

Logarithm Functions - Advanced

- 1** Simplify and solve for q

$$3^{(2q)} = 81$$

A

$$q = 0$$

B

$$q = 2$$

- 2** Simplify and solve for m

$$2^{(m+7)} = 32$$

A

$$m = -2$$

B

$$m = 2$$

- 3** Simplify and solve for x

$$7^{(2x+8)} = 49$$

A

$$x = -1$$

B

$$x = -3$$

C

$$x = -2$$

D

$$x = -4$$

- 4** Simplify and solve for q

$$5^{(q-8)} = 25^q$$

A

$$q = -9$$

B

$$q = -8$$

- 5** Simplify and solve for n

$$2^{(8n-9)} = 32^n$$

A

$$n = 2$$

B

$$n = 5$$

C

$$n = 3$$

D

$$n = 4$$

- 6** Simplify and solve for t

$$7^{\left(\frac{t+12}{t}\right)} = 49$$

A

$$t = 12$$

B

$$t = 11$$

- 7** Simplify and solve for t

$$5^{\left(\frac{7t+20}{4t}\right)} = 25$$

A

$$t = 21$$

B

$$t = 19$$

C

$$t = 20$$

D

$$t = 22$$

- 8** Simplify and solve for z

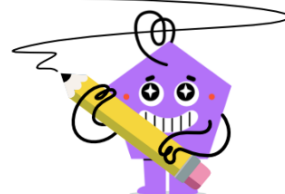
$$2^{\left(\frac{z+3}{z-5}\right)} = 32$$

A

$$z = 7$$

B

$$z = 6$$

**Logarithm Functions - Advanced****9** Simplify and solve for r

$$5^{\left(\frac{7r-9}{7r-8}\right)} = 25$$

A

$$r = 3$$

B

$$r = 2$$

C

$$r = 0$$

D

$$r = 1$$

10 Simplify and solve for r

$$9^{\left(\frac{r+5}{3}\right)} = 81^r$$

A

$$r = 1$$

B

$$r = 3$$

11 Simplify and solve for t

$$4^{\left(\frac{9t+8}{5}\right)} = 16^t$$

A

$$t = 7$$

B

$$t = 9$$

C

$$t = 8$$

D

$$t = 10$$

12 Use the product rule to simplify this to a quadratic of variable 'r'

$$\log_2(r+1) + \log_2(r+3) = \log_2(3)$$

A

$$r^2 + 5r + 3 = 0$$

B

$$r^2 + 4r + 2 = 0$$

C

$$r^2 + 4r + 0 = 0$$

13 Use the quotient rule to simplify this to a quadratic of variable 'q'

$$\log_8(q+8) - \log_8(q+3) = \log_8(1q)$$

A

$$-1q^2 - 2q + 8 = 0$$

B

$$q^2 - 2q + 6 = 0$$

C

$$-1q^2 - 1q + 9 = 0$$

14 Use the product rule to simplify this to a quadratic and solve for 'z'

$$\log_6(z+5) + \log_6(z+7) = \log_6(3)$$

A

$$z = -4$$

B

$$z = 4$$

C

$$z = -5$$

15 Use the quotient rule to simplify this to a quadratic and solve for 'z'

$$\log_8(z+9) - \log_8(z+9) = \log_8(1z)$$

A

$$z = 7$$

B

$$z = 1$$

C

$$z = -1$$

16 Use the power rule to simplify this equation

$$3^{(t+9)} = 6^{(t)}$$

A

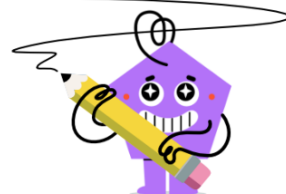
$$(9t+1) \ln 3 = (2t+1) \ln 6$$

B

$$(t-9) \ln 3 = (t-2) \ln 6$$

C

$$(t+9) \ln 3 = (t) \ln 6$$

**Logarithm Functions - Advanced****17** Use the power rule to simplify this and solve for 'p'

$$10^{(p-3)} = 3^{(p)}$$

A
$$p = \frac{3 \ln 10}{\ln 10 - \ln 3}$$

B
$$p = \frac{3 \ln 3}{\ln 3 - \ln 10}$$

C
$$p = \frac{\ln 3 - \ln 10}{-3 \ln 10 - 2 \ln 3}$$

18 Use the power rule to simplify this equation

$$10^{(-2x+7)} = 9^{(-7x)}$$

A
$$(-2x + 7) \ln 10 = (-7x) \ln 9$$

B
$$(7x - 2) \ln 10 = (2x - 7) \ln 9$$

C
$$(-2x - 7) \ln 10 = (-7x - 2) \ln 9$$

19 Use the power rule to simplify this and solve for 'y'

$$3^{(6y-2)} = 4^{(-4y)}$$

A
$$y = \frac{-4 \ln 4 - 6 \ln 3}{-2 \ln 3 - 2 \ln 4}$$

B
$$y = \frac{2 \ln 4}{6 \ln 4 + 4 \ln 3}$$

C
$$y = \frac{2 \ln 3}{6 \ln 3 + 4 \ln 4}$$

20 Use the power rule to simplify this equation

$$9^{(w-8)} = 7^{(w-6)}$$

A
$$(w - 8) \ln 9 = (w - 6) \ln 7$$

B
$$(w + 8) \ln 9 = (w + 6) \ln 7$$

C
$$(-8w + 1) \ln 9 = (-6w + 1) \ln 7$$

21 Use the power rule to simplify this and solve for 'q'

$$10^{(q-7)} = 7^{(q+5)}$$

A
$$q = \frac{5 \ln 7 + 7 \ln 10}{\ln 10 - 1 \ln 7}$$

B
$$q = \frac{\ln 7 - \ln 10}{-7 \ln 10 - 5 \ln 7}$$

C
$$q = \frac{5 \ln 10 + 7 \ln 7}{\ln 7 - \ln 10}$$

22 Use the power rule to simplify this equation

$$7^{(8n-4)} = 6^{(-4n+9)}$$

A
$$(8n + 4) \ln 7 = (-4n - 9) \ln 6$$

B
$$(8n - 4) \ln 7 = (-4n + 9) \ln 6$$

C
$$(-4n + 8) \ln 7 = (9n - 4) \ln 6$$

23 Use the power rule to simplify this and solve for 'p'

$$5^{(-4p-9)} = 9^{(-8p+8)}$$

A
$$p = \frac{-8 \ln 9 + 4 \ln 5}{-9 \ln 5 - 8 \ln 9}$$

B
$$p = \frac{8 \ln 5 + 9 \ln 9}{-4 \ln 9 + 8 \ln 5}$$

C
$$p = \frac{8 \ln 9 + 9 \ln 5}{-4 \ln 5 + 8 \ln 9}$$

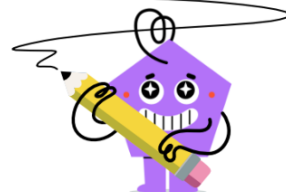
24 Use the power rule to simplify this to an equation with variable 'y'

$$2 \log_{10}(y - 6) = \log_{10}(4)$$

A
$$(y - 6)^2 = 16$$

B
$$2(y - 6) = 16$$

C
$$(y - 12) = 16$$



Logarithm Functions - Advanced

25 Use the power rule to simplify this and solve for 'm'

$$2\log_4(m+6) = \log_4(9)$$

A $m = -3$

B $m = 6$

C $m = 2$

26 Use the product rule to simplify this to a quadratic of variable 't'

$$\log_8(-1t-4) + \log_8(-2t-6) = \log_8(4)$$

A $2t^2 + 14t + 20 = 0$

B $t^2 + 12t + 20 = 0$

C $t^2 + 16t + 22 = 0$

27 Use the quotient rule to simplify this to a quadratic of variable 'y'

$$\log_2(3y+8) - \log_2(-2y-3) = \log_2(-1y)$$

A $-2y^2 + 0y + 8 = 0$

B $-1y^2 - 2y + 10 = 0$

C $-3y^2 + 1y + 6 = 0$

28 Use the product rule to simplify this to a quadratic and solve for 'y'

$$\log_8(y+7) + \log_8(-2y-8) = \log_8(4)$$

A $y = -1$
 $y = -4$

B $y = 1$
 $y = -10$

C $y = -6$
 $y = -5$

29 Find the inverse function of m(x)

A $m^{-1}(x) = \frac{\log_4 x}{2}$

B $m^{-1}(x) = \frac{\log_4 2}{x}$

30 Use the quotient rule to simplify this to a quadratic and solve for 'q'

$$\log_8(-8q+10) - \log_8(-1q-1) = \log_8(-1q)$$

A $q = -15$

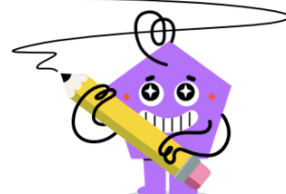
B $q = -10$

C $q = -17$

31 Is y(x) the inverse of m(x)

A No

B Yes

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32 Use the power rule to simplify this to an equation with variable 'y'

$$2\log_5(3y + 3) = \log_5(9)$$

A $(3y + 6) = 81$

B $2(3y + 3) = 81$

C $(3y + 3)^2 = 81$

33 Use the power rule to simplify this and solve for 'm'

$$2\log_8(m - 7) = \log_8(1)$$

A $m = 16$

B $m = 12$

C $m = 8$

34 Simplify and solve for y

$$\log_6(9y) = 3$$

A $y = 24$

B $y = 23$

35 Simplify and solve for m

$$\log_9(m + 3) = 2$$

A $m = 84$

B $m = 78$

36 Simplify and solve for t

$$\log_3(4t + 9) = 2$$

A $t = 0$

B $t = 2$

C $t = -1$

D $t = 1$

37 Simplify and solve for n

$$\log_5\left(\frac{n + 48}{n}\right) = 2$$

A $n = 2$

B $n = 4$

38 Simplify and solve for r

$$\log_3\left(\frac{9r + 36}{3r}\right) = 2$$

A $r = 3$

B $r = 2$

C $r = 1$

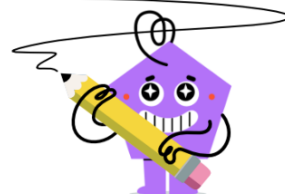
D $r = 4$

39 Simplify and solve for t

$$\log_2\left(\frac{t + 7}{t - 7}\right) = 3$$

A $t = 10$

B $t = 9$



Logarithm Functions - Advanced

40 Simplify and solve for q

$$\log_3\left(\frac{5q-7}{2q-8}\right) = 2$$

A $q = 5$

B $q = 4$

C $q = 7$

D $q = 6$

41 What is the dB magnitude on the decibel scale when the sound energy is 10^2 W/m^2 ?

$$\begin{aligned} \text{dB} &= 10 \log\left(\frac{I}{I_0}\right) \\ I_0 &= 10^{-12} \text{ W/m}^2 \\ I &= 10^2 \text{ W/m}^2 \end{aligned}$$

A $\beta = 11\text{dB}$

B $\beta = 14\text{dB}$

42 What is the sound intensity of a sound with a sound intensity of 19 dB on the decibel scale?

$$\begin{aligned} \text{dB} &= 10 \log\left(\frac{I}{I_0}\right) \\ I_0 &= 10^{-12} \text{ W/m}^2 \\ \beta &= 19\text{dB} \end{aligned}$$

A $I = 10^7 \text{ W/m}^2$

B $I = 10^{27} \text{ W/m}^2$

43 If a solution has 39.8 times the Hydrogen ion concentration as one with a pH of 6.7 on the pH scale, what is its pH?

$$\begin{aligned} \text{pH} &= -\log[\text{H}^+] \\ \frac{[\text{H}^+]_2}{[\text{H}^+]_1} &= 39.8 \\ \text{pH}_1 &= 6.7 \end{aligned}$$

A $\text{pH}_2 = 5.1$

B $\text{pH}_2 = 3.6$

44 If 2 sounds have dB magnitudes of 54 and 111 on the decibel scale what is the ratio of their sound energy measurements?

$$\text{dB} = 10 \log\left(\frac{I}{I_0}\right)$$

$$\begin{aligned} \beta_2 &= 111\text{dB} \\ \beta_1 &= 54\text{dB} \end{aligned}$$

A $\frac{I_2}{I_1} = 501,187$

B $\frac{I_2}{I_1} = 630,957$

45 What is the dB magnitude on the decibel scale when the sound energy is 0.00126 W/m^2 ?

$$\begin{aligned} \text{dB} &= 10 \log\left(\frac{I}{I_0}\right) \\ I_0 &= 10^{-12} \text{ W/m}^2 \\ I &= 0.00126 \text{ W/m}^2 \end{aligned}$$

A $\beta = 85\text{dB}$

B $\beta = 91\text{dB}$

46 What is the wave height of an earthquake with a magnitude of 4.5 on the Richter scale?

$$\begin{aligned} M &= \log\left(\frac{I}{I_0}\right) \\ I_0 &= 1 \mu\text{m} \\ M &= 4.5 \end{aligned}$$

A $I = 3,162,278 \mu\text{m}$

B $I = 31,623 \mu\text{m}$