

Water & Steam Properties – Conceptual Worksheet

This worksheet reinforces conceptual understanding of thermodynamic and transport properties of water and steam. Numerical tools may be used to verify trends.

Level 1 – Fundamentals & Intuition

- 1 A cup of water is filled to the brim at 25 °C. If it is heated to 40 °C, what happens to the water level? Explain why.
- 2 Why does ice float on liquid water, and what does this imply about density?
- 3 At 1 atm and 150 °C, is water subcooled, saturated, or superheated? Explain.
- 4 Why is the specific gravity of liquid water close to 1 at room temperature?
- 5 Which has higher density at atmospheric conditions: liquid water or steam? Why?

Level 2 – Trends & States

- 6 How does the density of liquid water change with increasing temperature at constant pressure?
- 7 Why does the viscosity of liquid water decrease as temperature increases?
- 8 Why is only one independent property required to define a saturated state?
- 9 During vaporization at constant pressure, what happens to entropy and why?
- 10 Why are C_p and C_v nearly equal for liquid water but significantly different for gases?

Level 3 – Engineering Reasoning & Applications

- 11 Why is superheated steam preferred over saturated steam at the inlet of a turbine?
- 12 Why is liquid water an excellent heat transfer medium compared to steam?
- 13 How do viscosity and density influence pumping power requirements?
- 14 Why must engineers understand property trends rather than relying solely on tabulated values?
- 15 How are temperature, pressure, and phase related according to the water phase diagram?