4 . Why? If three identical resistors are in parallel their resistance will be divided by 3.

So since their overall resistance is $1/3$ while the total current is the same, the voltage for the parallel part will also be $1/3$ of V_4 's

2. There will be a couple of questions about the phosphates lab.

Here are some sample questions:

- a) What prior knowledge did a student have if he assumed that the grey water with the most soap probably had the most phosphates?

A lot of soaps contain phosphates because it binds to Ca^{+2} . Ca^{+2} interferes with soap's ability to clean.

- b) There were two chemicals that were added to grey water when testing for phosphates. The first one had acid in it. The second chemical would not produce a green or bluish

colour (a sign of phosphates) when pH was too high. List two chemicals from the grey water that the acid could have been attacking.

Acids react with base.

(1) Soap itself is a base, and

(2) phosphates leave base behind.

- c) What quantity was proportional to the intensity of the colour after both chemicals were added to the grey water?

The concentration of phosphate determines how deep the colour is.