

Power, Energy, Series, Parallel

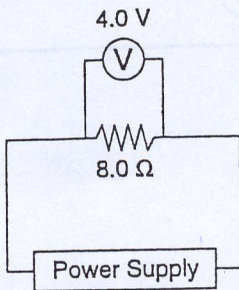
① If the potential drop across an operating 300.-watt floodlight is 120 volts, what is the current through the floodlight?

- (1) 0.40 A (3) 7.5 A
(2) 2.5 A (4) 4.8 A

② The heating element on an electric stove dissipates 4.0×10^2 watts of power when connected to a 120-volt source. What is the electrical resistance of this heating element?

- (1) 0.028 Ω (3) 3.3 Ω
(2) 0.60 Ω (4) 36 Ω

③ The diagram below represents an electric circuit.



The total amount of energy delivered to the resistor in 10. seconds is

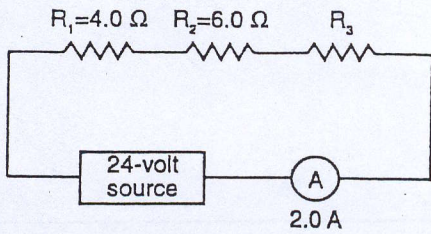
- (1) 3.2 J (3) 20. J
(2) 5.0 J (4) 320 J

④ An immersion heater has a resistance of 5.0 ohms while drawing a current of 3.0 amperes. How much electrical energy is delivered to the heater during 200. seconds of operation?

- (1) 3.0×10^3 J (3) 9.0×10^3 J
(2) 6.0×10^3 J (4) 1.5×10^4 J

⑤ True or False, High resistance circuits use up more power than low Resistance circuits when plugged into the same battery

The diagram below shows a circuit with three resistors.



6 Is this circuit series or parallel ?

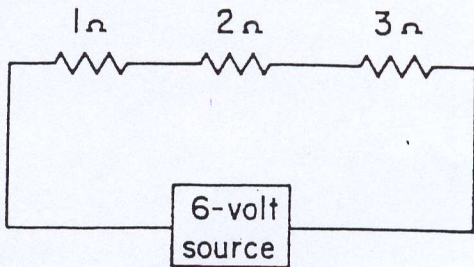
7 What is the resistance of resistor R_3 ?

- (1) 6.0Ω (3) 12Ω
 (2) 2.0Ω (4) 4.0Ω

8 The current flowing in the 6 ohm resistor is -

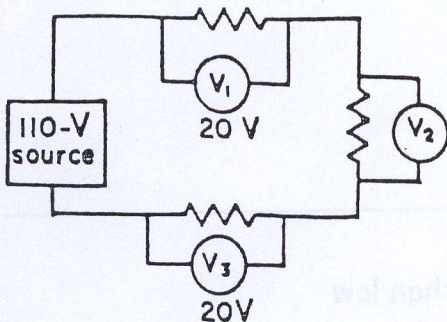
- 1) 1 Amp 2) 2 Amps 3) 3 Amp 4) 4 Amps

9 What is the current in the circuit represented in the diagram below?



- (1) 1 A (3) 3 A
 (2) 2 A (4) 6 A

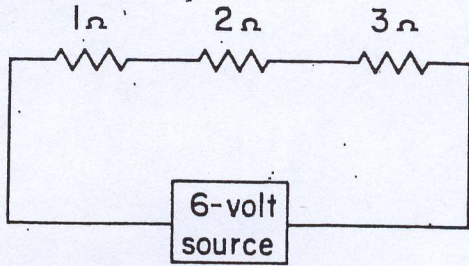
10 In the circuit diagram below, which is the correct reading for meter V_2 ?



- (1) 20 V (3) 90 V
 (2) 70 V (4) 110 V

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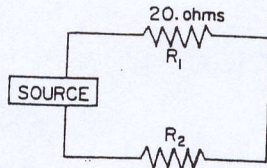
What is the current in the circuit represented in the diagram below?



- (1) 1 A (3) 3 A
 (2) 2 A (4) 6 A

12

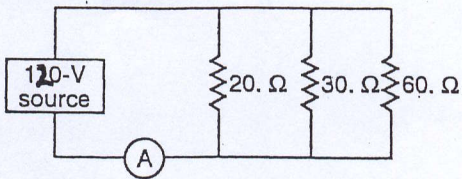
The diagram represents a circuit with two resistors in series. If the total resistance of R_1 and R_2 is 24 ohms, the resistance of R_2 is



- (1) 1.0 ohm
 (2) 0.50 ohm
 (3) 100 ohms
 (4) 4.0 ohms

13 to 16

In the diagram below of a parallel circuit, ammeter A measures the current supplied by the 120-volt source.



13

Is this circuit series or parallel ?

- 14) The current flowing in the 20 ohm resistor is -
 1) 2 Amps 2) 4 Amps 3) 6 Amps 4) 12 Amps

15) The potential difference across the 60 ohm resistor is -

- 1) 20V 2) 40V 3) 60V 4) 120V

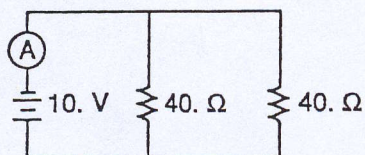
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The current measured by ammeter A is

- 1) 2 Amps 2) 4 Amps 3) 6 Amps 4) 12 Amps

17

In the circuit diagram below, ammeter A measures the current supplied by the 10.-volt battery.

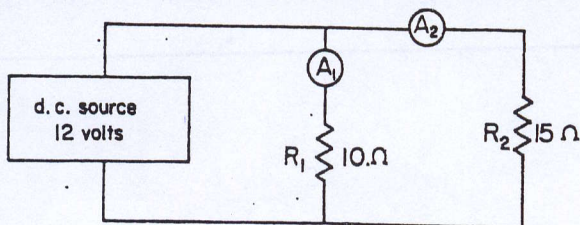


The current measured by ammeter A is

- 1) 0.13 A
- 2) 2.0 A
- 3) 0.50 A
- 4) 4.0 A

18 to 22

Base your answers to questions 96 through 100 on the diagram below which represents an electrical circuit.



- 18 96 The equivalent resistance of the circuit is
- (1) 25 Ω
 - (2) 6.0 Ω
 - (3) 5.0 Ω
 - (4) 0.17 Ω

- 19 97 The potential difference across R_2 is
- (1) 1.0 V
 - (2) 2.0 V
 - (3) 10. V
 - (4) 12 V

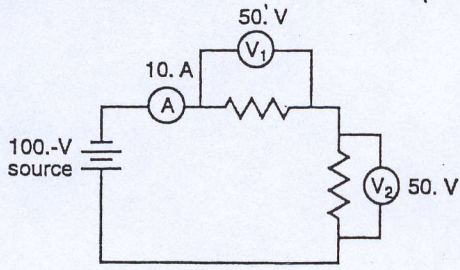
- 20 98 The magnitude of the current in ammeter A_1 is
- (1) 120 A
 - (2) 2.0 A
 - (3) 1.2 A
 - (4) 0.83 A

- 21 99 Compared to the current in A_1 , the current in A_2 is
- 1 less
 - 2 greater
 - 3 the same

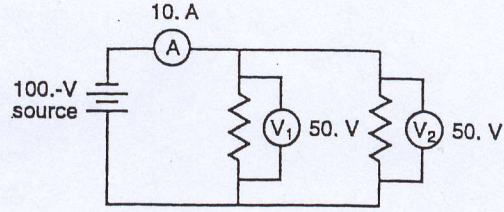
- 22 100 If another resistance were added to the circuit in parallel, the equivalent resistance of the circuit would
- 1 decrease
 - 2 increase
 - 3 stay same

23

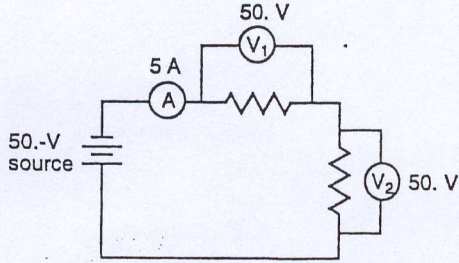
In which pair of circuits shown below could the readings of voltmeters V_1 and V_2 and ammeter A be correct?



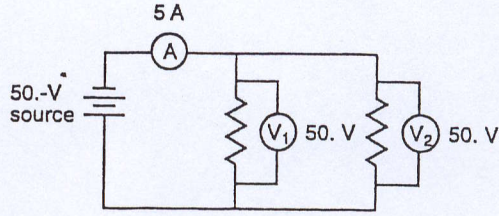
A



C



B



D

- (1) A and B
- (2) B and C

- (3) C and D
- (4) A and D

Long Problems

① An electric circuit contains a source of potential difference and 5-ohm resistors that combine to give the circuit an equivalent resistance of 15 ohms. In the space in your answer booklet, draw a diagram of this circuit using circuit symbols given in the *Reference Tables for Physical Setting/Physics*. [Assume the availability of any number of 5-ohm resistors and wires of negligible resistance.] [2]

* 2) A 12 volt battery is hooked in series to a $20\ \Omega$, $60\ \Omega$, & $80\ \Omega$ resistor

a) Draw the circuit (1)

b) Redraw the circuit with an ammeter in to measure total current, & a voltmeter to measure voltage drop across the $60\ \Omega$ resistor (1)

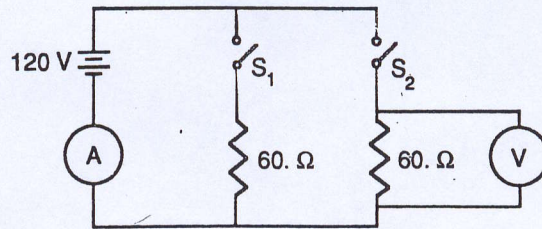
c) Calculate the total resistance of the circuit (1)

$$R = \underline{\hspace{2cm}} \ \Omega$$

d) Calculate the voltage drop across the $60\ \Omega$ resistor (show eqn., sub. & units) (2)

3)

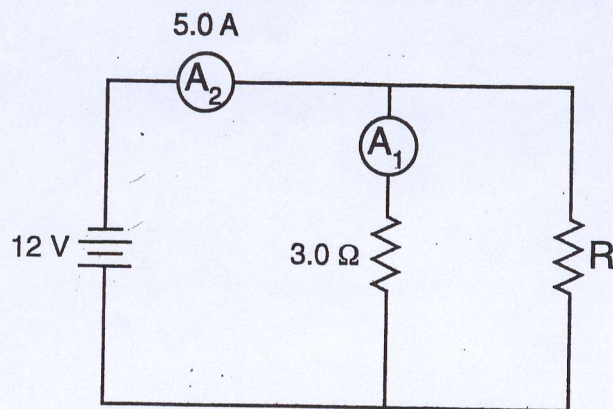
122 Base your answers to parts *a* through *d* on the diagram below which represents a circuit containing a 120-volt power supply with switches S_1 and S_2 and two 60.-ohm resistors.



- a* If switch S_1 is kept open and switch S_2 is closed, what is the circuit resistance? [1]
- b* If switch S_2 is kept open and switch S_1 is closed, how much current will flow through the circuit? [Show all calculations, including equations and substitutions with units.] [2]
- c* When both switches are closed, what is the current in the ammeter? [1]
- d* When both switches are closed, what is the reading of the voltmeter? [1]

4) Base your answers to questions 58 through 60 on the information and diagram below.

A 3.0-ohm resistor, an unknown resistor, R , and two ammeters, A_1 and A_2 , are connected as shown with a 12-volt source. Ammeter A_2 reads a current of 5.0 amperes.



58 Determine the equivalent resistance of the circuit. [1]

59 Calculate the current measured by ammeter A_1 . [Show all work, including the equation and substitution with units.] [2]

60 Calculate the resistance of the unknown resistor, R . [Show all work, including the equation and substitution with units.] [2]