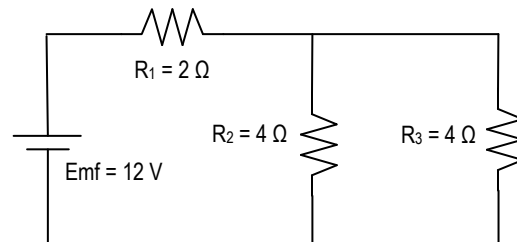


**Multiple Choice:** Choose the one best answer for each of the following questions. Each correct answer earns +1, each blank earns 0, and each incorrect answer earns -0.25 on your SCANTRON.  
Write on this test; it is your copy. **NOTA means "None Of These Answers"**

- 1 A small light bulb is connected to a 1.5 V battery. The light bulb draws 10 amps of current. The resistance of the light bulb (in ohms) is most nearly  
(a) 6.7                      (b) 1.5                      (c) 1.0                      (d) 0.15                      (e) 0.67

For questions 2 and 3, three resistors are connected to a battery having a voltage of 12 Volts as shown to the right.

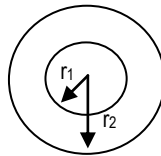
- 2 The current (in amps) through  $R_1$  is  
(a) 1.0                      (b) 3.0                      (c) 6.0  
(d) 12.0                      (e) NOTA



- 3 The power expended by the battery (in watts) is  
(a) 46                      (b) 72                      (c) 108  
(d) 144                      (e) NOTA

- 4 What is the resistance (in ohms) of an ordinary 120 V, 60 watt light bulb?  
(a) 0.5                      (b) 2                      (c) 240                      (d) 7200                      (e) NOTA

- 5 Two wires made of the same substance have identical lengths. The wires have cross-sectional areas as shown below. Wire 2 has twice the radius of wire 1. The ratio of the electrical resistance of wire 1 to that of wire 2 is  
(a) 4  
(b) 2  
(c) 1  
(d) 1/2  
(e) 1/4

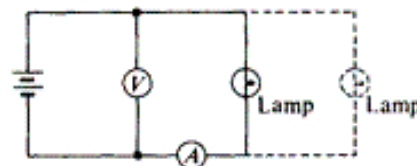


- 6 20 ma (milliamps =  $10^{-3}$  amps) is flowing through a small electric clock. The clock is running off of a battery of voltage  $V$ . The battery loses 30 joules of electrical energy in 1 minute. What is  $V$ ?  
(a) 0.5 V                      (b) 1.2 V                      (c) 1.5 V                      (d) 25 V                      (e) NOTA

- 7 In a series circuit, the voltage across each resistor  
I. is the same as the battery voltage.  
II. depends on the resistance of each resistor.  
III. depends on the current in the circuit.  
(a) I only                      (b) II only                      (c) III only                      (d) I and II                      (e) II and III

- 8 A lamp, a voltmeter  $V$ , an ammeter  $A$ , and a battery with zero internal resistance are connected as shown above. Connecting another lamp in parallel with the first lamp as shown by the dashed lines would

- (a) Increase the ammeter reading  
(b) Decrease the ammeter reading  
(c) Increase the voltmeter reading  
(d) Decrease the voltmeter reading  
(e) Produce no change in either meter



- 9 As more and more resistors are added to a **series** circuit, the total current goes \_\_\_\_\_, the total resistance goes \_\_\_\_\_, and the total power goes \_\_\_\_\_.  
(a) ↓, ↓, ↑                      (b) ↓, ↑, ↓                      (c) ↑, ↓, ↑                      (d) ↑, ↓, ↓                      (e) ↑, ↑, ↓

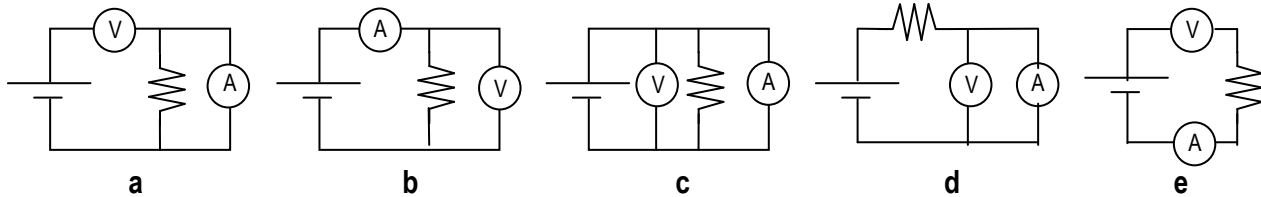
10 As more and more resistors are added to a **parallel** circuit, the total current goes \_\_\_\_\_, the total resistance goes \_\_\_\_\_, and the total power goes \_\_\_\_\_.

- (a) ↓, ↓, ↑      (b) ↓, ↑, ↓      (c) ↑, ↓, ↑      (d) ↑, ↓, ↓      (e) ↑, ↑, ↓

11 In circuit 1, two-4 ohm resistors are connected in series. In circuit 2, two 4-ohm resistors are connected in parallel. What is the ratio of the power dissipated in circuit 1 compared to that of circuit 2.

- (a) 1/2      (b) 2      (c) 1/4      (d) 4      (e) 1/8

12 It is desired to measure the current through and the potential difference across a resistor connected to a source of Emf. In which one of the following circuits are the voltmeter and ammeter connected correctly?



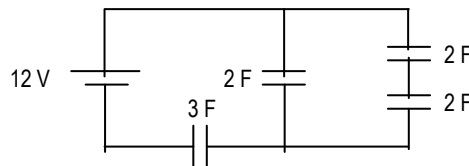
- (a) a      (b) b      (c) c      (d) d      (e) e

13 A current of 5 A is flowing through a battery for 1 minute. How much charge passes through the battery in this time?

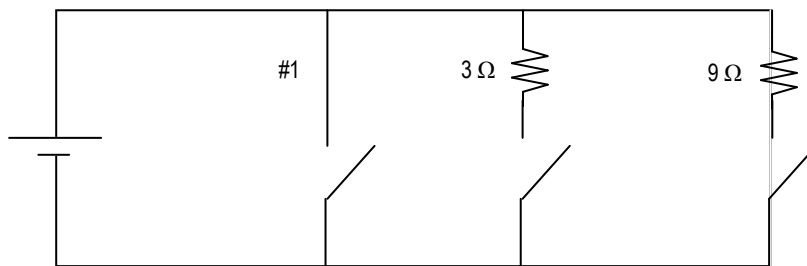
- (a) 0.2 C      (b) 5 C      (c) 12 C      (d) 300 C      (e) NOTA

14 What is the total capacitance of the circuit pictured below?

- (a) 0.67 F  
(b) 1 F  
(c) 1.5 F  
(d) 2 F  
(e) 3 F

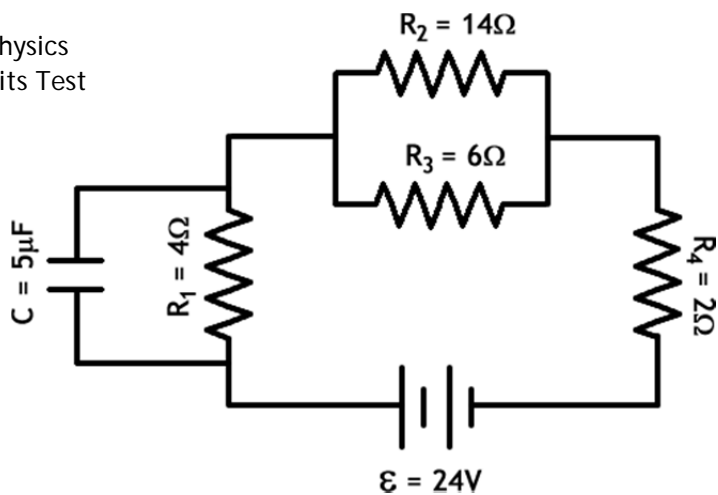


15 A battery of voltage 9 V is connected in the parallel circuit pictured below. Each branch contains a fuse which will blow out if the current exceeds 2.0 amperes. (Branch #1 is just a bare wire and has negligible resistance.) In which of the following branches will the fuse blow out?



- I. Branch 1  
II. The 3 Ω branch  
III. The 9 Ω branch

- (a) I only      (b) II only      (c) III only      (d) I and II      (e) I, II and III



Given the circuit to the right, answer the following questions. The capacitor is fully charged.

a) What is the total current in the circuit?

b) What is the current through  $R_2$ ?

c) What is the voltage across  $R_1$ ?

d) What is the charge stored on the capacitor?

e) What is the energy stored in the capacitor?

If another resistor is connected in parallel to just  $R_4$ , how will the following values change?

i) total resistance of the circuit    increase    decrease    stay the same

ii) the voltage drop across  $R_4$     increase    decrease    stay the same

iii) the energy stored in the capacitor    increase    decrease    stay the same

A 1200kg electric car runs on an electric motor connected to 375V. The car is capable of going from 0-22.8 m/s (60mph) in 3.7 seconds.

a) What is the work done car in accelerating the car to 22.8 m/s?

The manufacturer of the vehicle indicates that the efficiency of the cars motor is 88%.

b) What is the total power output of the battery?

c) What is the total resistance of the circuitry inside the car?

Below is a graph of the power consumption vs. speed for the vehicle.

d) What is the relationship between power consumption rate and speed?

e) What does the area of the graph below represent?

