

# Exponential and Logarithmic Functions Practice

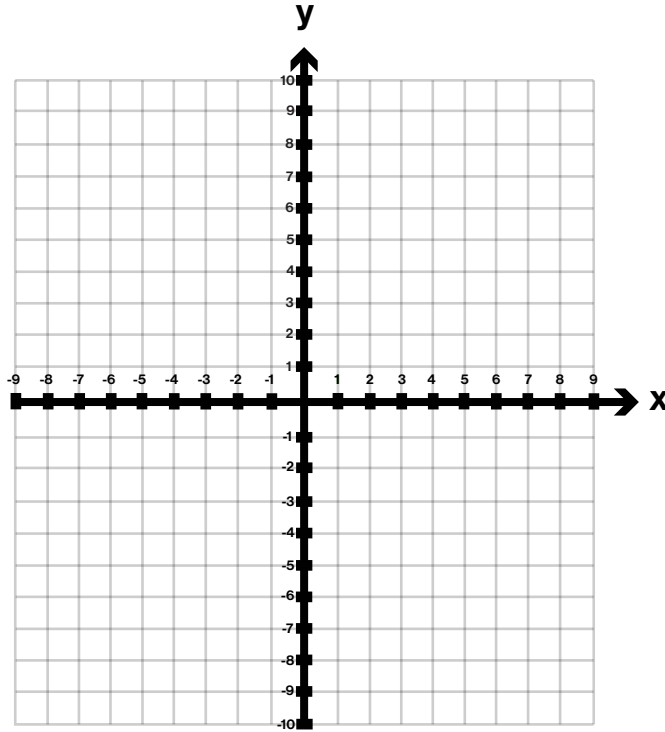
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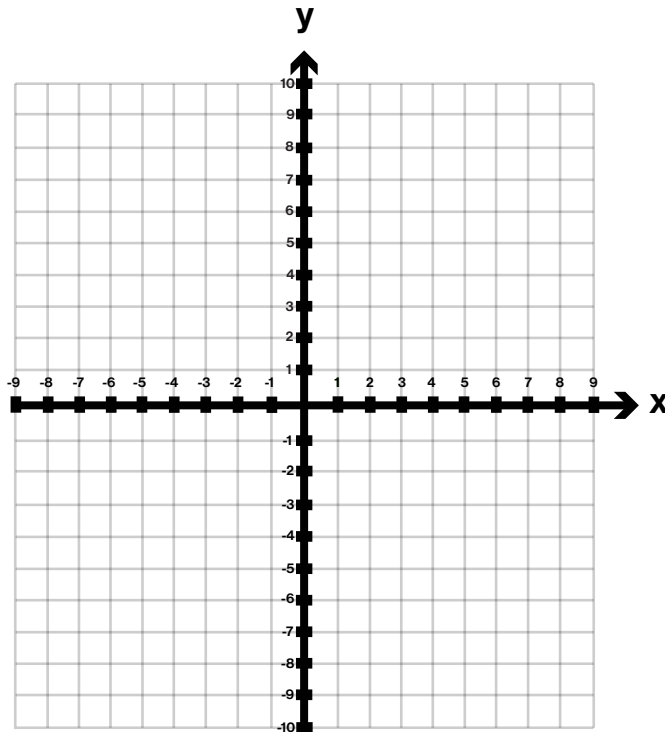
## Question 1

Graph

I.  $f(x) = 3^x$



II.  $f(x) = (1/3)^x$



# Exponential and Logarithmic Functions Practice

## Question 2

Solve

I.  $\log_3 9$

II.  $\log_5 1/5$

III.  $\log_7 7$

IV.  $\log_6 6^5$

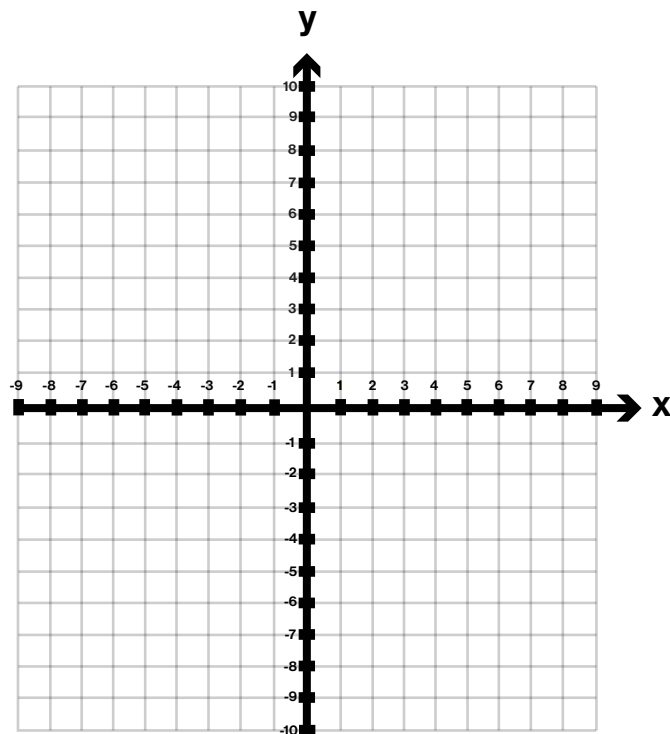
V.  $\log_{10} 0.1$

VI.  $3^{\log_3 29}$

## Question 3

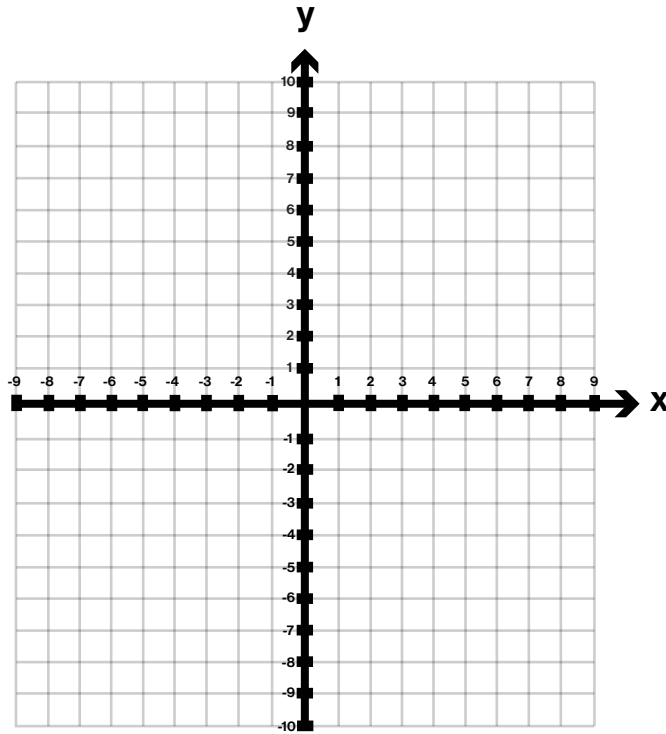
Graph

I.  $f(x) = \log_2 x$



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II.  $f(x) = \log_{1/2} x$



## Question 4

Convert to inverse form

I.  $w = \log_8 10$

II.  $8^{1/3} = 2$

## Question 5

Solve

I.  $\log_6 x = 2$

II.  $\log_2 32 = x$

III.  $\log_x 7 = 1/2$

IV.  $\log_8 x = 2/3$

# Exponential and Logarithmic Functions Practice

## Question 6

Solve (calculator)

I.  $\log_3(81 \cdot 27)$

II.  $\log_2 5 / 11$

III.  $\log 7$

IV.  $\ln 9$

V.  $\log_3 28$

## Question 7

Solve (calculator)

I.  $3^{2x} = 81$

II.  $2^{x+5} = 16$

## Question 8

Solve (calculator)

I.  $\log_2(8 - 6x) = 5$

II.  $\log(x - 9) + \log x = 1$

III.  $\log x - \log(x + 3) = 1$

IV.  $\log(x + 1) - \log x = 0$

V.  $\log_{12}(x + 5) - \log_{12}(x - 4) = \log_{12} 3$

VI.  $\log_6(x + 3) + \log_6(x + 2) = \log_6 20$

# Exponential and Logarithmic Functions Practice

Name: \_\_\_\_\_ **Key** \_\_\_\_\_

Date: \_\_\_\_\_

## Question 1

Graph

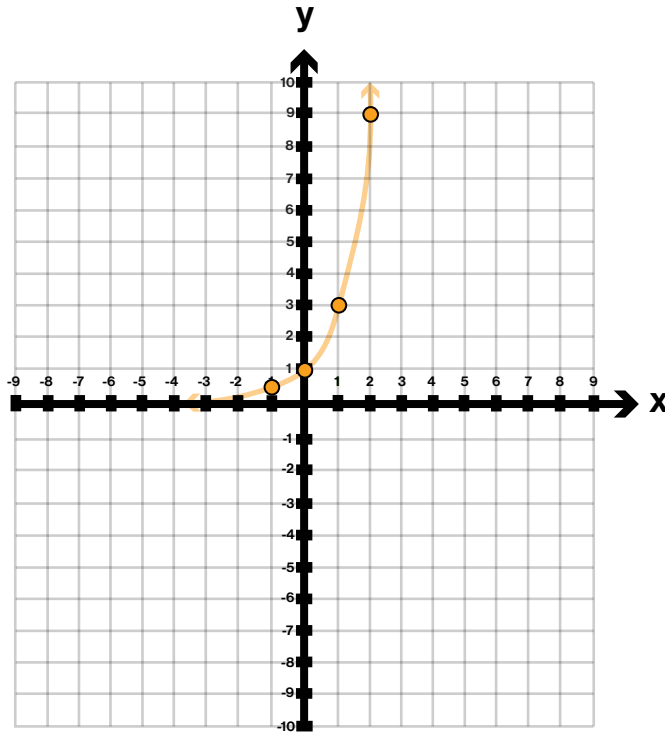
I.  $f(x) = 3^x \rightarrow y = 3^x$

$$0.33 \approx 3^{-1}$$

$$1 = 3^0$$

$$3 = 3^1$$

$$9 = 3^2$$



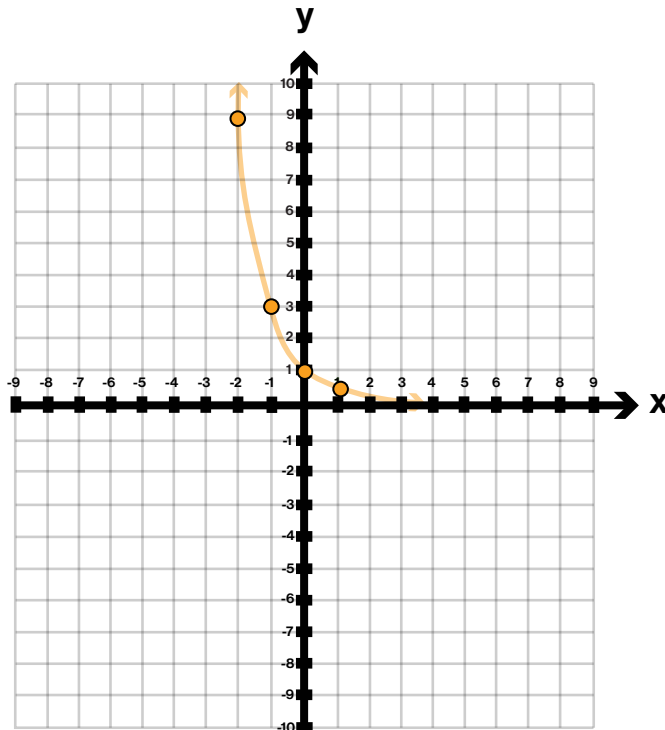
II.  $f(x) = (1/3)^x \rightarrow y = (1/3)^x$

$$9 = (1/3)^{-2}$$

$$3 = (1/3)^{-1}$$

$$1 = (1/3)^0$$

$$0.33 \approx (1/3)^1$$



# Exponential and Logarithmic Functions Practice

## Question 2

Solve

I.  $\log_3 9 \rightarrow 3^y = 9 \rightarrow 3^y = 3^2 \rightarrow y = 2 \rightarrow \log_3 9 = 2$

II.  $\log_5 1/5 \rightarrow 5^y = 1/5 \rightarrow 5^y = 5^{-1} \rightarrow y = -1 \rightarrow \log_5 1/5 = -1$

III.  $\log_7 7 \rightarrow \log_7 7 = 1$

IV.  $\log_6 6^5 \rightarrow \log_6 6^5 = 5$

V.  $\log_{10} 0.1 \rightarrow 10^y = 0.1 \rightarrow 10^y = 10^{-1} \rightarrow y = -1 \rightarrow \log_{10} 0.1 = -1$

VI.  $3^{\log_3 29} \rightarrow 3^{\log_3 29} = 29$

## Question 3

Graph

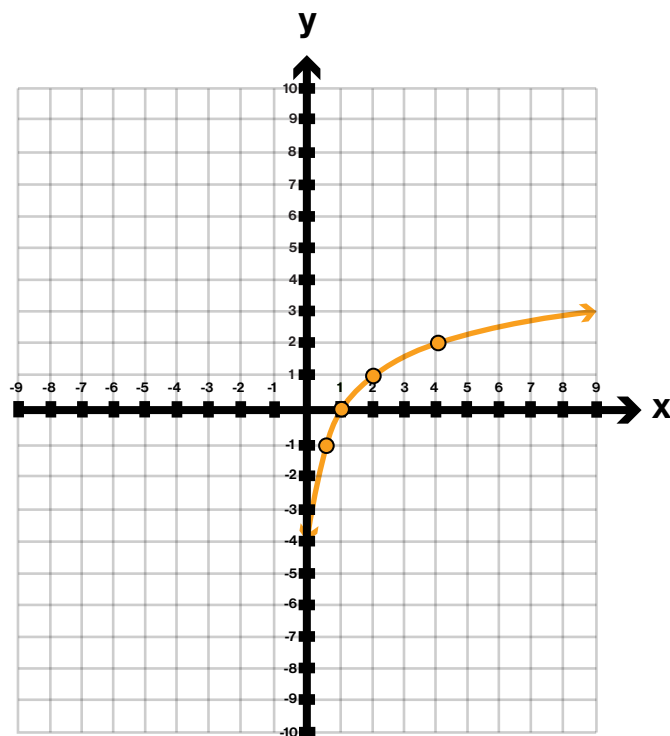
I.  $f(x) = \log_2 x \rightarrow y = \log_2 x \rightarrow 2^y = x$

$$0.5 = 2^{-1}$$

$$1 = 2^0$$

$$2 = 2^1$$

$$4 = 2^2$$



# Exponential and Logarithmic Functions Practice

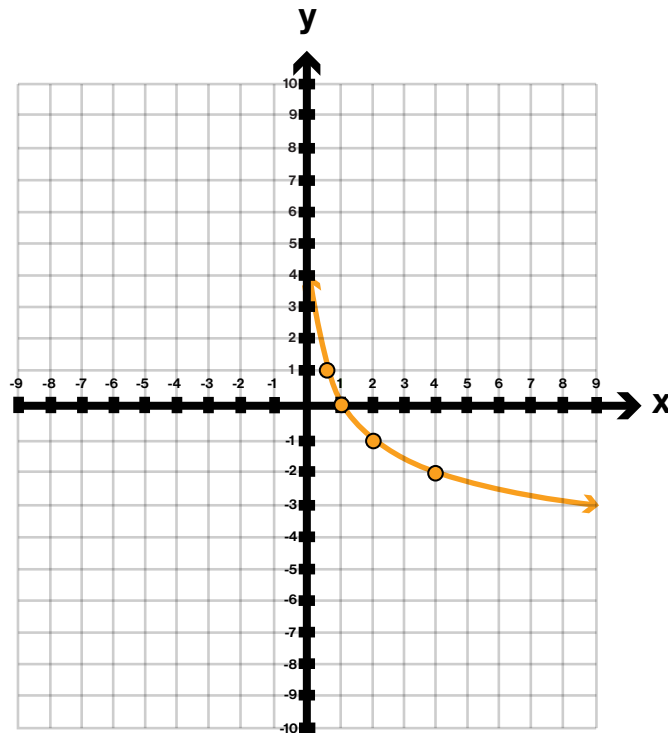
II.  $f(x) = \log_{1/2} x \rightarrow y = \log_{1/2} x \rightarrow (1/2)^y = x$

$$4 = (1/2)^{-2}$$

$$2 = (1/2)^{-1}$$

$$1 = (1/2)^0$$

$$0.5 = (1/2)^1$$



## Question 4

Convert to inverse form

I.  $w = \log_8 10 \rightarrow 8^w = 10$

II.  $8^{1/3} = 2 \rightarrow 1/3 = \log_8 2$

## Question 5

Solve

I.  $\log_6 x = 2 \rightarrow 6^2 = x \rightarrow 36 = x$

II.  $\log_2 32 = x \rightarrow 2^x = 32 \rightarrow 2^x = 2^5 \rightarrow x = 5$

III.  $\log_x 7 = 1/2 \rightarrow x^{1/2} = 7 \rightarrow (x^{1/2})^2 = (7)^2 \rightarrow x = 49$

IV.  $\log_8 x = 2/3 \rightarrow 8^{2/3} = x \rightarrow (2^3)^{2/3} = x \rightarrow 4 = x$

# Exponential and Logarithmic Functions Practice

## Question 6

Solve (calculator)

I.  $\log_3(81 \cdot 27) \rightarrow \log_3 2,187 \rightarrow 3^x = 2,187 \rightarrow 3^x = 3^7 \rightarrow x = 7$

II.  $\log_2 5/11 \rightarrow \frac{\log_{10} 5/11}{\log_{10} 2} \rightarrow -1.14$

III.  $\log 7 \rightarrow 0.85$

IV.  $\ln 9 \rightarrow 2.20$

V.  $\log_3 28 \rightarrow \frac{\log_{10} 28}{\log_{10} 3} \rightarrow 3.03$

## Question 7

Solve (calculator)

I.  $3^{2x} = 81 \rightarrow 3^{2x} = 3^4 \rightarrow 2x = 4 \rightarrow x = 2$

II.  $2^{x+5} = 16 \rightarrow 2^{x+5} = 2^4 \rightarrow x+5 = 4 \rightarrow x = -1$

## Question 8

Solve (calculator)

I.  $\log_2(8 - 6x) = 5 \rightarrow 2^5 = 8 - 6x \rightarrow 32 = 8 - 6x \rightarrow 24 = -6x \rightarrow -4 = x$

II.  $\log(x - 9) + \log x = 1 \rightarrow \log(x^2 - 9x) = 1 \rightarrow 10 = x^2 - 9x \rightarrow 0 = x^2 - 9x - 10 \rightarrow$   
 $x = 10$  True  
 $x = -1$  False

III.  $\log x - \log(x + 3) = 1 \rightarrow \log_{10} \frac{x}{x+3} = 1 \rightarrow \frac{x}{x+3} = 10 \rightarrow x = 10(x + 3) \rightarrow x = 10x + 30$

↓

No Solution ← False  $x = -10/3$  ←  $-9x = 30$

IV.  $\log(x + 1) - \log x = 0 \rightarrow \log(x + 1) = \log x \rightarrow x + 1 = x \rightarrow 1 = 0 \rightarrow$  No Solution

V.  $\log_{12}(x + 5) - \log_{12}(x - 4) = \log_{12} 3 \rightarrow \log_{12} \frac{x+5}{x-4} = \log_{12} 3 \rightarrow \frac{x+5}{x-4} = 3 \rightarrow x + 5 = 3(x - 4)$

↓

$17/2 = x$  ←  $17 = 2x$  ←  $5 = 2x - 12$  ←  $x + 5 = 3x - 12$

VI.  $\log_6(x + 3) + \log_6(x + 2) = \log_6 20 \rightarrow \log_6(x^2 + 5x + 6) = \log_6 20 \rightarrow x^2 + 5x + 6 = 20$

↓

$x = 2$  True  
 $x = -7$  False ←  $x^2 + 5x - 14 = 0$