

197: 1-3, 11-14, 22-23, 26-27

$$\begin{aligned} 1) \quad 4^{x+1} &= 8^{x+3} \\ 2^{(2)(x+1)} &= 2^{(3)(x+3)} \\ 2x+4 &= 3x+9 \\ \boxed{5} &= \boxed{x} \end{aligned}$$

$$\begin{aligned} 2) \quad 8^{x+4} &= 32^{3x} \\ 2^{(3)(x+4)} &= 2^{(5)(3x)} \\ 3x+12 &= 15x \\ 12 &= 12x \quad \boxed{x=1} \end{aligned}$$

$$\begin{aligned} 3) \quad 49^{x+4} &= 7^{18-x} \\ 7^{(2x+8)} &= 7^{18-x} \\ 2x+8 &= 18-x \\ 3x &= 10 \\ \boxed{x} &= \boxed{\frac{10}{3}} \end{aligned}$$

$$\begin{aligned} 11) \quad \ln a &= 4 \\ e^{\ln a} &= e^4 \\ a &= e^4 \approx \boxed{54.60} \end{aligned}$$

$$\begin{aligned} 12) \quad \frac{-8 \log b}{-8} &= \frac{-64}{-8} \\ \log b &= 8 \\ 10^{\log b} &= 10^8 \\ \boxed{b} &= \boxed{10^8} \end{aligned}$$

$$\begin{aligned} 13) \quad \ln(-2) &= c \\ &\text{no solutions} \end{aligned}$$

$$\begin{aligned} 14) \quad 2+3 \log 3d &= 5 \\ 3 \log 3d &= 3 \\ \log 3d &= 1 \\ 10^{\log 3d} &= 10^1 \\ 3d &= 10 \\ \boxed{d} &= \boxed{\frac{10}{3}} \end{aligned}$$

$$\begin{aligned} 22) \quad \log_6(x^2+5) &= \log_6 41 \\ (x^2+5) &= 41 \\ x^2 &= 36 \quad \boxed{x = \pm 6} \end{aligned}$$

$$\begin{aligned} 23) \quad \log_8(x^2+11) &= \log_8 92 \\ (x^2+11) &= 92 \\ x^2 &= 81 \quad \boxed{x = \pm 9} \end{aligned}$$

$$\begin{aligned} 24) \quad \log_9(x^4-3) &= \log_9 13 \\ (x^4-3) &= 13 \\ x^4 &= 16 \quad \boxed{x = \pm 2} \end{aligned}$$

$$\begin{aligned} 26) \quad \log_5 X &= \log_5(x+6) - \log_5 4 \\ \log_5 X &= \log_5 \frac{(x+6)}{4} \\ X &= \frac{x+6}{4} \\ 4X &= x+6 \\ 3X &= 6 \\ \boxed{X} &= \boxed{2} \end{aligned}$$

$$\begin{aligned} 27) \quad \log_{11} 3x &= \log_{11}(x+5) - \log_{11} 2 \\ \log_{11} 3x &= \log_{11} \frac{x+5}{2} \\ 3x &= \frac{x+5}{2} \\ 6x &= x+5 \\ 5x &= 5 \\ \boxed{x} &= \boxed{1} \end{aligned}$$