

Expand =

# 8.5 Part 2

## Expanding or condensing a Logarithmic Expression

- Expand  $\log_5 2x^6$  (assume  $x$  is positive)

$$6 \log_5(2x)$$

$$6(\log_5 2 + \log_5 x)$$

- Condense  $2 \log_3 7 - 5 \log_3 x$

$$\cancel{2} \log_3 7^2 - \log_3 x^5$$

$$\log_3 49 - \log_3 x^5 = \log_3 \frac{49}{x^5}$$

### Practice:

13. Expand  $\log_2 3x$

$$\log_2 3 + \log_2 x$$

14. Expand  $\log_6 \frac{6}{x}$

$$\log_6 6 - \log_6 x$$

$$6^1 = 6$$

$$1 - \log_6 x$$

15. Condense  $\log 3 + \log 5$

$$\log(3 \cdot 5)$$

$$\log 15$$

16. Condense  $\ln x - \ln 3$

$$\frac{\ln x}{\ln 3} = \ln \frac{x}{3}$$

OR

$$\log_e \frac{x}{3}$$

17. Expand  $\ln x^{-3}$

$$-3 \ln x$$

OR

$$-3 \log_e x$$

18. Condense  $2 \log_2 x^2 + \log_2 8$

$$\log_2 x^2 + \log_2 8$$

$$\log_2 8x^2$$

19. Condense  $\ln 2 - \ln(x+2)$

$$\frac{\ln 2}{\ln(x+2)}$$

OR

$$\log_e \frac{2}{(x+2)}$$

20. Expand  $\log_3(27x)^2$

$$2 \log_3(27x)$$

$$2(\log_3 27 + \log_3 x)$$

$$3^3 = 27 \Rightarrow 2(3 + \log_3 x)$$