In a reversible Claude system, if $T_1$, $T_2$, $T_3$ are held constant,

1. The $y_{\text{max}}$ ________ with the decrease in $T_3$.
2. $W/m_{\text{fmin}}$ ________ with the decrease in $T_3$.
3. The overall inefficiency of compressor is ______
4. The overall inefficiency of an expander is ______
5. Kapitza and Heylandt systems are the modifications of the _____ System.
6. ______ system is widely used in helium liquefaction.
7. The regenerator/heat exchanger performs both _____ & _______.
Self Assessment

8. ______ system was the first one to use a turbo-expander.
9. ______ system is a high-pressure Air liquefaction system.
10. In a Heylandt system, the inlet to the expander is at ________.
11. ______ system is considered as one of the biggest milestones in Cryogenic Engineering.
12. The inversion temperature of Helium is around ______.
Answers

1. Decreases
2. Increases
3. \( \eta_{\text{oval},c} = \eta_{\text{mech},c} \times \eta_{\text{iso},c} \)
4. \( \eta_{\text{oval},e} = \eta_{\text{mech},e} \times \eta_{\text{ad},e} \)
5. Claude
6. Collins
7. Gas cooling/warming, Gas purification
8. Kapitza
9. Heylandt
10. Ambient
11. Collins
12. 45 K