

## Math 3 – Exponent/Logarithm Review Sheet

Without graphing, determine whether each equation represents exponential growth or exponential decay. Then find the rate of growth or decay and the initial amount (y-intercept).

1.  $y = 0.5(1.67)^x$   
 → growth  
 → 67%  
 → (0, 0.5)

2.  $y = 1.14^x$   
 → growth  
 → 14%  
 → (0, 1)

3.  $y = 2\left(\frac{9}{10}\right)^x$   
 → decay  
 → 10%  
 → (0, 2)

4.  $y = 4.1(0.72)^x$   
 → decay  
 → 28%  
 → (0, 4.1)

5. Mr. Andersen put \$1000 into an account that earns 4.5% annual interest. The interest is compounded annually and there are no withdrawals. How much money will be in the account at the end of 30 years?

$$y = a(1+r)^t$$

$$= 1000(1 + .045)^{30}$$

$$= \mathbf{\$3745.32}$$

6. A manufacturer bought a new rolling press for \$48,000. It has depreciated in value at an annual rate of 15%. What is its value 5 years after purchase? Round to the nearest hundred dollars.

$$y = a(1-r)^t$$

$$= 48000(1 - .15)^5$$

$$= \mathbf{\$21,300.}$$

7. You place \$900 in an investment account that earns 6% interest compounded continuously. Find the balance after 5 years.

$$A = Pe^{rt}$$

$$= 900e^{.06 \cdot 5}$$

$$= \mathbf{\$1214.87}$$

Graph each function as a transformation of its parent function. Identify key point, asymptote, domain, and range.

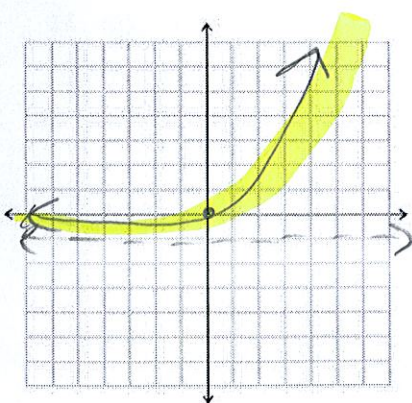
8.  $y = 3^x - 1$     down 1

Key point: (0, 0)

Asymptote:  $y = -1$

Domain:  $(-\infty, \infty)$

Range:  $(-1, \infty)$



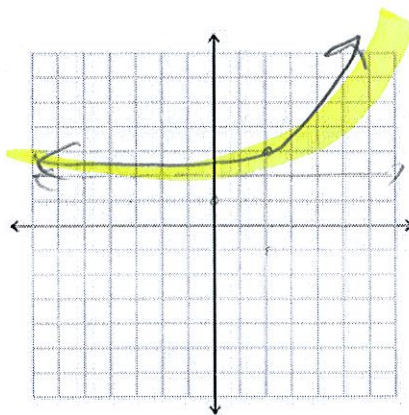
9.  $y = (2)^{x-2} + 2$     right 2, up 2

Key point: (2, 3)

Asymptote:  $y = 2$

Domain:  $(-\infty, \infty)$

Range:  $(2, \infty)$



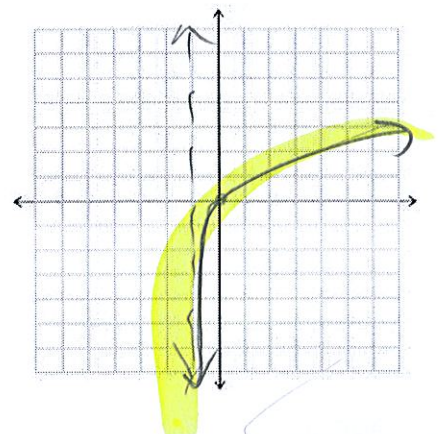
10.  $y = \log_2(x + 1)$

Key point: (0, 0)

Asymptote:  $x = -1$

Domain:  $(-1, \infty)$

Range:  $(-\infty, \infty)$



Write each equation in logarithmic form.

11.  $100 = 10^2$

$\log_{10} 100 = 2$

12.  $9^3 = 729$

$\log_9 729 = 3$

13.  $64 = 4^3$

$\log_4 64 = 3$

Evaluate each logarithm.

14.  $\log 1000$

3

15.  $\log_4 256$

$\frac{\log 256}{\log 4} = 4$

16.  $\log_{27} 9$

$\frac{\log 9}{\log 27} = \frac{2}{3}$

Solve each equation.

17.  $\log_3 (x + 1) = 4$

$x + 1 = 81$

$x = 80$

19.  $\log x + \log 2 = 5$

$\log 2x = 5$

$2x = 100000$

$x = 50000$

21.  $6^{3x+2} = 18$

$(3x+2)\log 6 = \log 18$   
 $3x+2 = \frac{\log 18}{\log 6}$

$3x+2 = 1.6131$   
 $3x = -.3869$

$x = -.1290$

24.  $5e^{2x} - 1 = 9$

$5e^{2x} = 10$

$\ln e^{2x} = \ln 2$

$2x = \ln(2)$

$2x = .6931$

$x = .3466$

26. Radium has a half-life of 1660 years. If the initial amount of radium is 200 grams, how much will remain after 500 years?

$y = a\left(\frac{1}{2}\right)^{\frac{t}{n}}$   
 $= 200\left(\frac{1}{2}\right)^{\frac{500}{1660}} = 162.31 \text{ mg}$

18.  $e^{\frac{x}{4}} = 5$

$\frac{x}{4} = \ln(5)$

$\frac{x}{4} = 1.6094$

20.  $\ln x - \ln 4 = 7$

$x = 6.4378$

$\ln \frac{x}{4} = 7$

$\frac{x}{4} = e^7$

$\frac{x}{4} = 1096.6332$

$x = 4386.5326$

22.  $e^{3x} = 20$

$3x = \ln(20)$

$3x = 2.9957$

$x = .9986$

25.  $\log 3 + \log x = \log 12$

$\log(3x) = \log 12$

$3x = 12$

$x = 4$

Simplify.

27.  $\ln e^6$

6

28.  $e^{\ln 3}$

3

29.  $\log_2 2$

1

30.  $3^{\log_3 8}$

8