

**CPS lesson**  
**Resistance and DC Circuits**  
**ANSWER KEY**

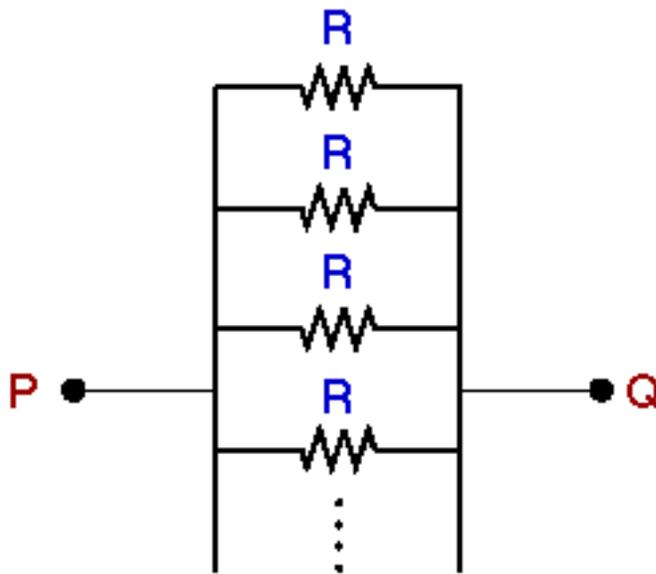
1.

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.

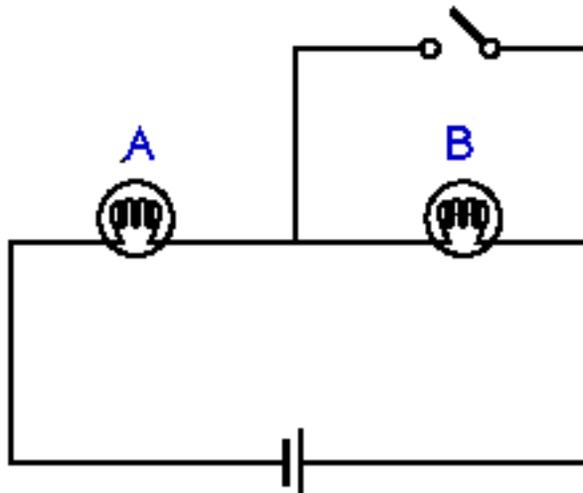
Suppose charge flows through a light bulb. If a wire is now connected across the bulb as shown,



- 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.

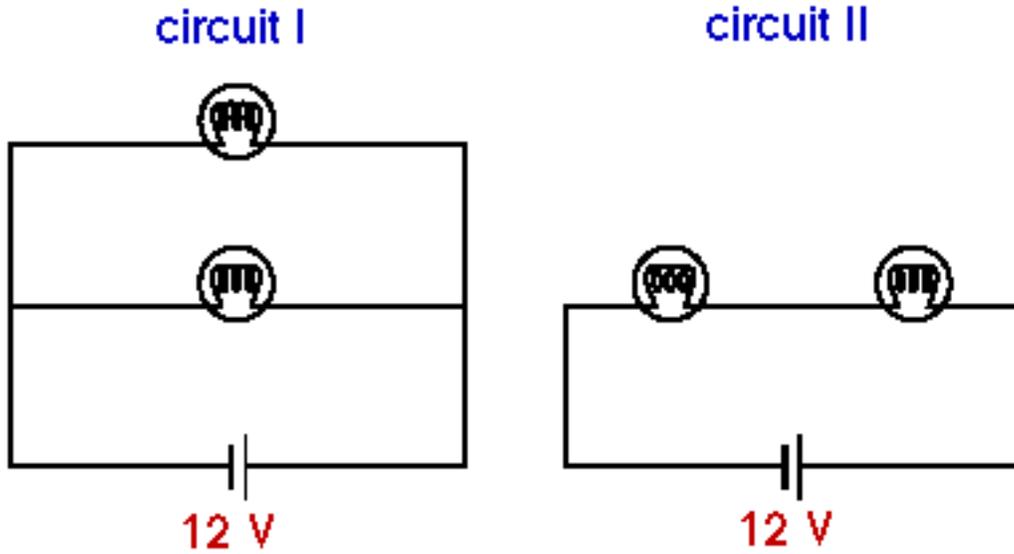
Two identical bulbs are wired in series to a battery. When the switch is closed, the brightness of bulb A:



- \* A. increases
- B. stays about the same
- C. decreases

5.

If all four bulbs are identical, which circuit puts out the most light?

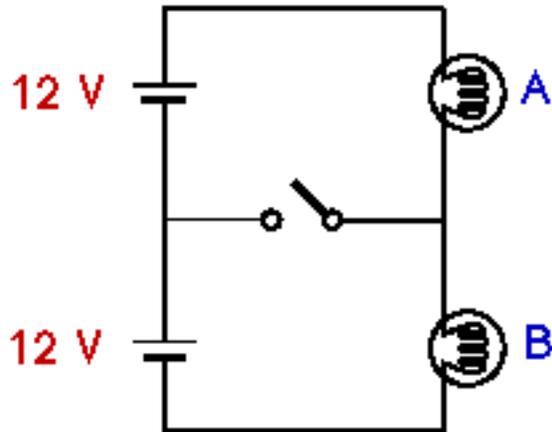


- \* A. circuit I
- B. both the same
- C. circuit II

6.

Both bulbs are identical.

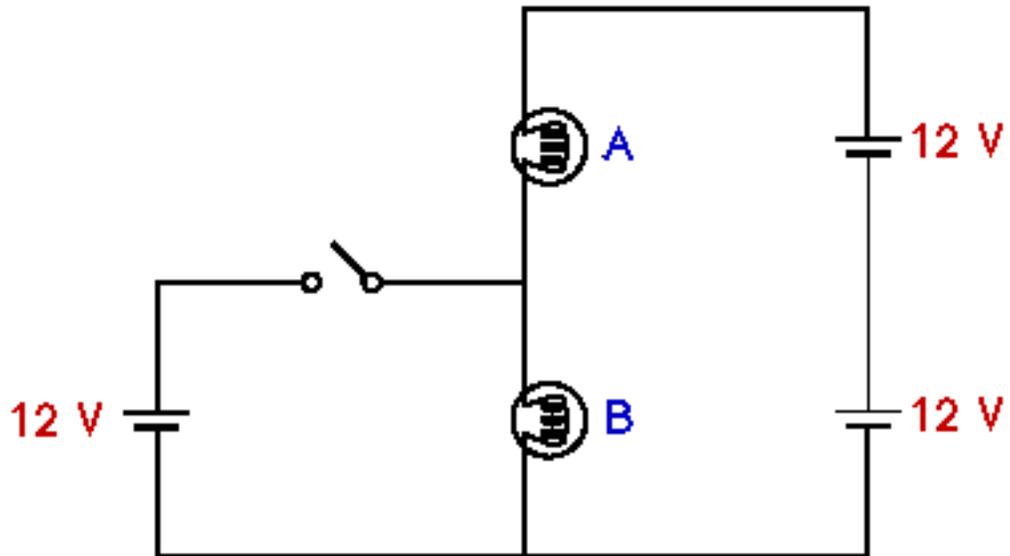
When the switch is closed:



- A. both bulbs go out
- B. both bulbs get brighter
- C. both bulbs get dimmer
- D. one gets brighter, one dims
- \* E. nothing changes

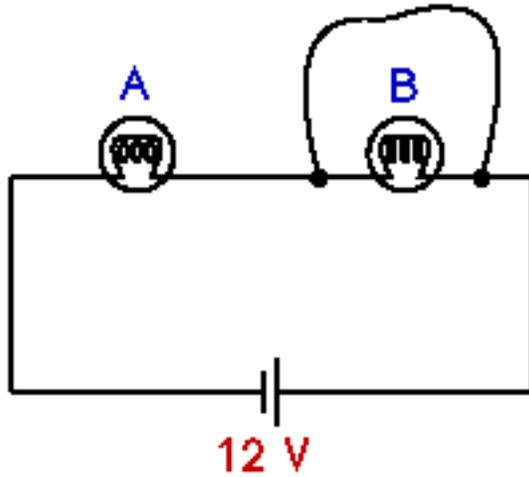
7.  
Both bulbs are identical.

When the switch is closed:



- A. both go out
- B. both brighten
- C. both dim
- D. only one brightens
- \* E. nothing changes

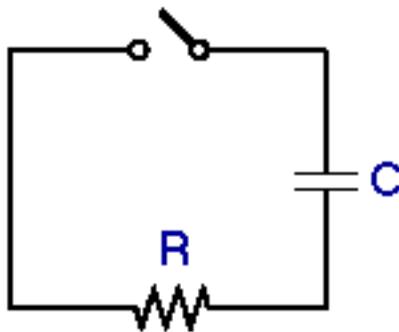
8.  
Two identical bulbs are connected in series to a battery. If a wire is now connected across B, then bulb A:



- \* A. gets brighter
- B. stays about equally bright
- C. gets dimmer
- D. goes out

9.  
A capacitor is initially charged to voltage  $x$ .

Just after closing the switch, the current in the circuit is:

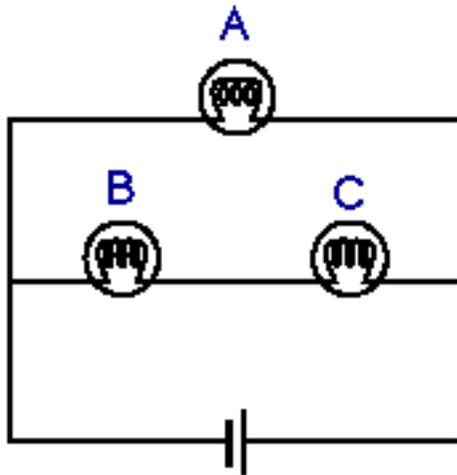


- \* A.  $x/R$
- B. zero
- C. neither of the above in general

10.

The three bulbs are identical.

The brightness of bulbs B and C together is approximately:



A. double that of bulb A alone

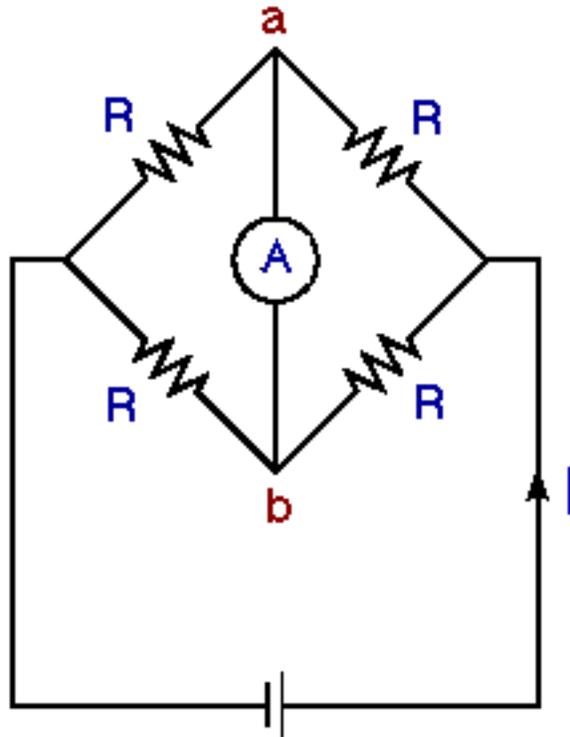
B. equal to that of A

\* C. half that of bulb A

11.

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

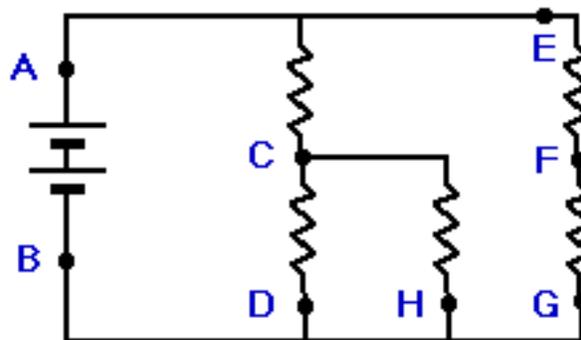
What does the meter read?



- A.  $I$
- B.  $I/2$
- \* C. zero

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

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



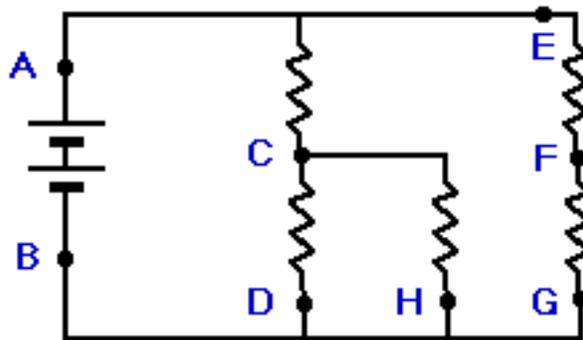
- \* A. increases

B. stays the same

C. decreases

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:



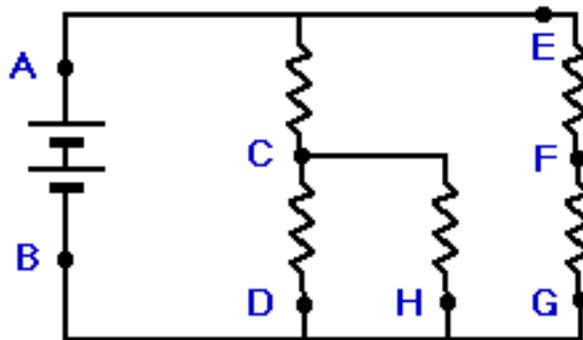
A. increases

\* B. stays the same

C. decreases

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

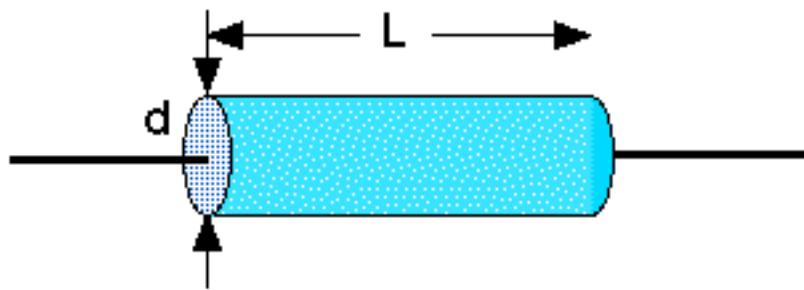
If a wire is connected between C and E, the potential difference between C and D:



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

15.

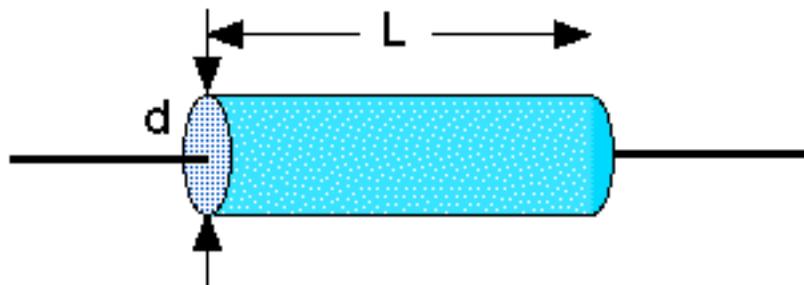
If the diameter and length of a resistor are both doubled, the resistance:



- A. quadruples
- B. doubles
- C. stays the same
- \* D. halves

16. A resistor is connected across an ideal battery.

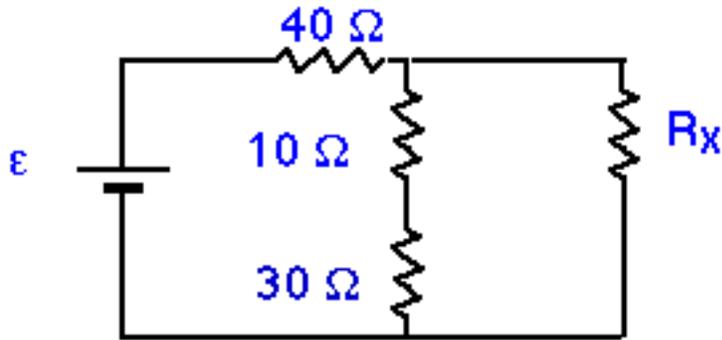
If both the diameter and length of the resistor are doubled, the drift velocity:



- A. quadruples
- B. doubles
- C. stays the same
- \* D. halves

17. The current through the  $40\ \Omega$  resistor is  $2\ \text{A}$  to the right and that through  $R_X$  is  $0.5\ \text{A}$  down.

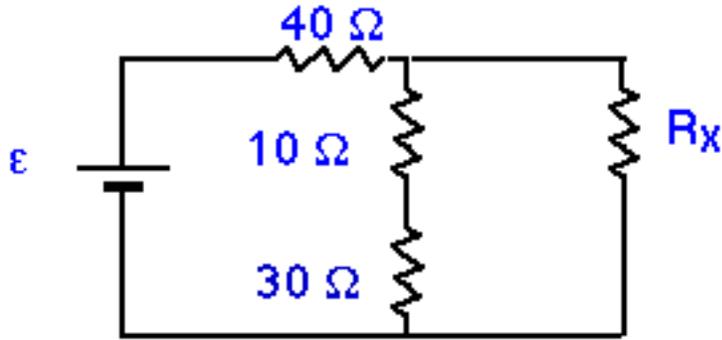
The current through the  $10\ \Omega$  resistor is:



- A.  $1\ \text{A}$  down
- B.  $1.5\ \text{A}$  up
- \* C.  $1.5\ \text{A}$  down
- D.  $0.5\ \text{A}$  down

18. The current through the  $40\ \Omega$  resistor is  $2\ \text{A}$  to the right and that through  $R_X$  is  $0.5\ \text{A}$  down.

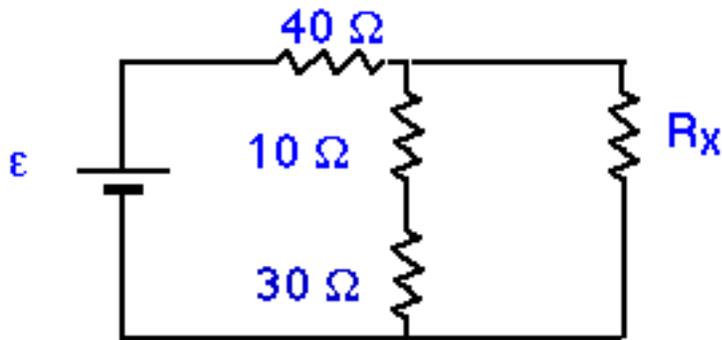
The voltage across the  $30\ \Omega$  resistor is:



- A. 60 V
- \* B. 45 V
- C. 30 V
- D. 15 V

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

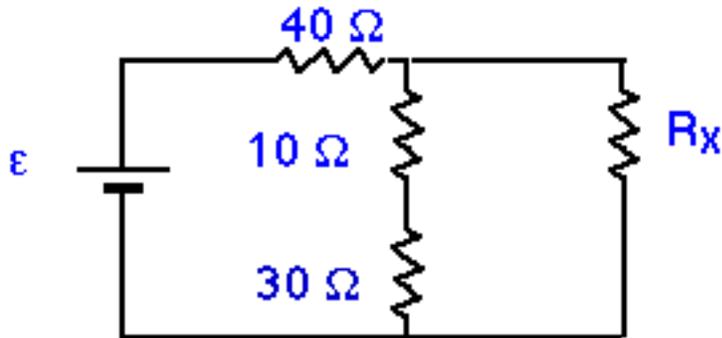
The resistance of  $R_X$  is:



- \* A. 120 W
- B. 100 W
- C. 40 W
- D. 37.5 W

20. The current through the  $40\ \Omega$  resistor is  $2\ \text{A}$  to the right and that through  $R_x$  is  $0.5\ \text{A}$  down.

The battery voltage  $x$  is:



- A.  $80\ \text{V}$
- B.  $100\ \text{V}$
- \* C.  $140\ \text{V}$
- D.  $180\ \text{V}$

21. Windshield wipers cycle at  $1\ \text{Hz}$  when a  $10\ \text{k}\Omega$  timing resistor is used in an RC circuit. What resistor is needed to wipe the windshield twice as fast?

- \* A.  $5\ \text{k}\Omega$
- B.  $10\ \text{k}\Omega$
- C.  $15\ \text{k}\Omega$
- D.  $20\ \text{k}\Omega$

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

- A. True

\* B. False

23.

Which combination has the larger resistance?

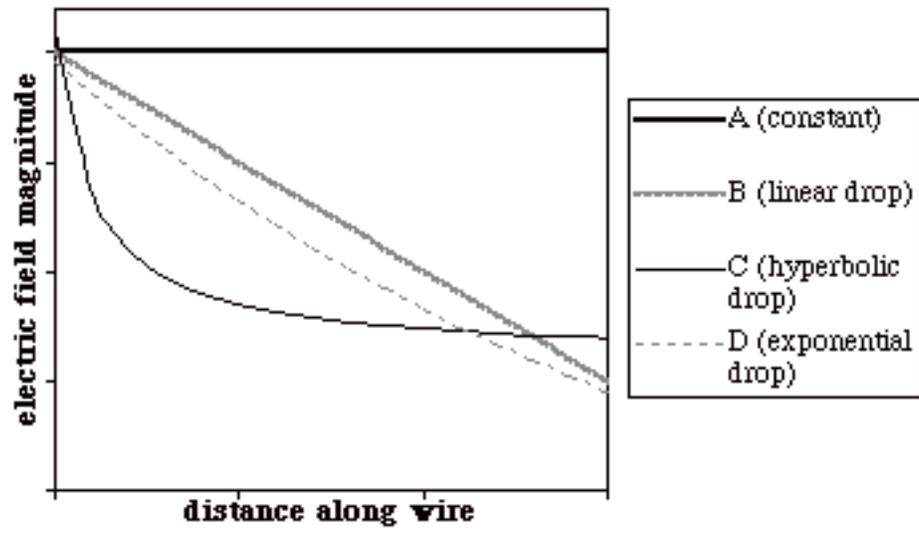
- \* A. two identical resistors in series
- B. the two in parallel
- C. both combinations have the same total resistance

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.