

A store has 15,600 VA of continuous lighting load at 120 volts. It will be supplied by 20-ampere branch circuits, and a continuous load may not exceed 80% of the circuit rating. What is the minimum number of circuits?

1. 6
2. 7
3. 8
4. 9

Official sources: NEC 210.20(A) (NFPA 70, NEC 2026 as adopted by TDLR) <https://www.nfpa.org/codes-and-standards/nfpa-70-standard-development/70> · TDLR/PSI Journeyman content outline, Calculations - Branch Circuit Calculations and Conductors <https://test-takers.psiexams.com/api/content/bulletin/1682>

An 8 AWG copper conductor has ampacities of 55 A in the 90 degrees C column and 50 A in the 75 degrees C column. It is installed with an ambient temperature correction factor of 0.88 and an adjustment factor of 0.80 for the number of conductors, and the equipment terminals are rated 75 degrees C. What is the greatest current the conductor may carry?

1. 38.7 A
2. 44.0 A
3. 48.4 A
4. 50.0 A

Official sources: NEC 110.14(C)(1)(a), 310.15(B) and 310.15(C)(1) (NFPA 70, NEC 2026 as adopted by TDLR) <https://www.nfpa.org/codes-and-standards/nfpa-70-standard-development/70> · TDLR/PSI Journeyman content outline, Calculations - Branch Circuit Calculations and Conductors <https://test-takers.psiexams.com/api/content/bulletin/1682>

A 1-inch conduit has an internal diameter of 1.049 inches. How many communications cables with an outside diameter of 0.25 inch can be installed if the cables, treated as circles, may fill no more than 40% of the internal area? Use $\pi = 3.1416$.

1. 7
2. 8
3. 9
4. 17

Official sources: NEC Chapter 9, Table 1 (NFPA 70, NEC 2026 as adopted by TDLR) <https://www.nfpa.org/codes-and-standards/nfpa-70-standard-development/70> · TDLR/PSI Journeyman content outline, Calculations - Electrical Wiring Methods and Electrical Materials <https://test-takers.psiexams.com/api/content/bulletin/1682>

One horsepower-rated disconnecting means serves a 20-hp motor (full-load current 27 A, locked-rotor current 145 A), a 15-hp motor (21 A, 116 A) and a 40-ampere resistance heater, all 460 volts, three-phase. The full-load currents and the locked-rotor currents are each summed (the heater adds its 40 A to both sums), and each sum is treated as a single motor; the disconnect must have at least the larger of the two equivalent horsepower ratings. Equivalent ratings (full-load / locked-rotor): 40 hp 52 / 290 A; 50 hp 65 / 362 A; 60 hp 77 / 435 A; 75 hp 96 / 543 A; 100 hp 124 / 725 A. What minimum horsepower rating must the disconnect have?

1. 40 hp
2. 50 hp
3. 75 hp
4. 100 hp

Official sources: NEC 430.110(C)(1) (NFPA 70, NEC 2026 as adopted by TDLR) <https://www.nfpa.org/codes-and-standards/nfpa-70-standard-development/70> · TDLR/PSI Journeyman content outline, Calculations - Electrical Control Devices and Disconnecting Means <https://test-takers.psiexams.com/api/content/bulletin/1682>

A feeder supplies four nonmotor-generator arc welders: 60 A rated primary current at 40% duty cycle, 50 A at 60%, 40 A at 100% and 30 A at 50%. Each welder's current is its rated primary current times the duty-cycle multiplier: 100%, 1.00; 60%, 0.78; 50%, 0.71; 40%, 0.63. The feeder ampacity is 100% of the two largest of those currents, plus 85% of the third largest, plus 70% of the fourth largest. What minimum feeder ampacity is required, to the nearest 0.1 ampere?

1. 126.0 A
2. 138.1 A
3. 165.0 A
4. 180.0 A

Official sources: NEC 630.11(A) and 630.11(B) (NFPA 70, NEC 2026 as adopted by TDLR) <https://www.nfpa.org/codes-and-standards/nfpa-70-standard-development/70> · TDLR/PSI Journeyman content outline, Calculations - Special Occupancies, Equipment, and Conditions <https://test-takers.psiexams.com/api/content/bulletin/1682>

Two resistance welders share one feeder. Each is wired for a specific operation whose actual primary current and duty cycle are known and do not change. Welder A has an actual primary current of 100 A at 10% duty cycle (multiplier 0.32); welder B has 75 A at 20% duty cycle (multiplier 0.45). Each welder's value is its actual primary current times its multiplier, and the feeder ampacity is the value for the largest welder plus 60% of the value for the other. What minimum feeder ampacity is required, to the nearest 0.1 ampere?

1. 53.0 A
2. 65.8 A
3. 145.0 A
4. 175.0 A

Official sources: NEC Article 630 (conductors supplying resistance welders) (NFPA 70, NEC 2026 as adopted by TDLR) <https://www.nfpa.org/codes-and-standards/nfpa-70-standard-development/70> · TDLR/PSI Journeyman content outline, Calculations - Special Occupancies, Equipment, and Conditions <https://test-takers.psiexams.com/api/content/bulletin/1682>

901. Answer 2. 8.6 kVA

The continuous current limit is $30 \times 0.8 = 24$ A, and $1.732 \times 208 \times 24 / 1,000 = 8.65$ kVA, about 8.6 kVA. 5.0 kVA uses single-phase power and leaves out the 1.732. 10.8 kVA leaves out the 80% limit. 13.5 kVA multiplies the rating by 125% instead of 80%.

902. Answer 4. 3.2 h

The bank stores $48 \times 200 = 9,600$ Wh, and at 3,000 W it runs $9,600 / 3,000 = 3.2$ hours. 0.3 h inverts the ratio. 0.8 h uses 12 volts instead of 48 volts. 1.6 h uses 24 volts instead of 48 volts.

903. Answer 1. 344.0 W

The power falls by $0.35\% \times 40 = 14\%$, so $400 \times 0.86 = 344.0$ W. 386.0 W subtracts 0.35 watt per degree instead of 0.35 percent. 400.0 W applies no temperature correction. 456.0 W raises the power instead of lowering it.

904. Answer 4. 9.6 kWh

The bank is $4 \times 12 = 48$ V and $2 \times 100 = 200$ Ah, so it stores $48 \times 200 = 9,600$ Wh, which is 9.6 kWh. 1.2 kWh counts only one battery. 2.4 kWh counts only two batteries. 4.8 kWh counts only one string of four.

905. Answer 2. 10.0 kW

At a constant 48 A the power is $208 \times 48 = 9,984$ W, which is 10.0 kW and lower than the 11.5 kW at 240 volts. 8.7 kW scales the power with the square of the voltage ratio. 11.5 kW assumes the power does not change with voltage. 13.3 kW inverts the voltage ratio.

906. Answer 1. 11.9 kWh

The system returns 85% of what goes in, so it delivers $14.0 \times 0.85 = 11.9$ kWh. 14.0 kWh assumes no losses. 16.5 kWh divides by the efficiency instead of multiplying. 85.0 kWh reports the efficiency percent as kilowatt-hours.

907. Answer 3. 5.6 h

Only 90% of the 7.2 kW reaches the battery, which is 6.48 kW, so the time is $36 / 6.48 = 5.56$ hours. 4.5 h multiplies by the efficiency instead of dividing by it. 5.0 h ignores the charging losses. 6.2 h applies the 90% efficiency twice.

908. Answer 4. 25.6 kWh

Daily energy is $6.4 \text{ kW} \times 5 \text{ h} \times 0.80 = 25.6$ kWh. 4.0 kWh leaves out the array size. 5.1 kWh leaves out the peak sun hours. 20.5 kWh applies the derate factor twice.

909. Answer 2. 9.6 kW

The continuous current may be $50 \times 0.8 = 40$ A, and $40 \times 240 = 9,600$ W, which is 9.6 kW. 7.7 kW applies the 80% limit twice. 12.0 kW uses the full 50-ampere circuit rating. 15.0 kW multiplies the circuit rating by 125%.

910. Answer 3. 6 AWG

Each motor needs $34 \times 1.25 = 42.5$ A. Starting from the 90 C column, 6 AWG gives $75 \times 0.91 \times 0.8 = 54.6$ A, and its 75 C value of 65 A also covers 42.5 A at the terminals; 8 AWG falls to 40.0 A after the two factors. 10 AWG sizes for the 34 A full-load current without the 125% factor and without correction or adjustment. 8 AWG applies the 125% factor at the 75 C column but forgets the ambient and conductor-count factors. 4 AWG derates the 60 C column although the terminals are rated 75 degrees C.