N: Key D: _____ P: 0 1 2 3 4 5 6

Algebra 2 // Topic 6 // **Solving Logs D**

#1-6 // Solve the following equations for x. Express your answer in A) log form and B) in Common Logs

1) $6^x = 12$

A. $\log_6 12$ B. $\frac{\log 12}{\log 6}$

2) $6^x = 14$

A. $\log_6 14$ B. $\frac{\log 14}{\log 6}$

3) $3^x = 13$

A. $\log_3 13$ B. $\frac{\log 13}{\log 3}$

4) $3^x - 8 = 7$

$+8 \quad +8$

$3^x = 15$ → Si

A. $\log_3 15$

B. $\frac{\log 15}{\log 3}$

5) $2(3^x) + 3 = 17$

$-3 \quad -3$

$\frac{2(3^x)}{2} = \frac{14}{2}$

$3^x = 7$ → Si

A. $\log_3 7$

B. $\frac{\log 7}{\log 3}$

6) $5(2^x) + 8 = 33$

$-8 \quad -8$

$\frac{5(2^x)}{5} = \frac{25}{5}$

$2^x = 5$

A. $\log_2 5$

B. $\frac{\log 5}{\log 2}$

#7-30 Solve the following equations for x.

7) $\log_3 x = 5$ → Si

$3^5 = x$

$x = 243$

8) $\log_x \frac{1}{27} = -3$ → Si

$x^{-3} = \frac{1}{27}$

$\frac{1}{x^3} = \frac{1}{27} \rightarrow x = 3$

9) $\log_{10} 4x = 3$ → Si

$10^3 = 4x$

$\frac{1000}{4} = \frac{4x}{4}$

$x = 250$

10) $\log_4 32 + \log_4 x = 2$

Si → $\log_4 32x = 2$

$4^2 = 32x$

$\frac{16}{32} = \frac{32x}{32} \rightarrow x = \frac{1}{2}$

11) $\log_7 10 + \log_7 x = 2$

Si → $\log_7 10x = 2$

$7^2 = 10x$

$\frac{49}{10} = \frac{10x}{10} \rightarrow x = \frac{49}{10}$

12) $\log 6 + \log x = 2$

Si → $\log_{10} 6x = 2$

$10^2 = 6x$

$\frac{100}{6} = \frac{6x}{6} \rightarrow x = \frac{50}{3}$

13) $\log 27 + 3\log x = 3$

$\log_{10} 27 + \log x^3 = 3$

Si → $\log_{10} 27x^3 = 3$

$\frac{10^3}{27} = \frac{27x^3}{27}$

$\sqrt[3]{\frac{1000}{27}} = \sqrt[3]{x^3}$

$\frac{10}{3} = x$

14) $2\log x - \log 9 = 0$

$\log x^2 - \log 9 = 0$

Si → $\log_{10} \frac{x^2}{9} = 0$

$10^0 = \frac{x^2}{9}$

$(9)1 = \frac{x^2}{9}(9)$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

15) $\log 4x - \log 16 = 1$

Si → $\log_{10} \frac{4x}{16} = 1$

$10^1 = \frac{4x}{16}$

$(4)10 = \frac{x}{4}(4)$

$x = 40$

16) $\log_{10}(5x - 75) = 3$ → Si

$10^3 = 5x - 75$

$1000 = 5x - 75$

$+75 \quad +75$

$\frac{1075}{5} = \frac{5x}{5}$

$x = 215$

17) $\log_{10}(3x + 15) = 2$ → Si

$10^2 = 3x + 15$

$100 = 3x + 15$

$-15 \quad -15$

$\frac{85}{3} = \frac{3x}{3}$

$x = \frac{85}{3}$

18) $\log_{10}(4x - 20) = 3$ → Si

$10^3 = 4x - 20$

$1000 = 4x - 20$

$+20 \quad +20$

$\frac{1020}{4} = \frac{4x}{4}$

$x = 255$

19) $\frac{1}{2}e^x = 4$ (2)

Si $e^x = 8$

$\log_e 8 = x$

$\ln 8 = x$

20) $e^{x+2} = 40$

$\log_e 40 = x+2$

$\ln 40 = x+2$

$-2 \quad -2$

$x = \ln 40 - 2$

21) $\frac{6e^x}{6} = \frac{8}{6}$

$e^x = \frac{4}{3}$ Si

$\log_e \frac{4}{3} = x$

$\ln \frac{4}{3} = x$

22) $\ln(3x + 2) = 4$

Si $\log_e 3x+2 = 4$

$e^4 = 3x + 2$

$-2 \quad -2$

$\frac{e^4 - 2}{3} = \frac{3x}{3}$

23) $\frac{8\ln(3x - 1)}{8} = \frac{16}{8}$

$\ln(3x-1) = 2$

Si $\log_e(3x-1) = 2$

$e^2 = 3x - 1$

$+1 \quad +1$

$\frac{e^2+1}{3} = \frac{3x}{3}$

24) $\frac{6\ln(3x - 2)}{6} = \frac{30}{6}$

$\ln(3x-2) = 5$

$\log_e 3x-2 = 5$

$e^5 = 3x - 2$

$+2 \quad +2$

$\frac{e^5+2}{3} = \frac{3x}{3}$

25) $\log x - \log 5 = -2$

Si $\log \frac{x}{5} = -2$

$10^{-2} = \frac{x}{5}$

$\frac{1}{100} = \frac{x}{5}$

$\frac{100x}{100} = \frac{5}{100} \rightarrow x = \frac{1}{20}$

26) $\log_8 4 - \log_8 x = 2$

Si $\log_8 \frac{4}{x} = 2$

$8^2 = \frac{4}{x}$

$64 = \frac{4}{x}$

$\frac{64x}{64} = \frac{4}{64} \rightarrow x = \frac{1}{16}$

27) $\frac{3\log_2(3x + 1)}{3} = \frac{15}{3}$

Si $\log_2(3x+1) = 5$

$2^5 = 3x + 1$

$32 = 3x + 1$

$-1 \quad -1$

$\frac{31}{3} = \frac{3x}{3} \rightarrow x = 31/3$

28) $\log_6 x + \log_6 (x + 5) = 2$

Si $\log_6 x(x+5) = 2$

$6^2 = x(x+5)$

$36 = x^2 + 5x$

$-36 \quad -36$

$x^2 + 5x - 36 = 0$

$1 \quad +9$

$1 \quad -4$

$(x+9)(x-4) = 0$

$\hookrightarrow x = -9 \quad x = 4$

29) $\log_3 x + \log_3 (x - 24) = 4$

Si $\log_3 x(x-24) = 4$

$3^4 = x(x-24)$

$81 = x^2 - 24x$

$-81 \quad -81$

$x^2 - 24x - 81 = 0$

$1 \quad -27$

$1 \quad +3$

$(x-27)(x+3) = 0$

$\hookrightarrow x = 27 \quad x = -3$