CPS lesson
Resistance and DC Circuits
ANSWER KEY

1. If two identical resistors are wired in series to a battery, the current through the second resistor is

* A. equal to the current through the first resistor

B. half of the current through the first

2. As more identical resistors are added in parallel, the total resistance between points P and Q:

A. increases

B. stays the same

* C. decreases

3.
Suppose charge flows through a light bulb. If a wire is now connected across the bulb as shown,

A. approximately the same current continues through the bulb
B. the current through the bulb falls to about half
C. approximately no charge will now flow through the bulb

4.
Two identical bulbs are wired in series to a battery. When the switch is closed, the brightness of bulb A:

A. increases
B. stays about the same
C. decreases
5.
If all four bulbs are identical, which circuit puts out the most light?

* A. circuit I

B. both the same

C. circuit II

6.
Both bulbs are identical.

When the switch is closed:
A. both bulbs go out
B. both bulbs get brighter
C. both bulbs get dimmer
D. one gets brighter, one dims
* E. nothing changes

7.
Both bulbs are identical.

When the switch is closed:
8. Two identical bulbs are connected in series to a battery. If a wire is now connected across B, then bulb A:

A. both go out
B. both brighten
C. both dim
D. only one brightens
* E. nothing changes
9. A capacitor is initially charged to voltage $x$. Just after closing the switch, the current in the circuit is:

* A. $x/R$
* B. zero
* C. neither of the above in general
10. The three bulbs are identical.

The brightness of bulbs B and C together is approximately:

A. double that of bulb A alone
B. equal to that of A
* C. half that of bulb A

11. An ammeter A is connected between points a and b of this Wheatstone bridge.

What does the meter read?
12. The battery is ideal and the resistors are identical.

If an additional resistor is connected between B and C, the current at A:

A. I
B. I/2

* C. zero

* A. increases
13. The battery is ideal and the resistors are identical.

If an additional resistor is connected between B and C, the potential difference between F and G:

A. increases
* B. stays the same
C. decreases

14. The battery is ideal and the resistors are identical.

If a wire is connected between C and E, the potential difference between C and D:
15. If the diameter and length of a resistor are both doubled, the resistance:

A. quadruples
B. doubles
C. stays the same
D. halves

16. A resistor is connected across an ideal battery. If both the diameter and length of the resistor are doubled, the drift velocity:
A. quadruples
B. doubles
C. stays the same
*D. halves

17. The current through the 40 W resistor is 2 A to the right and that through $R_X$ is 0.5 A down.

The current through the 10 W resistor is:

* A. 1 A down
B. 1.5 A up
*C. 1.5 A down
D. 0.5 A down

18. The current through the 40 W resistor is 2 A to the right and that through $R_X$ is 0.5 A down.

The voltage across the 30 W resistor is:
19. The current through the 40 W resistor is 2 A to the right and that through $R_X$ is 0.5 A down.

The resistance of $R_X$ is:

* A. 120 W
  
  * B. 100 W
  
  C. 40 W
  
  D. 37.5 W
20. The current through the 40 W resistor is 2 A to the right and that through $R_x$ is 0.5 A down.

The battery voltage $x$ is:

A. 80 V  
B. 100 V  
*C. 140 V  
D. 180 V

21. Windshield wipers cycle at 1 Hz when a 10 kW timing resistor is used in an RC circuit. What resistor is needed to wipe the windshield twice as fast?

*A. 5 kW  
B. 10 kW  
C. 15 kW  
D. 20 kW

22. Ohm's law is a general rule of nature like Newton's and Gauss's laws.

A. True
23. Which combination has the larger resistance?

* A. two identical resistors in series
B. the two in parallel
C. both combinations have the same total resistance

24. A resistor and an initially uncharged capacitor are wired in series to a switch and battery. After the switch is closed, the current in the circuit:

A. is constant assuming the battery emf is constant

* B. decreases exponentially in time
C. increases exponentially in time
D. is always zero because the capacitor is like an open circuit

25. How does the electric field vary with distance along the length of a resistor or real wire?
* A.
  B.
  C.
  D.