

# Cooling problem set

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Attempt the following problems. You are also recommended to try and write scripts to solve these (in PowerShell, Python, Perl, R, or your other favourite scripting language!)

1. A small wiring closet has a 500 W IT load within. Recommend the simplest suitable cooling solution to maintain a temperature of  $\leq 25^{\circ}\text{C}$ .
2. A data centre environment has a IT load of 26 kW in a closed space. Determine the cooling capacity required, stating key relevant assumptions that you make.
3. An air conditioning system consumes 3.3 kW to provide 11.55 kW of cooling. Determine the COP.
4. An air conditioning system has a COP of 4.2. It consumes 5.2 kW of power. Calculate the amount of heat it is capable of removing.
5. An American Air Conditioning manufacturer advertises an Air Cooled CRAC with an EER of 13.5. Calculate the COP.
6. Convert  $50\,000\text{ BTU h}^{-1}$  to kW.
7. A cooling load of 26 kW is serviced by a cooling system with an EER of 12. Calculate the power consumption of this cooling system.
8. A small server room contains 2 kW of IT loads in a closed space. A fan is installed which consumes 200 W at maximum speed. No other non-IT loads are located within the closed space. Determine the PUE.
9. A server room contains 5.8 kW of IT loads in a closed space. A cooling system with a COP of 5.2 is proposed to be installed. No other non-IT loads are located within the closed space. Determine the PUE.
10. A data centre environment hosts 16 kW of IT loads in a closed space. The UPS units are located within the racks and add an additional 25 % to the IT load at their current load. The cooling system has a COP of 4.5. Based on this information, determine the PUE.