

Worksheet #17—Exact Log Problems

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Simplify each of the following. Your final answer should contain no radicals.

(1) $\log_5 5$

(2) $\log_9 3$

(3) $\log_{16} 2$

(4) $\log_9 \frac{1}{9}$

(5) $\log_{\frac{1}{9}} 9$

(6) $\log_3 \frac{1}{9}$

(7) $\log_5 25$

(8) $\ln e$

(9) $\log_{\sqrt{2}} 4$

(10) $\log_4 \sqrt{2}$

(11) $\log_5 \frac{1}{25}$

(12) $\log_2 (-2)$

(13) $\log_{125} 5$

(14) $\log_{\frac{2}{3}} \frac{3}{2}$

(15) $\log_8 32$

(16) $\ln 1$

(17) $\log_{\frac{2}{3}} \frac{27}{8}$

(18) $\log_e e^2$

(19) $\log_{144} 12$

(20) $\log_8 4$

(21) $\log_{\frac{1}{3}} 9$

(22) $\log_8 2$

(23) $\log_2 8$

(24) $\log_3 1$

(25) $\log_b 1$

(26) $\log_{10} \frac{1}{100}$

(27) $3 \log_4 2$

(28) $\log_{16} 2$

(29) $\log_{125} 25$

(30) $\log_{b^2} b$

(31) $3^{2 \log_3 6}$

(32) $\log_9 \frac{1}{3}$

(33) $2^{\log_2 5}$

(34) $\log_{\frac{1}{2}} \frac{1}{4}$

(35) $\log_b \sqrt{b}$

(36) $\log_{27} 3$

(37) $\ln e^2$

(38) $e^{\ln 3}$

(39) $\log_{25} 125$

(40) $\log_4 \frac{\sqrt{8}}{2}$

(41) $\log_7 \sqrt{7}$

(42) $\log_{100} 10$

(43) $e^{2 \ln 5}$

(44) $e^{-3 \ln 2}$

(45) $e^{\ln 7}$

(46) $\log_5 125$

(47) $\log_{1000} 10$

(48) $\log_{64} \frac{1}{8}$

(49) $\log_3 \frac{1}{27}$

(50) $\log_{64} 8$

(51) $\log_9 \frac{1}{27}$

(52) $\log_{25} 5$

(53) $\log_4 2$

(54) $\log_2 2\sqrt{2}$

$$(55) \log_{\frac{1}{25}} 5$$

$$(58) \log_{10} 1000$$

$$(61) \log 10^5$$

$$(64) \log_{\frac{1}{27}} 9$$

$$(67) \log_{\frac{5}{2}} \frac{8}{125}$$

$$(70) \log_2 4 \log_3 9$$

$$(73) \log_{10} 10^5$$

$$(76) \log_b \frac{\sqrt{b}}{b^2}$$

$$(79) (e^{\ln 3})^2$$

$$(82) \log_b \sqrt{b}$$

$$(85) \log \sqrt{10}$$

$$(88) \log_{\frac{1}{b}} b$$

$$(56) \ln e^3$$

$$(59) \log_{\sqrt{7}} 7$$

$$(62) \log_4 32$$

$$(65) \log_9 27$$

$$(68) \log_8 \frac{2}{\sqrt{8}}$$

$$(71) \log_2 (2^3 4^5)$$

$$(74) 2 \log_3 9$$

$$(77) \log_6 \sqrt{12} + \log_6 \sqrt{3}$$

$$(80) \log_9 (27^{1/3})^2$$

$$(83) b^{\log_b 3}$$

$$(86) \ln \sqrt{e}$$

$$(89) \frac{1}{\log_{\frac{1}{2}} 4}$$

$$(57) \log 10^b$$

$$(60) \log_4 \frac{1}{2}$$

$$(63) \log_{36} 6$$

$$(66) \log_{\sqrt{2}} 4$$

$$(69) e^{\ln 3} e^{\ln 2}$$

$$(72) \log_8 \frac{\sqrt{2}}{\sqrt{8}}$$

$$(75) \frac{\log_4 8}{\log_3 \frac{1}{9}}$$

$$(78) (\log_9 27)^2$$

$$(81) \log_9 81 + \log_{81} 9$$

$$(84) b^{3 \log_b 5}$$

$$(87) \log_3 3 \sqrt{7} - \log_3 \sqrt{7}$$

$$(90) \frac{\log_4 8}{2}$$

Answers: (1) 1 (2) $\frac{1}{2}$ (3) $\frac{1}{4}$ (4) -1 (5) -1 (6) -2 (7) 2 (8) 1
(9) 4 (10) $\frac{1}{4}$ (11) -2 (12) Undefined (13) $\frac{1}{3}$ (14) -1 (15) $\frac{5}{3}$ (16) 0
(17) -3 (18) 2 (19) $\frac{1}{2}$ (20) $\frac{2}{3}$ (21) -2 (22) $\frac{1}{3}$ (23) 3 (24) 0
(25) 0 (26) -2 (27) $\frac{3}{2}$ (28) $\frac{1}{4}$ (29) $\frac{2}{3}$ (30) $\frac{1}{2}$ (31) 36 (32) $-\frac{1}{2}$
(33) 5 (34) 2 (35) $\frac{1}{2}$ (36) $\frac{1}{3}$ (37) 2 (38) 3 (39) $\frac{3}{2}$ (40) $\frac{1}{4}$ (41) $\frac{1}{2}$
(42) $\frac{1}{2}$ (43) 25 (44) $\frac{1}{8}$ (45) 7 (46) 3 (47) $\frac{1}{3}$ (48) $-\frac{1}{2}$ (49) -3
(50) $\frac{1}{2}$ (51) $-\frac{3}{2}$ (52) $\frac{1}{2}$ (53) $\frac{1}{2}$ (54) $\frac{3}{2}$ (55) $-\frac{1}{2}$ (56) 3 (57) b
(58) 3 (59) 2 (60) $-\frac{1}{2}$ (61) 5 (62) $\frac{5}{2}$ (63) $\frac{1}{2}$ (64) $-\frac{2}{3}$ (65) $\frac{3}{2}$
(66) 4 (67) -3 (68) $-\frac{1}{6}$ (69) 6 (70) 4 (71) 13 (72) $-\frac{1}{3}$ (73) 5
(74) 4 (75) $-\frac{3}{4}$ (76) $-\frac{3}{2}$ (77) 1 (78) $\frac{9}{4}$ (79) 9 (80) $\frac{1}{2}$ (81) $\frac{5}{2}$
(82) $\frac{1}{2}$ (83) 3 (84) 125 (85) $\frac{1}{2}$ (86) $\frac{1}{2}$ (87) 1 (88) -1 (89) $-\frac{1}{2}$
(90) $\frac{3}{4}$