pg. 449 # 1-26, 31, 33, 35, 37, 40

1. $\log 4 + \log 5 = \log 20$
$= \log(4 \cdot 5)$
Product Property

11. $\log 7 + \log 2 = \log(7 \cdot 2) = \log 14$

19. $\log x^3 y^5$

$3\log x + 5\log y$

31. $L_1 = 22\,dB$ I_1 = original intensity
L_2 = new loudness $I_2 = 8(I_1)$

$L_2 - L_1 = 10 \log \frac{8I_1}{I_0} - 10 \log\left(\frac{I_1}{I_0}\right)$

$L_2 - L_1 = 10 \log\left(8 \cdot \frac{I_1}{I_0}\right) - 10 \log\left(\frac{I_1}{I_0}\right)$

$= 10\log 8 + 10 \log \frac{I_1}{I_0} - 10 \log \frac{I_1}{I_0}$

$= 10 \log 8 = 9\,dB$

33. $\log_2 4 - \log_2 16 = \log_2\left(\frac{4}{16}\right) = \log_2 \frac{1}{4} = x$

$2^x = \frac{1}{4}$

$x = -2$

1. Product Property
2. Quotient Property
3. Power Property
4. Power Property
5. Power Property, Quotient Property
6. Power Property
7. Power Property, Quotient Property
8. Power Property, Product Property
9. Power Property, Quotient Property
10. Power Property, Product Property

11. $\log 14$
12. $\log_2 3$
13. $\log 972$
14. $\log \frac{2}{3}$
15. $\log \frac{m^4}{n}$
16. $\log \frac{5}{2^k}$
17. $\log_6 5x$
18. $\log_7 \frac{xy}{z}$
19. $3 \log x + 5 \log y$
20. $\log_7 22 + \log_7 x + \log_7 y + \log_7 z$
21. $\log_4 5 + \frac{1}{2} \log_4 x$
22. $\log 3 + 4 \log m - 2 \log n$
23. $\log_5 r - \log_5 s$
24. $2 \log_3 2 + 2 \log_3 x$
25. $\log_3 7 + 2 \log_3 (2x - 3)$
26. $2 \log a + 3 \log b - 4 \log c$
27. $\frac{1}{2} \log 2 + \frac{1}{2} \log x - \frac{1}{2} \log y$
28. $1 + \frac{1}{2} \log_8 3 + \frac{5}{2} \log_8 a$
29. $\log s + \frac{1}{2} \log 7 - 2 \log t$
30. $-\log_b x$
31. 9 dB
32. 13 dB
33. -2
34. 1
35. 6
36. 2
37. 2
38. 1

40. -2