18. $\log_4 \frac{1}{256} = -4$

$4^n = \frac{1}{256}$

$n = -4$

$\log_5 125 = 3$

product property

$$\log_b m + \log_b n = \log_b(mn)$$

quotient property

$$\log_b m - \log_b n = \log_b\left(\frac{m}{n}\right)$$

power property

$$\log_b m^p = p\log_b m$$

$\log_6 9 + \log_6 7 = \log_6(9 \cdot 7) = \log_6 63$

$\log_2 20 - \log_2 4 = \log_2 \frac{20}{4} = \log_2 5$

$3\log_5 2 = \log_5 2^3 = \log_5 8$

1. $\log_2 5 + \log_2 7$

$\log_2 35$

2. $\log_7 48 - \log_7 8$

$\log_7 \frac{48}{8}$

$\log_7 6$

3. $2\log_5 6 - 2\log_5 2$

$\log_5 6^2 - \log_5 2^2$

$\log_5 \frac{6^2}{2^2}$

$\log_5 36 - \log_5 4$

$\log_5 \frac{36}{4}$

$\log_5 9$

4. $\log_4 13 + 4\log_4 3$

$\log_4 13 + \log_4 3^4$

$\log_4 13 + \log_4 81$

$\log_4 1053$

cannot take log of zero/negative

5. $\boxed{3\log_5 x - \log_5 4} = \log_5 16$

$\log_5 x^3 - \log_5 4 = \log_5 16$

$\log_5 \frac{x^3}{4} = \log_5 16$

$\frac{x^3}{4} = 16$

$\sqrt[3]{x^3} = \sqrt[3]{64}$

$x = 4$

$2^{x} = \text{pos.}$ $\quad 2^{-1} = \frac{1}{2}$

log -8

log -3

log -1

log 0

6. $2\log_7 x = \log_7 27 + \log_7 3$

$\log_7 x^2 = \log_7 81$

$\sqrt{x^2} = \pm\sqrt{81}$

$x = \pm 9$

$x = 9$ only