

PMATH 12 - CHAPTER 5 - PRETEST

signature _____

Multiple Choice - PART 1 - NON-CALCULATOR - 15 MINUTES (#1-6)

CIRCLE the choice that best completes the statement or answers the question.

1. Which exponential function is increasing?

base > 1

A. $y = \left(\frac{1}{4}\right)^x$

B. $y = \left(\frac{4}{3}\right)^x$

C. $y = 0.1^x$

D. $y = 0.137^x$

2. Write $\frac{1}{16}$ as a power of 4.

$\frac{1}{4^2}$

A. 4^2

B. $4^{\frac{1}{2}}$

C. 4^{-2}

D. 4^{-4}

3. Solve: $2^{x+1} = 16$

*$2^{x+1} = 2^4$
 $x+1 = 4$
 $x = 3$*

A. $x = 3$

B. $x = \frac{15}{2}$

C. $x = -3$

D. $x = 15$

4. For which value of x is $y = \log_9 x$ not defined?

$x > 0$

A. $x = \frac{1}{9}$

B. $x = 81$

C. $x = -9$

D. $x = 1$

5. Which of these expressions is NOT equal to $\log 160$?

A. $\log 80 + \log 2$ *80×2*

B. $\log 48 + \log 112$ *48×112*

C. $\log 16 + \log 10$ *16×10*

D. $\log 8 + \log 20$ *8×20*

6. Solve: $3 \log 9 = \log x$

$9^3 = x$

A. $x = \frac{1}{3}$

B. $x = 12$

C. $x = 729$

D. $x = 27$

MULTIPLE CHOICE - PART 2 - CALCULATOR may be used after 15 minutes

7. This table of values represents an exponential function. Determine the missing value.

x	y
-1	100
0	1
1	

*$x^{-1} = 100$
 $\left(\frac{1}{100}\right)^1 = 100$*

A. -98

B. 0.01

C. 0.0001

D. 0.02

8. What is the y-intercept of the graph of $y = 4^{-4x} + 3$? $x=3$ $4^0 + 3 = 1 + 3$

- A. 1 B. 3 C. 259 **D. 4**

9. Solve: $125^{-2x} = 25^{x-24}$
 $5^{3(-2x)} = 5^{2(x-24)}$
 $5^{-6x} = 5^{2x-48}$
 A. $x=6$ C. $x = \frac{25}{3}$
 B. $x=8$ D. $x=3$
 $-6x = 2x - 48$
 $-8x = -48$
 $x = 6$

10. Evaluate $\log_2 64$.
 A. -6 C. 32
 B. 6 D. 62
 $2^{\square} = 64$

11. Write this exponential expression as a logarithmic expression: $3^{\frac{2}{3}} = \sqrt[3]{9}$
 A. $\frac{2}{3} = \log_3(\sqrt[3]{9})$ C. $\frac{2}{3} = \log_{\sqrt[3]{9}}(3)$
 B. $3 = \log_{\frac{2}{3}}(\sqrt[3]{9})$ D. $\log_3\left(\frac{2}{3}\right) = \sqrt[3]{9}$
 $\frac{2}{3} = \log_3 \sqrt[3]{9}$

12. Write as a single logarithm: $4 \log_3 4 + \log_3 12 + 3$
 A. $\log_3 4$ C. $\log_3 576$
 B. $\log_3 \frac{64000}{3}$ D. $\log_3 7$
 $\frac{4^4 \cdot 3^3}{12}$

13. The graph of $y+4 = \log_6(x+8)$ is the image of the graph of $y = \log_6 x$ after it has been
 A. translated 8 units left and 4 units up.
 B. translated 8 units right and 4 units down.
 C. translated 8 units left and 4 units down.
 D. translated 8 units right and 4 units up.
 -4

14. Which logarithm is equal to $\log_5(x+6) + \log_5 x$? $(x+6)(x) = x^2 + 6x$
 A. $\log_5(8x)$ B. $\log_{10}(x^2 + 6x)$ C. $\log_5(2x+6)$ **D. $\log_5(x^2 + 6x)$**

15. What is the solution of the equation $\frac{6(5^{x+3})}{6} = \frac{4500}{6}$? $\rightarrow 5^{x+3} = 750$
 A. $x = \frac{\log 6}{\log 5}$ C. $x = \frac{\log 750}{\log 5}$
 B. $x = \frac{\log 4500}{\log 30}$ D. $x = \log 250$
 $\log 5^{x+3} = \log 750$
 $(x+3) \log 5 = \log 750$
 $x \log 5 + 3 \log 5 = \log 750$
 $x \log 5 = \log 750 - 3 \log 5$
 $x = \frac{\log 750 - \log 5^3}{\log 5}$
 $x = \frac{\log 6}{\log 5}$
 $2 \div 125 = 6$

16. Solve: $36 = 3^x$
Give the solution to the nearest hundredth.

A. $x \approx 1.56$
B. $x \approx 12$

C. $x \approx 0.31$
D. $x \approx 3.26$

$$\begin{aligned} \log 36 &= \log 3^x \\ &= x \log 3 \\ \frac{\log 36}{\log 3} &= x \quad \underline{\text{calc.}} \end{aligned}$$

17. An account pays 5.0% annual interest, compounded semi-annually (twice a year).
What is the interest rate per compounding period, as a decimal?

A. 5.0

B. 0.025

C. 0.05

D. 2.5

$$\frac{5\%}{2} = 2.5\%$$

18. The decibel scale measures the intensity of sound. The loudness of a sound, L decibels (dB), can be determined using the function $L = 10 \log\left(\frac{I}{I_0}\right)$, where I is the intensity of the sound and I_0 is the intensity of the quietest sound that can be detected. The loudness of a library is 30 dB. Calculate the intensity of this sound in terms of I_0 .

A. $10^{30} I_0$
B. $30 I_0$

C. $10^3 I_0$
D. $3 I_0$

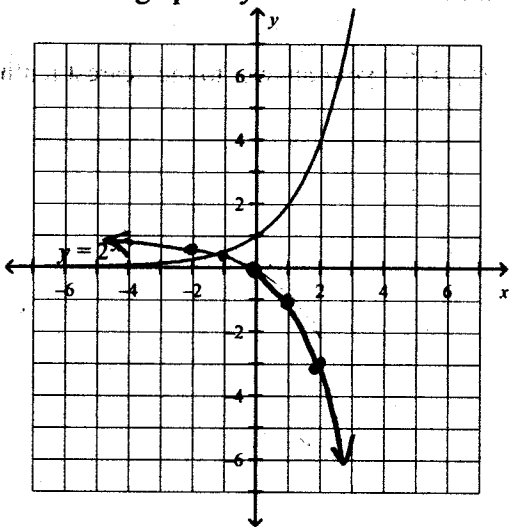
$$\begin{aligned} 30 &= 10 \log\left(\frac{I}{I_0}\right) \\ \frac{30}{10} &= \log\left(\frac{I}{I_0}\right) \\ 3 &= \log\left(\frac{I}{I_0}\right) \\ 10^3 &= \frac{I}{I_0} \end{aligned}$$

Short Answer - Show your work

1. Determine whether the exponential function $y = \left(\frac{3}{4}\right)^x$ is increasing or decreasing. Explain.

decreasing since base between 0 and 1

2. The graph of $y = 2^x$ is shown below.
Sketch the graph of $y = -2^x + 1$ on the same grid.



x	$y = 2^x$	$(x, -y + 1)$
-2	$\frac{1}{4}$	$(-2, \frac{3}{4})$
-1	$\frac{1}{2}$	$(-1, \frac{1}{2})$
0	1	$(0, 1)$
1	2	$(1, -1)$
2	4	$(2, -3)$
4	16	$(4, -15)$

3. Use graphing technology to solve: $7^{x+1} = 90$. Give the solution to the nearest tenth.

$$y_1 = 7^{x+1} - 90 \quad \boxed{x \approx 1.3}$$

4. Solve: $\frac{\sqrt{27}}{9} = 3^{x-3}$ WORK

$$\frac{3^{\frac{3}{2}}}{3^2} \rightarrow 3^{-\frac{1}{2}} = 3^{x-3}$$

$$-\frac{1}{2} = x-3$$

$$\frac{5}{2} = x$$

ANSWER

$$\boxed{x = \frac{5}{2}}$$

5. Evaluate: $\log_6\left(\frac{1}{216}\right)$ WORK

$$6^x = \frac{1}{216}$$

$$6^x = 216^{-1}$$

$$6^x = 6^{-3}$$

ANSWER

$$\boxed{\log_6\left(\frac{1}{216}\right) = -3}$$

6. Write 2 as a logarithm with base 3.

$$3^2 = 9 \rightarrow \boxed{2 = \log_3 9}$$

7. Write as a single logarithm: $\frac{4}{5} \log_3 x - 3 \log_3 y - 6 \log_3 z$

$$\log_3 \left[\frac{x^{\frac{4}{5}}}{y^3 z^6} \right]$$

8. Determine the y-intercept of the graph of $y = \log_3(3(x+3))$. Give your answer to the nearest tenth, if necessary.

$$\downarrow x=0$$

$$y = \log_3 9$$

$$3y = 9$$

$$\boxed{y = 2}$$

9. Determine whether $x = 4$ is a root of this equation.

$$\log(x-9) + \log(x-6) = 1$$

WORK

$$\log(4-9) + \log(4-6)$$

$$\log(-5) + \log(-2)$$

ANSWER

NO

$$\text{Reit.} \rightarrow \left[\begin{array}{l} x > 5 \\ x > 6 \\ x > 5 \\ x > 1 \end{array} \right] \Rightarrow x > 6$$

10. Solve: $\log(2x-10) + \log(x-6) = \log(x-5) + \log(x-1)$

WORK

$$(2x-10)(x-6) = (x-5)(x-1)$$

$$2x^2 - 22x + 60 = x^2 - 6x + 5$$

$$x^2 - 16x + 55 = 0$$

$$(x-11)(x-5) = 0$$

$$x = 11, \quad x = 5$$

ANSWER

$$x = 11$$

Problem - Show your work

1. a) Graph the exponential function $y = \left(\frac{1}{2}\right)^x$.

b) Determine:

i) whether the function is increasing or decreasing

ii) the intercepts

X-INT NONE

Y-INT $y = 1$

iii) the equation of the asymptote

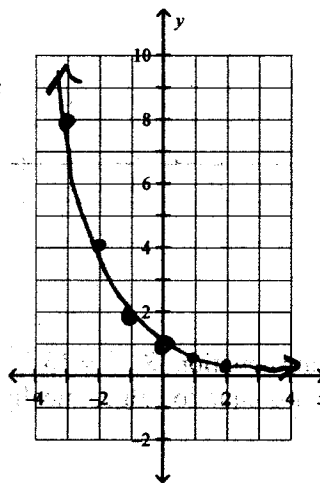
$$\text{hor} = y = 0$$

iv) the domain of the function

$$x \in \mathbb{R}$$

v) the range of the function

$$y > 0$$



2. Write $5(\log x - \log y)$ as a single logarithm.

$$5 \log x - 5 \log y$$

$$\log x^5 - \log y^5$$

$$\log \left(\frac{x^5}{y^5} \right)$$

$$5 \left(\log \left(\frac{x}{y} \right) \right)$$

OR

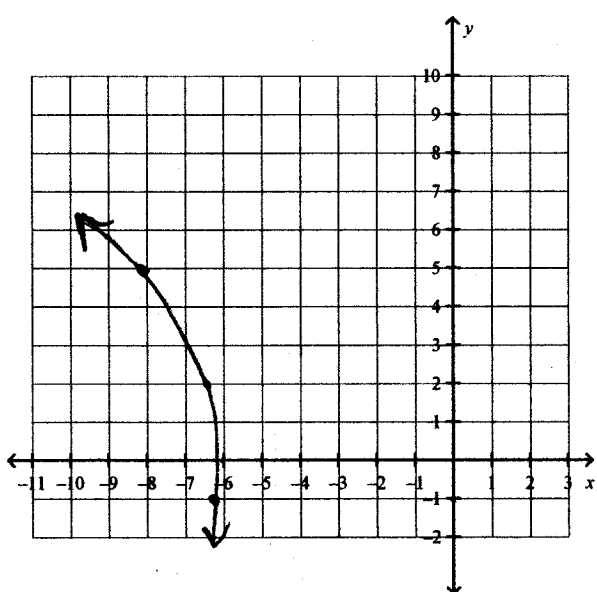
$$\log \left(\frac{x}{y} \right)^5$$

3. a) Graph $y = 3 \log_6(-3(x+6)+2)$ on the grid below.

b) Identify i) the intercepts x-int ≈ 6.1 y-int NONE

ii) the equations of any asymptotes $x = -6$

iii) the domain $x < -6$ and range $y \in \mathbb{R}$



$x = 6^y$	y	$(\frac{x}{-3} - 6, 3y + 2)$
$\frac{1}{36}$	-2	$(-6\frac{1}{108}, -4)$
$\frac{1}{6}$	-1	$(-6\frac{1}{18}, -1)$
1	0	$(-6\frac{1}{3}, 2)$
6	1	$(-8, 5)$
36	2	$(-18, 8)$

4. Consider the equation: $8^{x-3} = 16^{x+3}$ power of 2

a) Solve this equation algebraically using logarithms.

$$\log_2 8^{x-3} = \log_2 16^{x+3}$$

$$(x-3) \frac{\log_2 8}{\log_2 2^3} = (x+3) \frac{\log_2 16}{\log_2 2^4}$$

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

$$3x-9 = 4x+12$$

$$\boxed{-21 = x}$$

b) Solve this equation using common bases.

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

$$3x-9 = 4x+12$$

$$\boxed{-21 = x}$$