Directions: Solve each exponential equation using logarithms.

1. $3^x = 18$

$\log_3 18 = x$

$\dfrac{\log 18}{\log 3} = x$

$\boxed{x \approx 2.6309}$

2. $7^y = 24$

$\log_7 24 = y$

$\dfrac{\log 24}{\log 7} = y$

$\boxed{y \approx 1.6332}$

3. $12^{n-3} = 60$

$\log_{12} 60 = n-3$

$\dfrac{\log 60}{\log 12} = n-3$

$1.6477 = n-3$

$\boxed{n \approx 4.6477}$

4. $2^{3a} = 142$

$\log_2 142 = 3a$

$\dfrac{\log 142}{\log 2} = 3a$

$7.1497 = 3a$

$\boxed{a \approx 2.3832}$

5. $15^{3v-5} = 87$

$\log_{15} 87 = 3v-5$

$\dfrac{\log 87}{\log 15} = 3v-5$

$1.6491 = 3v-5$

$6.6491 = 3v$

$\boxed{v \approx 2.2164}$

6. $4^{8n-2} = 84$

$\log_4 84 = 8n-2$

$\dfrac{\log 84}{\log 4} = 8n-2$

$3.1962 = 8n-2$

$5.1962 = 8n$

$\boxed{n \approx .6495}$

7. $4 \cdot 10^k = 60$

$10^k = 15$

$\log_{10} 15 = k$

$\boxed{k \approx 1.1761}$

8. $16^n - 6 = 45$

$16^n = 51$

$\log_{16} 51 = n$

$\boxed{n \approx 1.4181}$

9. $13^{c-8} - 9 = 17$

$13^{c-8} = 26$

$\log_{13} 26 = c-8$

$1.2702 = c-8$

$\boxed{c \approx 9.2702}$

10. $2 \cdot 8^{5r} = 28$

$8^{5r} = 14$

$\log_8 14 = 5r$

$1.2691 = 5r$

$\boxed{r \approx .2538}$

11. $10^{2x-7} - 3 = 57$

$10^{2x-7} = 60$

$\log_{10} 60 = 2x-7$

$1.7782 = 2x-7$

$8.7782 = 2x$

$\boxed{4.3891 = x}$

12. $8^{6-4x} + 6 = 22$

$8^{6-4x} = 16$

$\log_8 16 = 6-4x$

$\frac{4}{3} = 6-4x$

$x = \frac{7}{6} \approx 1.1\overline{6}$

13. $6 \cdot 4^m - 14 = 88$

$6 \cdot 4^m = 102$

$4^m = 17$

$\log_4 17 = m$

$\boxed{m \approx 2.0437}$

14. $9 \cdot 12^{r+4} - 8 = 127$

$9 \cdot 12^{r+4} = 135$

$12^{r+4} = 15$

$\log_{12} 15 = r+4$

$1.0898 = r+4$

$\boxed{r \approx -2.9102}$

15. $-5 \cdot 4^{6x} + 5 = -30$

$-5 \cdot 4^{6x} = -35$

$4^{6x} = 7$

$\log_4 7 = 6x$

$1.4037 = 6x$ $\boxed{x \approx .2339}$

16. $8 \cdot 11^{3p-9} + 10 = 194$

$8 \cdot 11^{3p-9} = 184$

$11^{3p-9} = 23$

$\log_{11} 23 = 3p-9$

$1.3076 = 3p-9$

$10.3076 = 3p$

$\boxed{p \approx 3.4359}$