

Exponential Equations Requiring Logarithms

Isolate the exponential expression, take logarithms, and round the final solution to four decimal places.

1. Isolate the power, then take natural logarithms.

$$4 \cdot e^{-6 \cdot q - 10} + 6 = 15$$

Domain: real variables $q \in \mathbb{R}$

2. Isolate the power, then take natural logarithms.

$$e^{n-3} + 3 = 16$$

Domain: real variables $n \in \mathbb{R}$

3. Isolate the power, then take natural logarithms.

$$3 \cdot 3^{-6 \cdot z} = 17$$

Domain: real variables $z \in \mathbb{R}$

4. Isolate the power, then take natural logarithms.

$$11^{-3 \cdot y - 6} + 9 = 18$$

Domain: real variables $y \in \mathbb{R}$

5. Isolate the power, then take natural logarithms.

$$4^{r-3} + 9 = 19$$

Domain: real variables $r \in \mathbb{R}$

6. Isolate the power, then take natural logarithms.

$$7^m = 20$$

Domain: real variables $m \in \mathbb{R}$

Exponential Equations Requiring Logarithms

Isolate the exponential expression, take logarithms, and round the final solution to four decimal places.

7. Isolate the power, then take natural logarithms.

$$2 \cdot e^{6 \cdot q - 5} + 6 = 21$$

Domain: real variables $q \in \mathbb{R}$

8. Isolate the power, then take natural logarithms.

$$12^r = 22$$

Domain: real variables $r \in \mathbb{R}$

9. Isolate the power, then take natural logarithms.

$$13^{r+4} + 7 = 23$$

Domain: real variables $r \in \mathbb{R}$

10. Isolate the power, then take natural logarithms.

$$7^{2 \cdot n + 10} + 3 = 24$$

Domain: real variables $n \in \mathbb{R}$

11. Isolate the power, then take natural logarithms.

$$2 \cdot 13^{3 \cdot x} = 25$$

Domain: real variables $x \in \mathbb{R}$

12. Isolate the power, then take natural logarithms.

$$e^{n-7} + 9 = 26$$

Domain: real variables $n \in \mathbb{R}$

Math Sheet

Name _____ Score _____ / 16 Teacher _____ Date _____

Exponential Equations Requiring Logarithms

Isolate the exponential expression, take logarithms, and round the final solution to four decimal places.

13. Isolate the power, then take natural logarithms.

$$6 \cdot e^{-3 \cdot n + 9} - 4 = 27$$

Domain: real variables $n \in \mathbb{R}$

14. Isolate the power, then take natural logarithms.

$$14^{y-9} - 2 = 28$$

Domain: real variables $y \in \mathbb{R}$

15. Isolate the power, then take natural logarithms.

$$6 \cdot 15^{4 \cdot z} = 29$$

Domain: real variables $z \in \mathbb{R}$

16. Isolate the power, then take natural logarithms.

$$2^{-3 \cdot y - 10} + 3 = 30$$

Domain: real variables $y \in \mathbb{R}$

Exponential Equations Requiring Logarithms

Answer Key

Isolate the exponential expression, take logarithms, and round the final solution to four decimal places.

1. Isolate the power, then take natural logarithms.

$$4 \cdot e^{-6 \cdot q - 10} + 6 = 15$$

Domain: real variables $q \in \mathbb{R}$

Work:

$$e^{-6 \cdot q - 10} = \frac{9}{4}$$

$$-6 \cdot q - 10 = \ln \frac{9}{4}$$

$$q = \frac{\ln \frac{9}{4} + 10}{-6}$$

$$q \approx -1.8018$$

2. Isolate the power, then take natural logarithms.

$$e^{n-3} + 3 = 16$$

Domain: real variables $n \in \mathbb{R}$

Work:

$$e^{n-3} = 13$$

$$n - 3 = \ln 13$$

$$n = \ln 13 + 3$$

$$n \approx 5.5649$$

3. Isolate the power, then take natural logarithms.

$$3 \cdot 3^{-6 \cdot z} = 17$$

Domain: real variables $z \in \mathbb{R}$

Work:

$$3^{-6 \cdot z} = \frac{17}{3}$$

$$-6 \cdot z = \frac{\ln \frac{17}{3}}{\ln 3}$$

$$z = \frac{\ln \frac{17}{3}}{-6 \cdot \ln 3}$$

$$z \approx -0.2632$$

4. Isolate the power, then take natural logarithms.

$$11^{-3 \cdot y - 6} + 9 = 18$$

Domain: real variables $y \in \mathbb{R}$

Work:

$$11^{-3 \cdot y - 6} = 9$$

$$-3 \cdot y - 6 = \frac{\ln 9}{\ln 11}$$

$$y = \frac{\ln 9 + 6 \cdot \ln 11}{-3 \cdot \ln 11}$$

$$y \approx -2.3054$$

5. Isolate the power, then take natural logarithms.

$$4^{r-3} + 9 = 19$$

Domain: real variables $r \in \mathbb{R}$

Work:

$$4^{r-3} = 10$$

$$r - 3 = \frac{\ln 10}{\ln 4}$$

$$r = \frac{\ln 10 + 3 \cdot \ln 4}{\ln 4}$$

$$r \approx 4.6610$$

6. Isolate the power, then take natural logarithms.

$$7^m = 20$$

Domain: real variables $m \in \mathbb{R}$

Work:

$$7^m = 20$$

$$m = \frac{\ln 20}{\ln 7}$$

$$m \approx 1.5395$$

Exponential Equations Requiring Logarithms

Answer Key

Isolate the exponential expression, take logarithms, and round the final solution to four decimal places.

7. Isolate the power, then take natural logarithms.

$$2 \cdot e^{6 \cdot q - 5} + 6 = 21$$

Domain: real variables $q \in \mathbb{R}$

Work:

$$e^{6 \cdot q - 5} = \frac{15}{2}$$

$$6 \cdot q - 5 = \ln \frac{15}{2}$$

$$q = \frac{\ln \frac{15}{2} + 5}{6}$$

$$q \approx 1.1692$$

8. Isolate the power, then take natural logarithms.

$$12^r = 22$$

Domain: real variables $r \in \mathbb{R}$

Work:

$$12^r = 22$$

$$r = \frac{\ln 22}{\ln 12}$$

$$r \approx 1.2439$$

9. Isolate the power, then take natural logarithms.

$$13^{r+4} + 7 = 23$$

Domain: real variables $r \in \mathbb{R}$

Work:

$$13^{r+4} = 16$$

$$r + 4 = \frac{\ln 16}{\ln 13}$$

$$r = \frac{\ln 16 - 4 \cdot \ln 13}{\ln 13}$$

$$r \approx -2.9190$$

10. Isolate the power, then take natural logarithms.

$$7^{2 \cdot n + 10} + 3 = 24$$

Domain: real variables $n \in \mathbb{R}$

Work:

$$7^{2 \cdot n + 10} = 21$$

$$2 \cdot n + 10 = \frac{\ln 21}{\ln 7}$$

$$n = \frac{\ln 21 - 10 \cdot \ln 7}{2 \cdot \ln 7}$$

$$n \approx -4.2177$$

11. Isolate the power, then take natural logarithms.

$$2 \cdot 13^{3 \cdot x} = 25$$

Domain: real variables $x \in \mathbb{R}$

Work:

$$13^{3 \cdot x} = \frac{25}{2}$$

$$3 \cdot x = \frac{\ln \frac{25}{2}}{\ln 13}$$

$$x = \frac{\ln \frac{25}{2}}{3 \cdot \ln 13}$$

$$x \approx 0.3282$$

12. Isolate the power, then take natural logarithms.

$$e^{n-7} + 9 = 26$$

Domain: real variables $n \in \mathbb{R}$

Work:

$$e^{n-7} = 17$$

$$n - 7 = \ln 17$$

$$n = \ln 17 + 7$$

$$n \approx 9.8332$$

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Answer Key

Isolate the exponential expression, take logarithms, and round the final solution to four decimal places.

- 13.** Isolate the power, then take natural logarithms.

$$6 \cdot e^{-3 \cdot n + 9} - 4 = 27$$

Domain: real variables $n \in \mathbb{R}$

Work:

$$e^{-3 \cdot n + 9} = \frac{31}{6}$$

$$-3 \cdot n + 9 = \ln \frac{31}{6}$$

$$n = \frac{\ln \frac{31}{6} - 9}{-3}$$

$$n \approx 2.4526$$

- 14.** Isolate the power, then take natural logarithms.

$$14^{y-9} - 2 = 28$$

Domain: real variables $y \in \mathbb{R}$

Work:

$$14^{y-9} = 30$$

$$y - 9 = \frac{\ln 30}{\ln 14}$$

$$y = \frac{\ln 30 + 9 \cdot \ln 14}{\ln 14}$$

$$y \approx 10.2888$$

- 15.** Isolate the power, then take natural logarithms.

$$6 \cdot 15^{4 \cdot z} = 29$$

Domain: real variables $z \in \mathbb{R}$

Work:

$$15^{4 \cdot z} = \frac{29}{6}$$

$$4 \cdot z = \frac{\ln \frac{29}{6}}{\ln 15}$$

$$z = \frac{\ln \frac{29}{6}}{4 \cdot \ln 15}$$

$$z \approx 0.1454$$

- 16.** Isolate the power, then take natural logarithms.

$$2^{-3 \cdot y - 10} + 3 = 30$$

Domain: real variables $y \in \mathbb{R}$

Work:

$$2^{-3 \cdot y - 10} = 27$$

$$-3 \cdot y - 10 = \frac{\ln 27}{\ln 2}$$

$$y = \frac{\ln 27 + 10 \cdot \ln 2}{-3 \cdot \ln 2}$$

$$y \approx -4.9183$$