1) $27^{\log_{81} 256}$

$\log_{81} 256$

$= \frac{\log 256}{\log 81}$

$= \frac{\log 4}{\log 3}$

$27^{\frac{\log 4}{\log 3}}$

$= 27^{\frac{\log \frac{8}{3}}{\log 3}} \times 27^{\frac{\log 2}{\log 3}}$

$= 8 \cdot 8$

$= 64$

2) $\frac{\log_3 125 + \log_9 729}{\log_3 15}$

$= \frac{\frac{\log 125}{\log 3} + 3}{\frac{\log 15}{\log 3}}$

$= \frac{\frac{\log 125}{\log 3}}{\frac{\log 15}{\log 3}} + \frac{3}{\frac{\log 15}{\log 3}}$

$= \frac{\log 125}{\log 3} \cdot \frac{\log 3}{\log 15} + 3 \cdot \frac{\log 3}{\log 15}$

$= \log_{15} 125 + 3 \log_{15} 3$

$= \log_{15} 125 + \log_{15} 27$

$= 3$

3) $m = p^{x^y}$

$\log_p m = x^y$

$\log_x(\log_p m) = y$