# AP Physics 1 Multiple Choice Questions - Chapter 12

**1**  If a current of 125 mA exists in a metal wire, how many electrons flow past a given cross section of the wire in 10 minutes?

**a**  $6.25 \times 10^{21}$ electrons       **b**  $3.98 \times 10^{19}$ electrons

**c**  $5.35 \times 10^{22}$ electrons       **d**  $4.66 \times 10^{20}$ electrons

| | 12.1 |
|---|---|

**2**  A wire carries a current of 1.6A.  How many electrons per second pass a given point in the wire?  Choose the best estimate.

**a**  $10^{17}$       **b**  $10^{18}$

**c**  $10^{19}$       **d**  $10^{20}$

**e**  $10^{21}$

| | 12.1 |
|---|---|

**3**  A proton beam in an accelerator carries a current of 125 microamps.  If the beam is incident on a target, how many protons strike the target in a period of 23.0 seconds?

**a**  $1.8 \times 10^{16}$ protons       **b**  $3.5 \times 10^{19}$ protons

**c**  $1.4 \times 10^{15}$ protons       **d**  $8.5 \times 10^{17}$ protons

| | 12.1 |
|---|---|

# AP Physics 1 Multiple Choice Questions - Chapter 12

**1** An electric heater carries a current of 12 A when operating at a voltage of 120 V. what is the resistance of the electric heater?

**a** 100 ohms                            **b** 10 ohms

**c** 1000 ohms                          **d** 0.1 ohms

| | 12.2 |
|---|---|

**2** Wire B has the same resistivity, twice the legnth, and twice the radius of wire A. If wire A has a resistance $R$, what is the resistance of wire B?

**a** *4R*                            **b** *2R*

**c** *R*                            **d** *R/2*

**e** *R/4*

| | 12.2 |
|---|---|

**3** Three wires are made of copper having circular cross sections. Wire 1 has a length $L$ and a radius $r$. Wire 2 has a length $L$ and a radius $2r$. Wire 3 has a length $2L$ and a radius $3r$.

Which wire has the smallest resistance?

**a** Wire 1                          **b** Wire 2

**c** Wire 3                          **d** All three wires have the same resistance

**e** Not enough information given to answer the question

| | 12.2 |
|---|---|

**1**
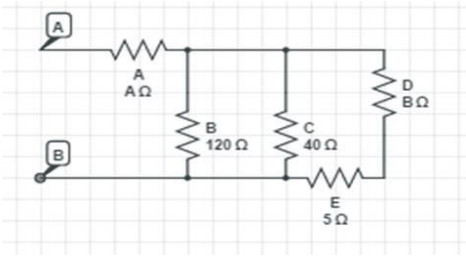


Using the circuit shown above, and assuming that A = 10 ohms and B = 20 ohms, calculate the equivalent resistance

**a** 195 ohms

**b** 23.64 ohms

**c** 4.65 ohms

**d** 13.08 ohms

**12.3**

**2** Three resistors, A, B, and C, are connected in parallel and attached to a battery, with the resistance of A being the smallest and the resistance of C being the greatest. Which resistor carries the highest current?

**a** A

**b** B

**c** C

**d** All wires carry the same current

**e** More information is needed to answer the question

**12.3**

**3** Three resistors, A, B, and C, are connected in series in a closed loop with a battery, with the resistance of A being the smallest and the resistance of C the greatest. Across which resistor is the voltage drop the greatest?

**a** A

**b** B

**c** C

**d** The voltage drops are the same for each
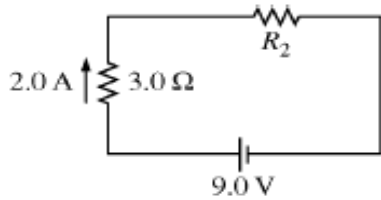
**e** More information is needed to answer the question

**12.3**
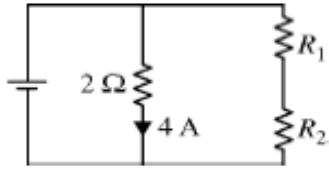
12.4

**1** In the circuit shown above, the sum of the resistances of resistors $R_1$ and $R_2$ is 8 Ω.
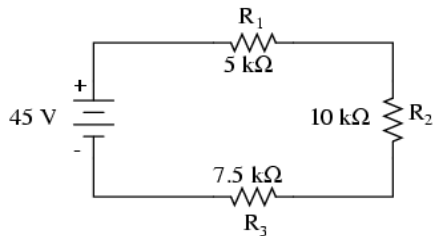
What is the current through the battery?

a  4 A                                                       **b** 5 A

**c** 8 A                                                    **d** 20 A



12.4

**2** A 9.0 V battery and two resistors are connected in the circuit shown above.  The current through the 3.0 Ω resistor is 2.0 A.  What is the potential difference across resistor $R_2$ ?

a  9.0 V                                                     **b** 6.0 V

**c** 3.0 V                                                   **d** 1.5 V
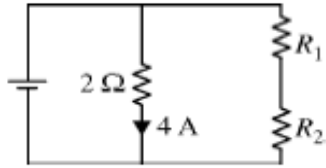


12.4

**3** A 45 V battery and three resistors are connected in the circuit shown above. What is the current passing through the circuit?

a  2 A                                                        **b** 0.005 A

**c** 0.002 A                                                **d** 5 A

12.5

**1** In the circuit shown above, the sum of the resistances of resistors $R_1$ and $R_2$ is 8 Ω. Resistor $R_1$ and the 2Ω resistor are now swapped. How does the current in the right branch of the circuit change, and why?

**a** The current does not change, because the total resistance does not change

**b** The current increases, because the total resistance will always decrease

**c** The current decreases, because the total resistance will always increase

**d** The change in current cannot be determined without knowing the resistances of $R_1$ and $R_2$.
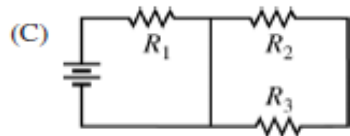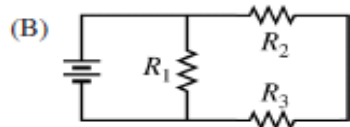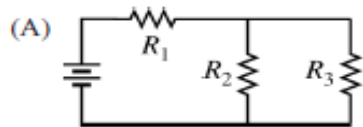
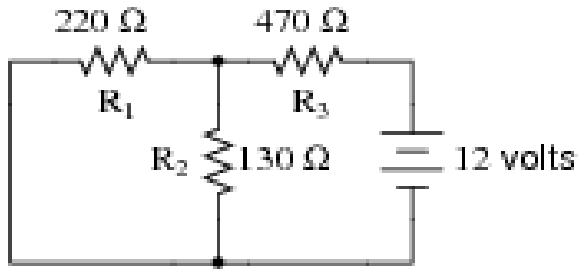| Circuit Element | Potential Difference (V) | Current (A) |
|---|---|---|
| Battery | 10 | 8 |
| Resistor $R_1$ | 6 | 8 |
| Resistor $R_2$ | 4 | 3 |
| Resistor $R_3$ | 4 | 5 |

12.5

2  The above table shows the potential difference and current for each circuit element in a circuit consisting of a battery and three resistors.  Which of the following diagrams could represent the circuit?

(A)


(B)


(C)


(D)

220 Ω  470 Ω

$R_1$  $R_3$

$R_2$ 130 Ω  12 volts
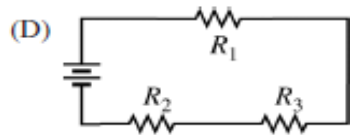
| | 12.5 |

**3** A DC circuit is set up as shown above. What is the power dissipated in the third resistor $R_3$?

**a** 222 mW

**b** 24 mW

**c** 85 mW

**d** 14 mW