1. Saturation pressure of water at 100°C (two decimals, kPa)?

   _____ kPa

2. Work at constant pressure, 200 kPa, from 0.3 to 0.9 $m^3$ (one decimal, kJ)?

   _____ kJ

3. Quality at the isentropic turbine exit, 50 kPa (four decimals)?

   _____

4. Carnot efficiency between 800 K and 300 K (three decimals)?

   _____

5. Ideal cycle: turbine exit quality at 10 kPa (four decimals)?

   _____

6. The coefficient of performance is defined as:

   ☐ the work over what you want: w_in divided by q_L

   ☐ work out over heat in, as for an engine

   ☐ the ratio of the two absolute temperatures

   ☐ what you want over the work: q_L or q_H divided by w_in

7. Inside the saturation dome, quality x is:

   ☐ the temperature span across the dome

   ☐ the ratio of actual to saturation pressure

   ☐ the vapour mass fraction of the mixture

   ☐ the vapour volume fraction of the mixture

8. Which of these is a state function?

   ☐ Boundary work

   ☐ Shaft work

   ☐ Enthalpy

   ☐ Heat transferred

9. Across an adiabatic nozzle with no shaft work:

   ☐ entropy stays exactly constant



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   ☐ enthalpy drops by the kinetic-energy gain

   ☐ pressure stays constant

10. When can you use $ds = \delta q/T$ directly?

    ☐ when the device is adiabatic

    ☐ when the fluid is an ideal gas

    ☐ when the process is a cycle

    ☐ when the path is reversible; otherwise use the entropy balance with sigma

1. **101.35 kPa**

   Read from the saturated-water temperature table.

2. **120.0 kJ**

   $W = p\Delta V = 200 \times 0.6 = 120.0$ kJ.

3. **0.8966**

   $x = (6.9212 - 1.0910)/6.5029 = 0.8966$.

4. **0.625**

   $1 - 300/800 = 0.625$.

5. **0.7227**

   $x_4 = (6.0700 - 0.6492)/7.5009 = 0.7227$.

6. **what you want over the work: q_L or q_H divided by w_in**

   COP is what you want over the work you pay; the reversed-Carnot limit caps it.

7. **the vapour mass fraction of the mixture**

   Quality is a mass fraction. Working it out from volumes is a common mistake.

8. **Enthalpy**

   Work and heat depend on the path. $h = u + pv$ depends only on the state.

9. **enthalpy drops by the kinetic-energy gain**

   $q - w = 0$, so $\Delta h = -\Delta ke$.

10. **when the path is reversible; otherwise use the entropy balance with sigma**

    The definition needs $q_{rev}$. For other paths, use the balance with $\sigma$.



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