

Exponential and Logarithmic Functions

1 Simplify using the laws of exponents.

$$\frac{x^{-2}y^{-2}z^{-\frac{3}{2}}}{x^{-1}y^{-\frac{1}{2}}z^{-\frac{3}{2}}}$$

A $x^{-1}y^{-\frac{3}{2}}$

B $xy^{-\frac{3}{2}}$

C $x^{-3}y^{-\frac{5}{2}}z^{-3}$

D $y^{-\frac{3}{2}}$

2 Simplify using the laws of exponents.

$$\left(\frac{x^{-2}y}{x^{-1}y^2}\right)^{-2} \cdot \sqrt{\frac{x^2y^2}{x^{-1}y^2}}$$

A $x^{-\frac{7}{2}}y^2$

B $x^{\frac{9}{2}}y^2$

C $x^{\frac{7}{2}}y^2$

D x^2y^{-1}

3 Simplify using the laws of exponents.

$$\sqrt{xy^{-1}} \cdot x^{-\frac{1}{2}}y$$

A $x^{-1}y^{\frac{1}{2}}$

B $xy^{-\frac{3}{2}}$

C $y^{\frac{1}{2}}$

D $xy^{\frac{1}{2}}$

4 Simplify using the laws of exponents.

$$\sqrt{x^2y^{-2}z}$$

A $x^{\frac{5}{2}}y^{-\frac{3}{2}}z^{\frac{3}{2}}$

B $x^2y^{-1}z^{\frac{1}{2}}$

C $xy^{-1}z^{\frac{1}{2}}$

D $x^{-1}y^{-1}z^{\frac{1}{2}}$

5 Convert the given logarithm to its equivalent based on the quotient property

$$\log_n \frac{x}{w}$$

A $\log_n w - \log_n x$

B $\log_n x - \log_n w$

6 Convert the given logarithm to its equivalent based on the power property

$$\log_4 5^3$$

A $4\log_5 3$

B $3\log_5 4$

C $3\log_4 5$

D $5\log_4 3$

7 Convert the given logarithm to its equivalent based on the product property

$$\log_t q + \log_t p$$

A $\log_t(q \cdot p)$

B $\log_p(t \cdot q)$

C $\log_t \frac{q}{p}$

8 Convert the given exponent to the equivalent in logarithm form

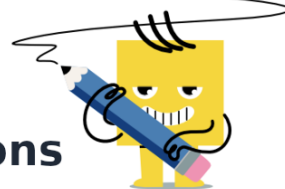
$$(2)^{-2} = \frac{1}{4}$$

A $\log_{\frac{1}{4}} 2 = -2$

B $\log_{-2} 2 = \frac{1}{4}$

C $\log_{\frac{1}{4}} -2 = 2$

D $\log_2 \frac{1}{4} = -2$



Exponential and Logarithmic Functions

9 Convert the given exponent to the equivalent in logarithm form

$$10^3 = 1,000$$

- | | |
|---|-----------------------|
| A | $\log_{1,000} 3 = 10$ |
| B | $\log_{10} 1,000 = 3$ |
| C | $\log_3 10 = 1,000$ |
| D | $\log_3 1,000 = 10$ |

10 Convert the given exponent to the equivalent in logarithm form

$$7^{2.39} = 104$$

- | | |
|---|-----------------------|
| A | $\log_{2.39} 7 = 104$ |
| B | $\log_7 104 = 2.39$ |
| C | $\log_{104} 2.39 = 7$ |
| D | $\log_{2.39} 104 = 7$ |

11 Convert the given exponent to the equivalent in logarithm form

$$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

A $\log_{\frac{1}{4}} 2 = \frac{1}{2}$

B $\log_{\frac{1}{2}} \frac{1}{4} = 2$

C $\log_{\frac{1}{4}} \frac{1}{2} = 2$

D $\log_2 \frac{1}{2} = \frac{1}{4}$

12 Convert the given logarithm to the equivalent in exponent form

$$\log_{10} 125 = 2.1$$

- | | |
|---|------------------|
| A | $125^{2.1} = 10$ |
| B | $2.1^{10} = 125$ |
| C | $10^{2.1} = 125$ |
| D | $125^{10} = 2.1$ |

13 Convert the given logarithm to the equivalent in exponent form

$$\log_e 3.58 = x$$

- | | |
|---|--------------|
| A | $3.58^e = x$ |
| B | $3.58^x = e$ |
| C | $e^x = 3.58$ |

14 Convert the given exponent to the equivalent in logarithm form

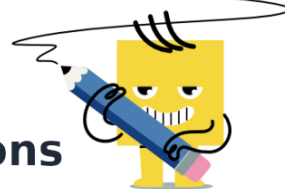
$$e^x = 3.96$$

- | | |
|---|---------------------|
| A | $\log_{3.96} x = e$ |
| B | $\log_e 3.96 = x$ |
| C | $\log_{3.96} e = x$ |
| D | $\log_x e = 3.96$ |

15 Convert the given logarithm to the equivalent in exponent form

$$\log_8 338 = 2.8$$

- | | | | |
|---|-----------------|---|-----------------|
| A | $8^{2.8} = 338$ | B | $338^8 = 2.8$ |
| C | $2.8^8 = 338$ | D | $338^{2.8} = 8$ |
| E | $2.8^{338} = 8$ | | |



Exponential and Logarithmic Functions

16 How is the graph of f transformed to produce g ?

A vertically stretch by a factor of 4 and horizontally compress by a factor of 3

B shift right by 4 and horizontally compress by a factor of 3

C shift right by 4 and reflect over the y-axis

D shift down by 4 and reflect over the y-axis

17 Which function applies these transformations to f ?

A

$$g(x) = f(x + 3) - 2$$

B

$$g(x) = f(x - 2) + 3$$

18 Which scenario describes this equation?

$$151 = 200 \cdot e^{(-0.07 \cdot 4)}$$

A A radioactive material starts at an isotope concentration of 700ppm. It decays continuously at 2% per day. After 4 days it has decayed to an isotope concentration of 151ppm.

B A radioactive material starts at an isotope concentration of 200ppm. It decays continuously at 7% per day. After 4 days it has decayed to an isotope concentration of 151ppm.

19 What is the value of the final population given this scenario?

An insect population starts at 300. Each subsequent yearly breeding season it grows by 2%. After 5 years it has increased to a certain population.

A

$$P = 230$$

B

$$P = 485$$

C

$$P = 331$$

20 Simplify and solve for q

$$9^{(3q-5)} = 81^q$$

A

$$q = 4$$

B

$$q = 6$$

C

$$q = 5$$

D

$$q = 7$$

21 Simplify and solve for z

$$3^{(2z-8)} = 9$$

A

$$z = 4$$

B

$$z = 7$$

C

$$z = 6$$

D

$$z = 5$$

22 Simplify and solve for r

$$2^{\left(\frac{3r+7}{4r-8}\right)} = 16$$

A

$$r = 4$$

B

$$r = 3$$

C

$$r = 5$$

D

$$r = 2$$

23 Simplify and solve for x

$$3^{\left(\frac{2x+36}{5x}\right)} = 81$$

A

$$x = 4$$

B

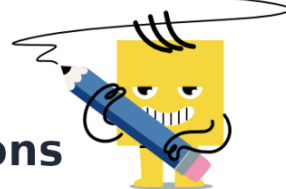
$$x = 3$$

C

$$x = 1$$

D

$$x = 2$$



Exponential and Logarithmic Functions

24 Solve for the missing exponent (x) in reduced form

$$(2^n)^8 = 16^x$$

A

$$x = 4n$$

B

$$x = \frac{8}{2n}$$

C

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

D

$$x = 12n$$

E

$$x = 2n$$

F

$$x = \frac{2n}{4}$$

25 Solve for the missing exponent (x) in reduced form

$$(2^4)^n = 8^x$$

A

$$x = \frac{2n}{3}$$

B

$$x = \frac{9n}{4}$$

C

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

D

$$x = 4n$$

E

$$x = \frac{2}{3n}$$

F

$$x = \frac{4}{12n}$$

26 Solve for the missing exponent (x) in reduced form

$$81^n = (3^x)^8$$

A

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

B

$$x = \frac{n}{2}$$

C

$$x = \frac{8n}{2}$$

D

$$x = \frac{3n}{2}$$

E

$$x = \frac{4n}{8}$$

F

$$x = 7n$$

27 Solve for the missing exponent (x) in reduced form

$$32^n = (2^3)^x$$

A

$$x = 7n$$

B

$$x = 3n$$

C

$$x = \frac{5n}{3}$$

D

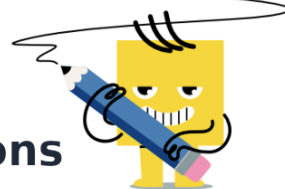
$$x = \frac{9n}{5}$$

E

$$x = \frac{5n}{15}$$

F

$$x = 9n$$



Exponential and Logarithmic Functions

28 Use the power rule to simplify this and solve for 'n'

$$7^{(n-6)} = 6^{(n)}$$

A $n = \frac{\ln 6 - \ln 7}{-6 \ln 7 - 2 \ln 6}$

B $n = \frac{6 \ln 6}{\ln 6 - \ln 7}$

C $n = \frac{6 \ln 7}{\ln 7 - \ln 6}$

29 Use a logarithm to solve for the missing exponent

$$10^x = 24$$

A $x = 1.38$

B $x = 3.38$

C $x = 0.38$

D $x = 2.38$

E $x = -0.62$

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

$$4^{(y-1)} = 7^{(y-3)}$$

A $y = \frac{-3 \ln 7 + \ln 4}{\ln 4 - 1 \ln 7}$

B $y = \frac{-3 \ln 4 + 1 \ln 7}{\ln 7 - \ln 4}$

C $y = \frac{\ln 7 - \ln 4}{-1 \ln 4 + 3 \ln 7}$

31 Use a logarithm to solve for the missing exponent

$$2^x = 11.31$$

A $x = 1.5$

B $x = 2.5$

C $x = 4.5$

D $x = 5.5$

E $x = 3.5$

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

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

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

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

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

33 Simplify and solve for z

$$\log_2\left(\frac{z+7}{z-8}\right) = 4$$

A $z = 9$

B $z = 8$

34 What is the value of the time given this model of a growth in credit card debt with yearly interest?

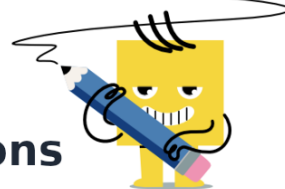
$$670 = 400 \cdot (1 + 0.09)^{\left(\frac{t}{4}\right)}$$

A $t = 24$ quarters

B $t = 20$ quarters

C $t = 23$ quarters

D $t = 29$ quarters



Exponential and Logarithmic Functions

35 Simplify and solve for t

$$\log_2\left(\frac{7t+18}{2t}\right) = 3$$

A $t = 2$

B $t = 4$

C $t = 3$

D $t = 1$

36 Simplify and solve for y

$$\log_8(y-4) = 2$$

A $y = 60$

B $y = 68$

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

$$\log_{10}(z-3) + \log_{10}(z-7) = \log_{10}(5)$$

A $z = 8$

B $z = 15$

C $z = 10$

38 Solve the following logarithm

$$\log_8 17,559.94 = x$$

A $x = 5.7$

B $x = 2.7$

C $x = 4.7$

D $x = 3.7$

E $x = 6.7$

39 Solve the following logarithm

$$\log_e 33.45 = x$$

A $x = 4.51$

B $x = 1.51$

C $x = 5.51$

D $x = 3.51$

E $x = 2.51$

40 Solve the following logarithm

$$\log_{\frac{1}{2}} 16 = x$$

A $x = 0$

B $x = -1$

C $x = 8$

D $x = 1$

E $x = 5$

F $x = 4$