13. $8^{x-3} = 6^{x+2}$

$\log 8^{x-3} = \log 6^{x+2}$

$(x-3)\log 8 = (x+2)\log 6$

$x\log 8 - 3\log 8 = x\log 6 + 2\log 6$

$-x\log 6 \quad +3\log 8 \quad -x\log 6 \quad +3\log 8$

$x\log 8 - x\log 6 = 2\log 6 + 3\log 8$

$\frac{x(\log 8 - \log 6)}{\log 8 - \log 6} = \frac{(2\log 6 + 3\log 8)}{(\log 8 - \log 6)} = \frac{(\log 6^2 + \log 8^3)}{\log \frac{8}{6}} = \frac{(\log 36 + \log 512)}{\log \frac{4}{3}} = \frac{\log 18{,}432}{\log \frac{4}{3}}$

$x \approx 34.1413$

$\log_2 32 = 5$ $\log_2 31$

$2^n = 32$

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**Change of base formula:** $\log_a n = \frac{\log_b n}{\log_b a}$

→ **Express each logarithm in terms of common logarithms.**
→ **Then approximate its value to four decimal places.**

14. $\log_4 25$

$\frac{\log 25}{\log 4}$

2.3219

15. $\log_3 56$

$\frac{\log 56}{\log 3}$

3.6640

16. $\log_{13} 1987$

$\frac{\log 1987}{\log 13}$

2.9608