

Exponentials & Logarithms Mixed Review

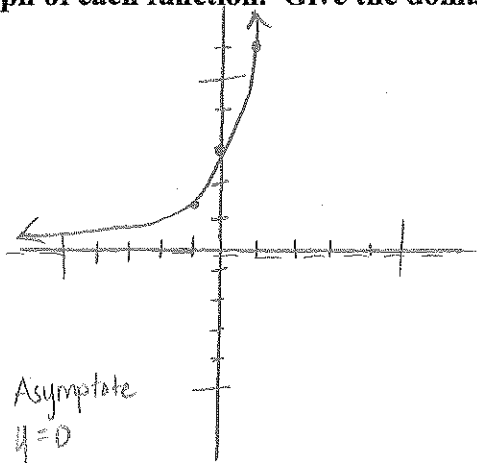
Date _____

Period _____

Sketch the graph of each function. Give the domain, range and asymptote.

1) $y = 3 \cdot 2^x$

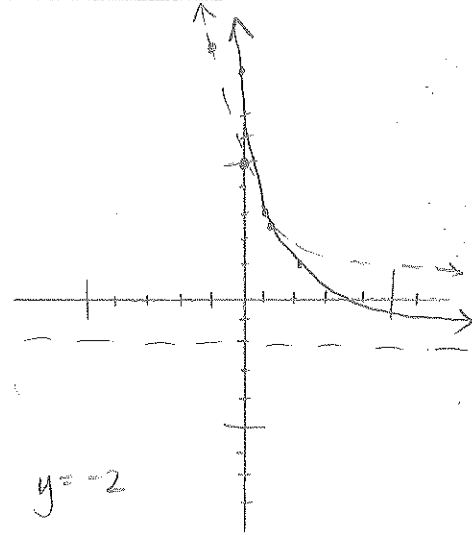
x	y
-1	1.5
0	3
1	6



D: $(-\infty, \infty)$
R: $(0, \infty)$
Asymptote $y = 0$

2) $y = 5 \cdot \left(\frac{1}{2}\right)^{x-1} - 2$

x	y
-1	10
0	5
1	2.5



D: $(-\infty, \infty)$
R: $(-2, \infty)$
Asymptote $y = -2$

Solve each equation.

3) $5^{-3r-2} = 5^{-2r}$
 $-3r-2 = -2r$
 $-2 = r$
 $r = -2$

4) $\left(\frac{1}{625}\right)^{-2x} = 125$
 $5^{-4(-2x)} = 5^3$
 $8x = 3$
 $x = \frac{3}{8}$

5) $3^{2x} = \frac{1}{81}$
 $3^{2x} = 3^{-4}$
 $2x = -4$
 $x = -2$

6) $\left(\frac{1}{81}\right)^{-r} = \frac{1}{27}$
 $3^{-4(-r)} = 3^{-3}$
 $4r = -3$
 $r = -\frac{3}{4}$

7) $\left(\frac{1}{243}\right)^{3n+1} = 27^{-3n}$
 $3^{-5(3n+1)} = 3^{3(-3n)}$
 $-15n-5 = -9n$
 $-5 = 6n$
 $n = -\frac{5}{6}$

8) $64^{-p} = 16$
 $4^{3(-p)} = 4^2$
 $-3p = 2$
 $p = -\frac{2}{3}$

Rewrite each equation in exponential form.

9) $\log_{12} \frac{1}{12} = -1$
 $12^{-1} = \frac{1}{12}$

10) $\log_{15} 225 = 2$
 $15^2 = 225$

11) $\log_b a = -\frac{1}{7}$
 $b^{-\frac{1}{7}} = a$

12) $\log_5 x = -13$
 $5^{-13} = x$

Solve each equation. Round your answers to the nearest ten-thousandth.

13) $\frac{2 \cdot 9^{4x}}{2} = 97$
 $9^{4x} = 48.5$
 $4x = \log_9 48.5$
 $x = .4417$

15) $3 \cdot 14^{5-6a} - 10 = 65$
 $3 \cdot 14^{5-6a} = 75$
 $14^{5-6a} = 25$
 $\log_{14} 14^{5-6a} = \log_{14} 25$
 $5-6a = 1.2197$
 $-6a = -3.7803$
 $a = .63005$

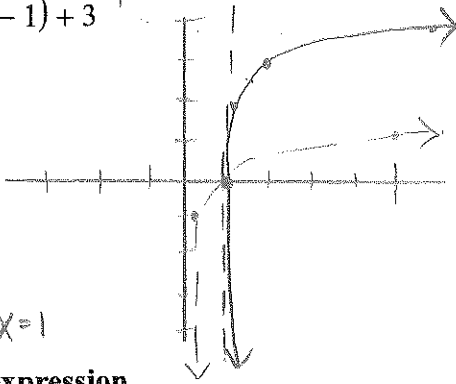
16) $6.5 \cdot 7^{10-0.7r} + 8 = 105$
 $6.5 \cdot 7^{10-0.7r} = 97$
 $7^{10-0.7r} = 14.9231$
 $\log_7 7^{10-0.7r} = \log_7 14.9231$
 $10-0.7r = 1.389$
 $-0.7r = -8.611$
 $r = 12.3014$

Identify the domain and range of each. Then sketch the graph.

17) $y = \log_5(x-1) + 3$ R1 Up3

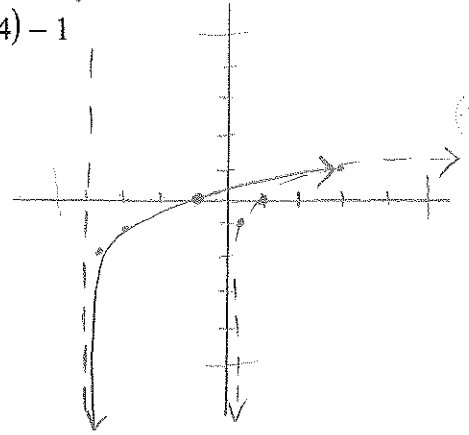
x	y
1/5	-1
1	0
5	1

D: (1, ∞)
R: (-∞, ∞)
Asymptote: x=1



18) $y = \log_3(x+4) - 1$ L4 Down1

x	y
1/3	-1
1	0
3	1



Evaluate each expression.

19) $\log_7 49 = x$ or you can just type in calculator
 $7^x = 49$ $x = 2$

20) $\log_3 1 = 0$

21) $\log_3 243 = 5$

22) $\log_8 \frac{1}{64} = -2$

Expand each logarithm.

23) $\log_5(x \cdot y \cdot z^4) = \log_5 x + \log_5 y + \log_5 z^4$
 $\log_5 x + \log_5 y + 4 \log_5 z$

24) $\log_6(xy^3)^5 = \log_6 x^5 y^{15}$
 $= 5 \log_6 x + 15 \log_6 y$

25) $\log\left(\frac{a^2}{b}\right)^5 = \log \frac{a^{10}}{b^5} = \log a^{10} - \log b^5$
 $= 10 \log a - 5 \log b$

26) $\log_6(12 \cdot 11^5)^4 = \log_6(12^4 \cdot 11^{20})$
 $4 \log_6 12 + 20 \log_6 11$

Condense each expression to a single logarithm.

27) $3 \ln 10 + 18 \ln 3 + 3 \ln 7$

28) $3 \log_3 8 - \log_3 7 - 2 \log_3 5$
 $\log_3 8 - \log_3 7 - \log_3 5^2 = \log_3 \frac{8}{7 \cdot 5^2}$

29) $\log_4 c + 5 \log_4 a + 6 \log_4 b$
 $\log_4 c + \log_4 a^5 + \log_4 b^6 = \log_4 c a^5 b^6$

30) $6 \log_9 x + 6 \log_9 z - 30 \log_9 y$
 $\log_9 x^6 + \log_9 z^6 - \log_9 y^{30}$
 $= \log_9 \frac{x^6 z^6}{y^{30}}$

Rewrite each equation in logarithmic form.

31) $64^{\frac{1}{2}} = \frac{1}{8}$
 $\log_{64} \frac{1}{8} = -\frac{1}{2}$

32) $\left(\frac{11}{6}\right)^y = x$
 $\log_{\frac{11}{6}} x = y$