

Skill 38-Electric Current

80. The current in a wire is 4.0 amperes. The time required for 2.5×10^{19} electrons to pass a certain point in the wire is

A) 1.0 s B) 0.25 s
C) 0.50 s D) 4.0 s

$$I = \frac{q}{t} \quad q = 2.5 \times 10^{19} e \times \frac{1.6 \times 10^{-19} C}{1e} = 4C$$

$$t = \frac{q}{I} = \frac{4C}{4A} = 1s$$

81. What is the current in a wire if 3.4×10^{19} electrons pass by a point in this wire every 60. seconds?

A) $1.8 \times 10^{-18} A$ B) $3.1 \times 10^{-11} A$
C) $9.1 \times 10^{-2} A$ D) 11 A

$$q = 3.4 \times 10^{19} e \times \frac{1.6 \times 10^{-19} C}{1e} = 5.44 \times 10^{-2} C$$

$$I = \frac{q}{t} = \frac{5.44 \times 10^{-2} C}{60s} = .09A$$

82. What is the current through a wire if 240 coulombs of charge pass through the wire in 2.0 minutes?

A) 120 A B) 2.0 A
C) 0.50 A D) 0.0083 A

$$q = 240C$$

$$t = 2min = 120s$$

$$I = \frac{q}{t} = \frac{240C}{120s} = 2A$$

83. The current through a lightbulb is 2.0 amperes. How many coulombs of electric charge pass through the lightbulb in one minute?

A) 60. C B) 2.0 C
C) 120 C D) 240 C

$$I = 2A$$

$$q = ?$$

$$t = 1min = 60s$$

$$I = \frac{q}{t} \quad q = It = (2A)(60s) = 120C$$

84. A 1.5-volt, AAA cell supplies 750 milliamperes of current through a flashlight bulb for 5.0 minutes, while a 1.5-volt, C cell supplies 750 milliamperes of current through the same flashlight bulb for 20. minutes. Compared to the total charge transferred by the AAA cell through the bulb, the total charge transferred by the C cell through the bulb is

A) half as great
B) twice as great
C) the same
D) four times as great

AAA	C
1.5V	1.5V
750mA	750mA
5min	20min
$t \times 4$	
$q \times 4$	

85. The current traveling from the cathode to the screen in a television picture tube is 5.0×10^{-5} ampere. How many electrons strike the screen in 5.0 seconds?

A) 3.1×10^{24} B) 6.3×10^{18}
C) 1.6×10^{15} D) 1.0×10^5

$$I = 5 \times 10^{-5} A$$

$$t = 5s$$

$$q = It = (5 \times 10^{-5} C/s)(5s) = 2.5 \times 10^{-4} C$$

$$q = It \quad = 2.5 \times 10^{-4} C \times \frac{1e}{1.6 \times 10^{-19} C} = 1.6 \times 10^{15}$$

86. During a thunderstorm, a lightning strike transfers 12 coulombs of charge in 2.0×10^{-3} second. What is the average current produced in this strike?

A) $1.7 \times 10^{-4} A$ B) $2.4 \times 10^{-2} A$
C) $6.0 \times 10^3 A$ D) $9.6 \times 10^3 A$

$$I = \frac{q}{t} = \frac{12C}{2 \times 10^{-3}s} = 6 \times 10^3 A$$

87. A charge of 5.0 coulombs moves through a circuit in 0.50 second. The current in the circuit is

A) 2.5 A B) 5.0 A
C) 7.0 A D) 10. A

$$q = 5C$$

$$t = .5s$$

$$I = \frac{q}{t} = \frac{5C}{.5s} = 10C/s = 10A$$

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88. If 12 coulombs of electric charge pass a point in 4.0 seconds, the current is

- A) 8.0 amperes B) 16 amperes
C) 3.0 amperes D) 48 amperes

$$I = \frac{q}{t} = \frac{12 \text{ C}}{4 \text{ s}} = 3 \text{ A}$$

89. One coulomb per second is equal to one

- A) watt B) ohm
C) volt D) ampere

90. A flow rate of 1 coulomb per 0.1 second is measured in a wire. What is the electrical current in the wire?

- A) 1 A B) 0.1 A
C) 10 A D) 100 A

$$I = \frac{1 \text{ C}}{0.1 \text{ s}} = 10 \text{ A}$$

91. If 60. electrons pass a given point in a conductor in one second, the current in this conductor is

- A) $9.6 \times 10^{-18} \text{ A}$ B) $1.6 \times 10^{-19} \text{ A}$
C) $1.6 \times 10^{-20} \text{ A}$ D) $2.7 \times 10^{-21} \text{ A}$

$$q = 60 \text{ e} \times \frac{1.6 \times 10^{-19} \text{ C}}{1 \text{ e}} = 9.6 \times 10^{-18} \text{ C}$$

$$I = \frac{q}{t} = \frac{9.6 \times 10^{-18} \text{ C}}{1 \text{ s}} = 9.6 \times 10^{-18} \text{ A}$$