

Duty Cycle Quiz

Name Key

1. Find the operating time for a machine with a 60% duty cycle at 150 amps.

6 minutes

$$60\% \times 10 \text{ min} \\ = .6(10) \\ = 6$$

2. A \$75 item is on sale for 35% off. Sales tax is 6%. How much is the item going to cost?

\$51.68

$$100\% - 35\% = 65\% \\ 65\% * 75 = 48.75 \\ \text{Tax } 100\% + 6\% \\ 106\% * 48.75 \\ 1.06(48.75) \\ = 51.68$$

3. A bill at a restaurant is \$28.95 with tax. How much should you leave for a 20% tip?

\$5.79

$$20\% * 28.95 \\ = .2(28.95) \\ = 5.79$$

4. If you have a machine rated 60% at 175 amps and need to work at 225 amps, how long will you be able to operate the machine with it overheating?

3 minutes

$$D = 60\% \left( \frac{175}{225} \right)^2 \\ = .6 \left( .77 \right)^2 \\ = .6(0.6049) \\ = 0.3630 = 36\% \\ 36\% * 10 \text{ min} \\ = .36 * 10 \\ = 3.6 \\ \text{Don't round up!}$$

5. If you have a machine rated 60% at 150 amps and only need 90 amps for the job, how long will you be able to operate the machine before burning out the transformer?

16 minutes

$$D = 60\% \left( \frac{150}{90} \right)^2 \\ = .6 \left( 1.67 \right)^2 \\ = .6(2.77) \\ = 1.66 \\ D = 1.66 \\ D = 166\% \\ 166\% * 10 \text{ min} \\ = 1.66 * 10 \\ = 16.6 \text{ min} \\ 16 \text{ min} \\ \text{Don't round up!}$$

6. There are two welding machines in a shop. One has a duty cycle rating of 60% at 150 amperage while the other machine has a 90% duty cycle at 125 amps. You are planning a job that needs to operate at 175 amps and need to get it done as soon as possible. Which machine should you use? Show your work and give an explanation.

Both machine will run about 4 min, although Machine 2 could go a bit longer

Machine 1

$$60\% \left( \frac{150}{175} \right)^2 \\ = .6(0.8571)^2 \\ = .6(0.7347) \\ = 0.4408 \\ 44\% \\ 44\% * 10 \text{ min} \\ = .44 * 10 \\ = 4.4 \text{ min}$$

Machine 2

$$90\% \left( \frac{125}{175} \right)^2 \\ = .9(0.7143)^2 \\ = .9(0.5102) \\ = 0.4592 \\ 46\% \\ 46\% * 10 \text{ min} \\ = 4.6 \text{ min}$$