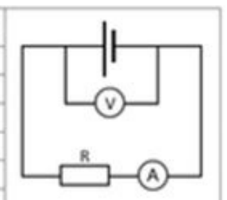
Series circuit analysis worksheet answers

Circuit calculation practice

SERIES CIRCUITS: To solve simple circuit calculations you will need to use Ohm's law, which can be represented mathematically as V = I x R. The simplest problems will expect you to use the formula in this arrangement. More difficult questions will require you to rearrange the formula.

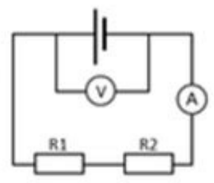
If you are not confident rearranging calculations use the formula triangle to help you find the correct formula

V = Voltmeter reading V (volts) [V]	A = Ammeter Reading A (amps) [I]	R = Resistor value Ω (ohms) [R]
10	2	5
3	1.5	2
3	6	0.5
9	3	3
12	6	2
24	4	6



More difficult circuit problems will include more than one resistor connected in series. The key to being able to solve these problems is remembering that total resistance is equal to the value of both resistors added together. You can then use Ohm's law (V = I x R) to calculate the unknown values. Sometimes you may need to use Ohm's law first.

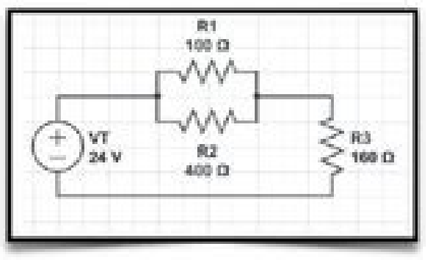
Remember: if you are not confident rearranging calculations use the formula triangle to help you find the correct formula



Resistor 1 value (Ω)	Resistor 2 value (Ω)	Total resistance (Ω)	Voltage (V)	Current (A)
R1	R2	R1 + R2	V	I
2	2	4	12	3
1	4	5	25	5
3	9	12	6	0.5
5	5	10	2	0.2
6	6	12	24	2
3	1	4	3.6	0.9

Question 2

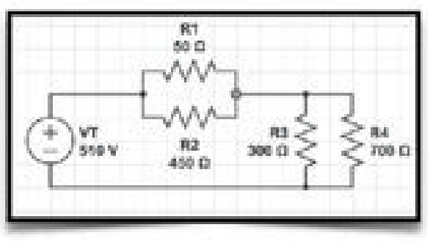
Determine the unknown quantities in the table from the circuit



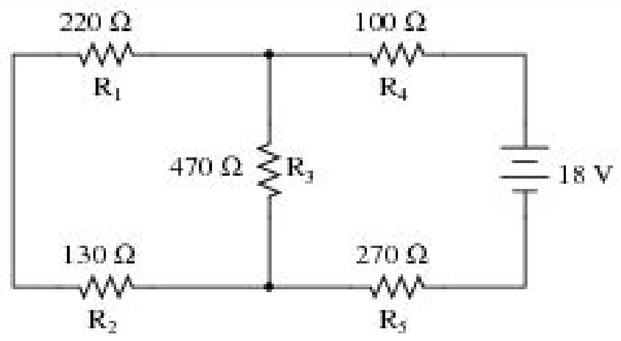
V=	
V=	
V=	
I=	
I=	
I=	
I	
R	

Question 3

Determine the unknown quantities in the table from the circuit



V=	
V=	
V=	
V=	
I=	
I=	
I=	
I	
R	



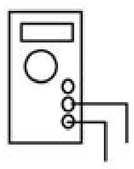
	R1	R2	R3	R4	R5	Total
V						
I						
R	220 Ω	130 Ω	470 Ω	100 Ω	270 Ω	
P						

Using **YOUR** values for **Total Voltage & Total Current** in the above tables, **CALCULATE** the **TOTAL RESISTANCE** of the circuit using **Ohm's Law.**

Calculated **Total Resistance of your Parallel Circuit →** _____

WITH THE WIRES REMOVED FROM THE RESISTOR(S)… MEASURE RESISTANCE

Measure with the Digital Multimeter… The Resistance of…	**Resistance [Ohms]**
Resistor #1	
Resistor #3	
CALCULATED Total Resistance of Circuit [Using Ohm's Law]	
MEASURED Total Resistance of Circuit [Using the Multi-meter]	
PERCENT ERROR between the two CALCULATED Total Resistance values.	



TO TEST RESISTANCE…
Set Multi-meter to the **200 Ω setting**
WITH THE WIRES REMOVED FROM THE RESISTORS BEFORE TESTING!

Conclusions

Using your knowledge of electric circuits, answer the following…

#1-3→ For SERIES circuits…

1. A. What would happen to the **Total Current of your circuit** if you were to change from a two-bulb series circuit to a three-bulb series circuit?

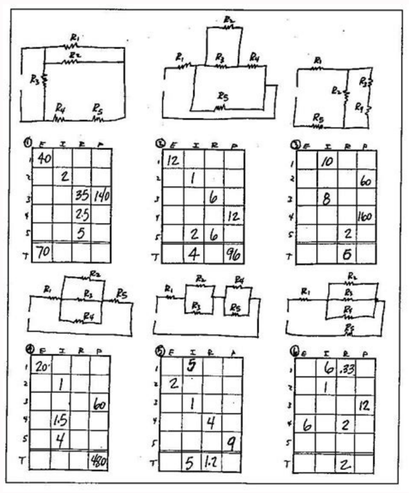
   B. How could you tell from **JUST LOOKING** at the bulbs?

2. What would happen to the bulbs if one bulb blows out while doing the experiment?

3. What happens to the **Total Resistance of your circuit** if you added a bulb to the series circuit?

#4-6→ For PARALLEL circuits…

4. A. What would happen to the **Total Current of your circuit** if you change from a two-bulb parallel circuit to a three-bulb parallel circuit?



Series circuit answer key.

Three Laws for Series Circuits There are three fundamental relationships concerning resistance, current, and voltage for all series circuits. It is important that you learn the three fundamental laws for series circuits. Resistance Whenever individual resistances are connected in series, they have the same effect as one large combined resistance. Since there is only one path for current flow in a series circuit, and since each of the resistors is in line to act as an opposition to this current flow, the overall resistance is the combined opposition of all the in-line resistors. The total resistance of a series circuit is equal to the sum of all the individual resistances in the circuit. Rt = R1 + R2 + R3… Using this formula, you find that the total resistance of the circuit is: RT = 15 Ω + 5 Ω + 20 Ω = 40 Ω Figure 16. Series circuit Current Since there is only one path for electron flow in a series circuit, the current is the same magnitude at any point in the circuit. The total current in a series circuit is the same as the current through any resistance of the circuit. IT = I1 = I2 = I3… Given 120 V as the total voltage, and having determined the total resistance of the circuit as 40 Ω, you can now apply Ohms law to determine the total current in this circuit: IT = 120 V/ 40 Ω = 3 A This total circuit current would remain the same through all the individual circuit resistors. Voltage Before any current will flow through a resistance, a potential difference, or voltage, must be available. When resistors are connected in series, they must "share" the total voltage of the source. The total voltage in a series circuit is equal to the sum of all the individual voltage drops in the circuit. As current passes through each resistor in a series circuit, it establishes a difference in potential across each individual resistance. This is commonly called voltage drop, and its magnitude is in direct proportion to the value of resistance. The greater the value of resistance, the higher the voltage drop across that resistor. ET = E1 + E2 + E3… Using Ohms law you can determine the voltage across each resistor. 3 A × 15 Ω = 45 V 3 A × 5 Ω = 15 V 3 A × 20 Ω = 60 V The total source voltage is equal to the sum of the individual voltage drops: 45 V + 15 V + 60 V = 120 V An Open in a Series Circuit If an open is introduced, current through the circuit is interrupted. If there is no current flow, the voltage drop across each of the resistive elements is zero. However, the potential difference of the source appears across the open. If a voltmeter is connected across the open, the reading is the same as if it were connected directly across the terminals of the supply source. Figure 17. Open circuit Effects of Line Drop and Line Loss Copper and aluminum are used as conductors because they offer little opposition to the flow of current. Although the resistance is often neglected in simple circuit analysis, it may be necessary to consider the resistance of lines in practical applications. Line Drop Figure 18. Volt drops As the 10 A current flows through each line resistance of 0.15Ω, a small voltage drop appears across each line. This voltage drop across the line conductors is commonly referred to as a line drop. Since there are two lines, the total drop is 2 × 1.5 V = 3 V. The net voltage across the load (117 V) is less than the source voltage. In some situations, it may be necessary to used larger conductors, which have lower resistance, so that the line drop does not reduce the load voltage too significantly. Line Loss Another term associated with conductors is line loss. This is a power loss expressed in watts and is related to heat energy dissipation as current flows through the resistance of the line conductors. Line loss is calculated by using one of the power equations. Using the previous example: P = I2 × R P = (10A)2 × 0.3Ω P = 30 watts *Remember: Line drop is expressed in volts. Line loss is expressed in watts. Attribution DC series circuit video by The Electric Academy is under a Creative Commons Attribution License.

Cathode Ray Tube - The Cathode Ray Experiment by J.J.Thomson helped to discover electrons. Cathode ray tube is the heart of the oscilloscope and it generates the electron bean, accelerates the beam and deflects the beam. Visit BYJUS to learn more about it. Curious to see how well you have mastered a certain physics concept? Take Study.com's quick multiple-choice quiz. Obtain immediate results to ascertain how well … Civil Engineering Engineering Reference Manual for the PE Exam Fourteenth Edition 19/08/2022 · This Twosday Challenge is the perfect way to infuse a bit of mathematical fun on an upcoming mathematical holiday - Twosday! Using exactly four twos, add arithmetical symbols between the twos to make each of the target numbers. You may use plus, minus, times, and divide symbols, as well as parentheses and brackets for grouping. Notes: Rules of series and parallel circuits are very important for students to comprehend. However, a trend I have noticed in many students is the habit of memorizing rather than understanding these rules. Students will work hard to memorize the rules without really comprehending why the rules are true, and therefore often fail to recall or apply the rules properly. Experiment with an electronics kit! Build circuits with batteries, resistors, ideal and non-Ohmic light bulbs, fuses, and switches. Determine if everyday objects are conductors or insulators, and take measurements with an ammeter and voltmeter. View the circuit as a schematic diagram, or switch to a lifelike view. Cathode Ray Tube - The Cathode Ray Experiment by J.J.Thomson helped to discover electrons. Cathode ray tube is the heart of the oscilloscope and it generates the electron bean, accelerates the beam and deflects the beam. Visit BYJUS to learn more about it. The latest tweets from @Sciemce_Course 3 chapter 5 test form 2a answers - …About Clutch Scime Answers . About Flats Fort Lake Prater Loudon . C. Many applicants wonder if their U. Get help with your science homework! Access answers to tons of science questions explained in a way that's simple and easy for you to understand. In her first … Jack Knifed is part of the Detective Jack Stratton Mystery-Thriller Series which has more than 3,000+ five-star reviews and 900,000 readers and counting. If you love a page-turning thriller with mystery, humor, and a dash of romance, pick up Jack Knifed today.Jack Knifed-336140, Christopher Greyson Books, Greyson Media Associates Books, 9781683990307 at Meripustak. Take the Series DC Circuits Practice Worksheet with Answers (Basic Electricity) worksheet. … It has been my experience that students require much practice with circuit analysis to become proficient. … This question challenges students' comprehension of series circuit behavior by asking what happens after a change is made to the circuit. Access Google Sheets with a personal Google account or Google Workspace account (for business use). In English grammar there are three main tenses: the past tense, the present tense, and the future tense. Some grammarians state that the future tense isn't really a tense at all and is just a modification of the present tense. However, it is now widely accepted and taught that the future tense is one of the three main tenses in English.. Use your understanding of the work-energy theorem to answer the following questions. Then click the button to view the answers. 1. Consider the falling and rolling motion of the ball in the following two resistance-free situations. In one situation, the … Access Google Sheets with a personal Google account or Google Workspace account (for business use). Along with our worksheets we also have year 7 science test papers with answers to give your child an idea what they have to look forward to when it comes to the real deal! We cover the whole range of year 7 science topics to help your child learn … As mentioned in a previous section of Lesson 4, two or more electrical devices in a circuit can be connected by series connections or by parallel connections.When all the devices are connected using parallel connections, the circuit is referred to as a parallel circuit.In a parallel circuit, each device is placed in its own separate branch.The presence of branch lines means that there are … Use your understanding of the work-energy theorem to answer the following questions. Then click the button to view the answers. 1. Consider the falling and rolling motion of the ball in the following two resistance-free situations. In one situation, the … A worksheet was developed for calculating the DC incident energy for an arc flash in an enclosure/box. This worksheet is based on the box equation and reduces the calculation into a series of simple steps. To use this worksheet, the following data is required: • DC arcing current in amperes, IDC arc • Arc resistance in ohms, Rarc

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