Practice quiz: Journeyman Electrician (national, 2023 NEC)

10 questions. The answer key is on page 2.

Name _____ Date _____

1. **Why does the single-phase voltage drop formula multiply by 2?**
   A. Current flows out on one conductor and back on the other
   B. It converts the one-way length to circular mils
   C. It allows for the 125% continuous load factor
   D. It corrects copper's resistance for a 75°C ambient

2. **A 240 V, single-phase load draws 24 A at 120 ft on 10 AWG copper. Take 10 AWG as 10,380 circular mils and K as 12.9. What is the voltage drop?**
   A. 3.58 V
   B. 6.20 V
   C. 7.16 V
   D. 14.32 V

3. **A 120 V circuit at the end of a long run has a voltage drop of 12 V. What percentage drop is that?**
   A. 5.0%
   B. 2.5%
   C. 0.1%
   D. 10.0%

4. **A 120 V, single-phase, 20 A load is 90 ft away. Using K = 12.9, which is the smallest copper conductor that keeps the drop at 3% or less? Take 12 AWG as 6,530 cmil, 10 AWG as 10,380, 8 AWG as 16,510 and 6 AWG as 26,240.**
   A. 6 AWG
   B. 8 AWG
   C. 10 AWG
   D. 12 AWG

5. **A 208 V, three-phase load draws 50 A at 150 ft on 6 AWG copper. Take 6 AWG as 26,240 circular mils and K as 12.9. What is the voltage drop?**
   A. 11.06 V
   B. 7.37 V
   C. 6.39 V
   D. 3.19 V

6. **A single-phase circuit carries 16 A to a load 180 ft away on 10 AWG copper. Take its resistance as 1.24 per 1,000 ft. Using the resistance method, what is the voltage drop?**
   A. 14.29 V
   B. 7.14 V
   C. 6.19 V
   D. 3.57 V

7. **A circuit's load current and conductor size stay the same, but the run is twice as long. What happens to the voltage drop?**
   A. It stays the same
   B. It is cut in half
   C. It rises by a factor of four
   D. It doubles

8. **For ordinary branch circuits and feeders, what is the code status of the 3% and 5% voltage drop figures in the 2023 NEC?**
   A. Recommendations in informational notes
   B. Mandatory limits for every branch circuit
   C. Mandatory limits for feeders but not branch circuits
   D. Limits that the serving utility sets and enforces

9. **A 120 V, single-phase, 12 A load is supplied on 12 AWG copper (6,530 circular mils). Using K = 12.9, what is the longest one-way run that keeps the drop at 3% or less?**
   A. 152 ft
   B. 88 ft
   C. 76 ft
   D. 38 ft

10. **A 240 V, 4,800 W resistive heater has only 228 V at its terminals because of voltage drop. About how much power does it produce?**
    A. 5,053 W
    B. 4,800 W
    C. 4,560 W
    D. 4,332 W

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Answer key

Journeyman Electrician (national, 2023 NEC). One line of why for each answer.

1. **A** In a single-phase circuit the current travels the length L twice, out on one conductor and back on the other, so the drop is twice that of one conductor.
2. **C** VD = 2 x 12.9 x 24 x 120 ÷ 10,380 = 74,304 ÷ 10,380 = 7.16 V.
3. **D** 12 ÷ 120 = 0.10, or 10.0%.
4. **B** 3% of 120 V is 3.6 V.
5. **C** Three-phase VD = 1.732 x 12.9 x 50 x 150 ÷ 26,240 = 167,571 ÷ 26,240 = 6.39 V.
6. **B** Total conductor length is out and back: 2 x 180 = 360 ft. R = 360 x 1.24 ÷ 1,000 = 0.446 , and VD = 16 x 0.446 = 7.14 V.
7. **D** Voltage drop is in direct proportion to length in both the circular mil and the resistance methods, so twice the length gives twice the drop.
8. **A** The 3% and 5% figures appear in informational notes in Articles 210 and 215.
9. **C** 3% of 120 V is 3.6 V.
10. **D** Resistance is fixed: 240² ÷ 4,800 = 12 .

Full explanations

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