Unit 5

(85) a) $\log_{32} 4 = x$

- change to Exponential form: $32^x = 4$
- Rewrite so left & right sides have the same base: $(2^5)^x = 2^2$
- Equate exponents: $5x = 2$

$\boxed{x = 2/5}$

b) $\log_{216} x = -\frac{2}{3}$

$216^{-2/3} = x$

$(6^3)^{-2/3} = x$

$6^{-2} = x$

$\frac{1}{6^2} = x$

$\boxed{\frac{1}{36} = x}$

c) $\log_x 625 = \frac{4}{3}$

$x^{4/3} = 625$

raise both sides to 3/4 → $x^1 = 625^{3/4}$

$x = (5^4)^{3/4}$

$x = 5^3$

$\boxed{x = 125}$

(86)

a) $\log_2 3 + \log_2 5 = \log_2 (3 \cdot 5) = \boxed{\log_2 15}$

b) $\log_5 4 + \log_5 8 - \log_5 2 = \log_5 \frac{4 \cdot 8}{2} = \boxed{\log_5 16}$

c) $3\log_{12} 6 - \log_{12} 4 = \log_{12} 6^3 - \log_{12} 4 = \log_{12} \frac{6^3}{4} = \log_{12} \frac{216}{4}$

$= \boxed{\log_{12} 54}$

(87) $\log_{10} 0.0001 = -4$

$10^{-4} = 0.0001$ (B)

(88) $4.2^{x+1} = 8.3$

$x+1 = \log_{4.2} 8.3$

$x+1 = \frac{\log 8.3}{\log 4.2}$

$x+1 = 1.4747$

$x \approx 0.4747$ (D)

(89) $\log_a 9 = 2$

$a^2 = 9$

$a = \pm 3$

a cannot be a negative #, so answer is (A)

(94) a) $4^{7a} = 16^{5a-6}$

$4^{7a} = (4^2)^{5a-6}$

$7a = 2(5a-6)$

$7a = 10a - 12$

$-3a = -12$

$\boxed{a = 4}$

b) $\log_x \frac{1}{49} = -2$

$x^{-2} = \frac{1}{49}$

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

$\boxed{x = 7}$

c) $\log_6 x = 2$

$6^2 = x$

$\boxed{36 = x}$