



LOGARITHMIC & EXPONENTIAL EQUATIONS REVIEW

Directions: Work together to solve each equation. Do not divide up the work! Each person should be participating. At the end of class, one person's paper will be chosen at random and graded for the group.

LOGARITHMIC EQUATIONS

<p>1. $\log_7(9x - 4) = \log_7(x + 20)$</p> $9x - 4 = x + 20$ $8x = 24$ $x = 3$	<p>2. $\log_5(m^2 - 12) = \log_5 m$</p> $m^2 - 12 = m$ $m^2 - m - 12 = 0$ $(m - 4)(m + 3) = 0$ $m = 4 \quad m = -3$ <p style="text-align: center;">ext</p>
<p>3. $\log_3 4 + \log_3(a + 5) = \log_3 56$</p> $\log_3 4(a + 5) = \log_3 56$ $4a + 20 = 56$ $4a = 36$ $a = 9$	<p>4. $\log(2y - 10) = 7 \cdot \log 2 - \log 8$</p> $\log(2y - 10) = \log 2^7 - \log 8$ $\log(2y - 10) = \log 128 - \log 8$ $\log(2y - 10) = \log \frac{128}{8}$ $2y - 10 = 16$ $2y = 26$ $y = 13$
<p>5. $\log_4(5m + 9) = 3$</p> $4^3 = 5m + 9$ $64 = 5m + 9$ $55 = 5m$ $11 = m$	<p>6. $\log_{36}(20 - 4p) = \frac{1}{2}$</p> $36^{1/2} = 20 - 4p$ $\sqrt{36} = 20 - 4p$ $\pm 6 = 20 - 4p$ <p style="text-align: center;">↓</p> $6 = 20 - 4p$ $-14 = -4p$ $p = 7/2$ <p style="text-align: right;">↗</p> $-6 = 20 - 4p$ $-26 = -4p$ $p = 13/2 \text{ ext}$
<p>7. $\log_6(7k - 1) = 3$</p> $6^3 = 7k - 1$ $216 = 7k - 1$ $217 = 7k$ $31 = k$	<p>8. $\log(n + 8) + \log 4 = 2$</p> $\log 4(n + 8) = 2$ $10^2 = 4n + 32$ $100 = 4n + 32$ $68 = 4n$ $17 = n$

EXPONENTIAL EQUATIONS

9. $25^{v-2} = 625$ same base

$$5^{2(v-2)} = 5^4$$

$$2(v-2) = 4$$

$$2v - 4 = 4$$

$$2v = 8$$

$$\boxed{v = 4}$$

10. $\frac{1}{16} = 8^{4x-2}$ same base

$$2^{-4} = 2^{3(4x-2)}$$

$$-4 = 3(4x-2)$$

$$-4 = 12x - 6$$

$$2 = 12x$$

$$\boxed{\frac{1}{6} = x}$$

11. $8^k = 78$

$$\log 8^k = \log 78$$

$$k \log 8 = \log 78$$

$$k = \frac{\log 78}{\log 8}$$

$$\boxed{k = 2.153}$$

12. $9^{m-6} = 78$

$$\log 9^{m-6} = \log 78$$

$$(m-6) \frac{\log 9}{\log 9} = \frac{\log 78}{\log 9}$$

$$m-6 = 1.983$$

$$\boxed{m = 7.983}$$

13. $15^{3a} + 7 = 67$

$$15^{3a} = 60$$

$$\log 15^{3a} = \log 60$$

$$3a \log 15 = \log 60$$

$$3a = \frac{\log 60}{\log 15}$$

$$3a = 1.512$$

$$\boxed{a = 0.504}$$

14. $14^{3-8x} + 9 = 77$

$$14^{3-8x} = 68$$

$$\log 14^{3-8x} = \log 68$$

$$(3-8x) \frac{\log 14}{\log 14} = \frac{\log 68}{\log 14}$$

$$3-8x = 1.599$$

$$-8x = -1.401$$

$$\boxed{x = 0.175}$$

15. $8 \cdot 3^{n-1} - 21 = 51$

$$8 \cdot 3^{n-1} = 72$$

$$3^{n-1} = 9 \rightarrow$$

$$\log 3^{n-1} = \log 9$$

$$(n-1) \frac{\log 3}{\log 3} = \frac{\log 9}{\log 3}$$

$$n-1 = 2$$

$$\boxed{n = 3}$$

$$3^{n-1} = 3^2$$

$$n-1 = 2$$

$$n = 3$$

16. $2 \cdot 18^{10r-3} - 1 = 73$

$$2 \cdot 18^{10r-3} = 74$$

$$18^{10r-3} = 37$$

$$\log 18^{10r-3} = \log 37$$

$$(10r-3) \frac{\log 18}{\log 18} = \frac{\log 37}{\log 18}$$

$$10r-3 = 1.249$$

$$10r = 4.249$$

$$\boxed{r = 0.425}$$