

PreCalc 12 Chapter 5 Review 2017 v1

Multiple Choice

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

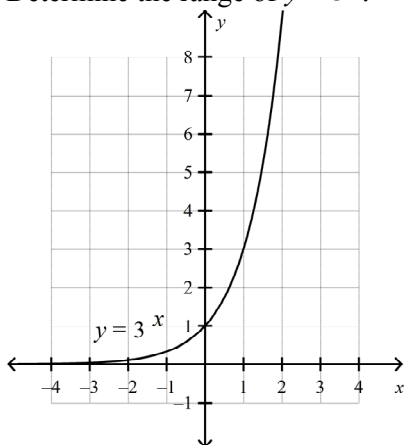
Easy

- _____ 1. Determine the missing value in this table of values for the function $y = 2^x$.

x	$y = 2^x$
-1	0.5
0	
1	2

- A. 2
B. -1
C. 0
D. 1

- _____ 2. Determine the range of $y = 3^x$.



- A. $y > 0$
B. $x > 0$
C. $y < 0$
D. $y \in \mathbb{R}$

- _____ 3. Write this logarithmic expression as an exponential expression: $\log_2\left(\sqrt[3]{1024}\right) = \frac{10}{3}$

- A. $\sqrt[3]{1024} = \left(\frac{10}{3}\right)^2$
B. $2 = \left(\sqrt[3]{1024}\right)^{\frac{10}{3}}$
C. $\sqrt[3]{1024} = 2^{\frac{10}{3}}$
D. $2^{\sqrt[3]{1024}} = \frac{10}{3}$

_____ 4. Which exponential function is increasing?

A. $y = 0.2^x$

C. $y = \left(\frac{1}{2}\right)^x$

B. $y = 0.057^x$

D. $y = \left(\frac{7}{2}\right)^x$

_____ 5. Which exponential function is decreasing?

A. $y = \left(\frac{9}{2}\right)^x$

C. $y = 1.3^x$

B. $y = \left(\frac{3}{7}\right)^x$

D. $y = 1.515^x$

_____ 6. Consider the exponential function $y = a^x$, $a > 0$. Which of these statements is false?

A. The graph has y -intercept 1.B. The graph does not have an x -intercept.C. The function has a horizontal asymptote with equation $y = a$.D. The range of the function is $y > 0$.

_____ 7. Solve: $7^{x+4} = 343$

A. $x = 339$

C. $x = \frac{339}{7}$

B. $x = -1$

D. $x = 1$

_____ 8. Consider the logarithmic function $y = \log_5 x$.
Which of the following statements is false?

A. The domain of the function is $x > 0$.B. The graph has x -intercept 1.C. The graph does not have a y -intercept.D. The function has a vertical asymptote with equation $x = 5$.

_____ 9. Write this logarithmic expression as an exponential expression: $\log_8 4096 = 4$

A. $4096 = 8^4$

C. $8^{4096} = 4$

B. $4096 = 4^8$

D. $8 = 4096^4$

___ 10. Which of these expressions is NOT equal to $\log 210$?

- A. $\log 70 + \log 3$ C. $\log 10 + \log 21$
B. $\log 91 + \log 119$ D. $\log 30 + \log 7$

___ 11. Which of these expressions is NOT equal to $\log 64$?

- A. $3 \log 4$ C. $2 \log 32$
B. $2 \log 8$ D. $6 \log 2$

___ 12. Which logarithm is equal to $\log_3(x+1) + \log_3(x+7)$?

- A. $\log_3(x^2 + 8x + 7)$ C. $\log_6(x^2 + 8x + 7)$
B. $\log_3(2x + 8)$ D. $\log_3(x + 8)$

___ 13. Solve: $\log 8 + \log 5 = \log x$

- A. $x = \frac{8}{5}$ C. $x = 40$
B. $x = 13$ D. $x = 3$

Moderate (Show work for non-MC)

___ 14. What is the range of the function $y = 3(2^{x-7})$?

- A. $y > 3$ C. $y > 7$
B. $y \in \mathbb{R}$ D. $y > 0$

___ 15. Determine the equation of the horizontal asymptote of the graph of $y - k = c(a)^{d(x-h)}$, $a > 0$, $c \neq 0$, $d \neq 0$.

- A. $y = 0$ C. $y = -k$
B. $y = 1$ D. $y = k$

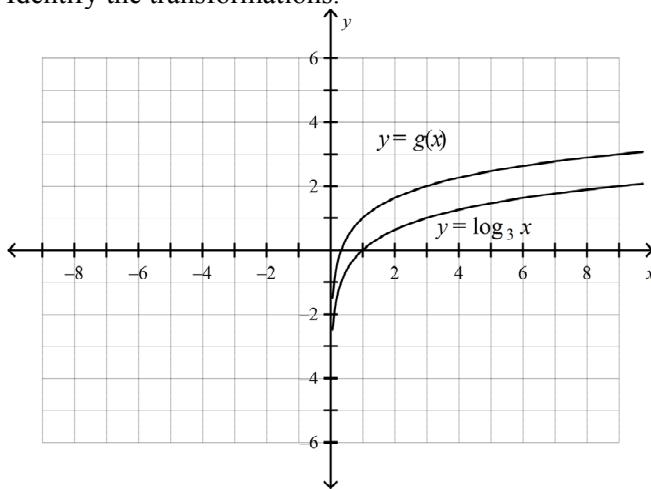
___ 16. Write $343\sqrt{7}$ as a power of 7.

- A. $7^{\frac{3}{2}}$ C. $7^{\frac{7}{2}}$
B. 7^6 D. $7^{\frac{5}{2}}$

_____ 17. The graph of $y = 3(8)^{x+6}$ is the image of the graph of $y = 8^x$ after it has been (for non-MC provide a description).

- A. compressed vertically by a factor of $\frac{1}{3}$, and then translated 6 units left.
- B. stretched vertically by a factor of 3, and then translated 6 units right.
- C. compressed vertically by a factor of $\frac{1}{3}$, and then translated 6 units right.
- D. stretched vertically by a factor of 3, and then translated 6 units left.

_____ 18. The graphs of $y = \log_3 x$ and its transformation image $y = g(x)$ are shown. Identify the transformations.



- A. A horizontal compression by a factor of $\frac{1}{3}$
- B. A translation of 2 units left and 1 unit up
- C. A horizontal stretch by a factor of 3
- D. A vertical stretch by a factor of 3

_____ 19. What is the x -intercept of the graph of $y = 3 \log_2(x - 4)$?

- A. 4
- B. 1
- C. 5
- D. 12

_____ 20. What is the domain of the function $y = \log_2(4x) - 5$?

- A. $x > 0$
- B. $x < 0$
- C. $x \in \mathbb{R}$
- D. $x > -5$

_____ 21. What is the solution of the equation $2(3^{x+4}) = 324$?

A. $x = \frac{\log 2}{\log 3}$

C. $x = \log \frac{81}{2}$

B. $x = \frac{\log 162}{\log 3}$

D. $x = \frac{\log 324}{\log 6}$

_____ 22. 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 vacuum cleaner is 75 dB and the loudness of a snowmobile is 115 dB.

How many times as intense as the sound of a vacuum cleaner is the sound of a snowmobile?

A. 40 times as intense

C. 10^{40} times as intense

B. Approximately 1.5 times as intense

D. 10^4 times as intense

_____ 23. The pH scale measures the acidity or alkalinity of a solution. A solution that has a pH of 7 is neutral. For each increase of 1 pH, a solution is 10 times as alkaline. For each decrease of 1 pH, a solution is 10 times as acidic.

A sample of juice has a pH of 2.5. A sample of milk has a pH of 6.7.

To the nearest whole number, how many times as acidic as the milk is the juice?

A. 15 849 times as acidic

C. 3 times as acidic

B. 27 times as acidic

D. 3543 times as acidic

_____ 24. The future value formula is used when an amount, FV dollars, is saved through a series of equal investments at equal time intervals, and the compounding period of the interest is equal to the time interval for the

investments. The formula is: $FV = \frac{R[(1+i)^n - 1]}{i}$, where R dollars is the regular investment, i is the interest rate per compounding period, and n is the number of investments.

To the nearest month, how many monthly investments of \$100 would have to be made into a savings account that pays 4% annual interest, compounded monthly, for the future value to be \$4962.49?

A. 10

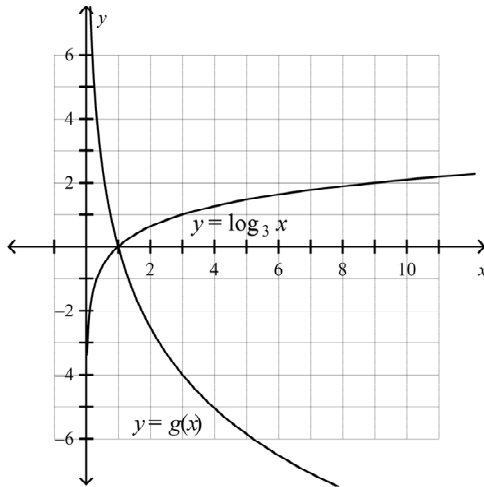
C. 861

B. 46

D. 28

Short Answer**Easy**

25. Order these logarithms from least to greatest.
 $\log_2 171$, $\log_3 6280$, $\log_4 14234$, $\log_5 15626$
26. The graphs of $y = \log_3 x$ and its transformation image $y = g(x)$ are shown.
 Write an equation for the function $y = g(x)$ in the form $y = c \log_3 x$.



27. Determine whether $x = 6$ is a root of this equation.
 $\log_6 x + \log_6 (6x) = 3$
28. Use graphing technology to solve: $5^{x-2} = 2^{x-1}$
 Give the solution to the nearest tenth.
29. Determine the equation of the vertical asymptote of the graph of $y = -3 \log_3 (x + 1)$.

Moderate (Show work for non-MC)

30. Solve algebraically: $27^x = 3^{(x^2 - 4)}$

31. Solve algebraically: $\left(\frac{1}{256}\right)^{x-4} = \left(\sqrt[3]{16}\right)^x$
32. Solve algebraically: $\log_2(x+1) - \log_2(x-8) = 1 + \log_2(x-4) - \log_2(x-6)$
33. The future value formula is used when an amount, FV dollars, is saved through a series of equal investments at equal time intervals, and the compounding period of the interest is equal to the time interval for the investments. The formula is: $FV = \frac{R[(1+i)^n - 1]}{i}$, where R dollars is the regular investment, i is the interest rate per compounding period, and n is the number of investments.

Each month, Raj deposits \$60 into a savings account with an annual interest rate of 2.9%, compounded monthly. How much will Raj have in the account after 5 years?

Difficult (Show work for non-MC)

34. Use linear interpolation to estimate the value of $\log_2 14.3$. Leave answer as a mixed fraction.

Problem

Moderate (Show work for non-MC)

35. When a beam of light is reflected in a mirror, its intensity is reduced by about 10%.
- Determine a function that models the percent of light, P , that remains after the beam of light is reflected in n mirrors.
 - Determine how many mirrors a beam of light has been reflected in when its intensity is reduced to approximately 53% of its initial value.
36. The pH of a solution can be described by the equation $\text{pH} = -\log[\text{H}^+]$, where $[\text{H}^+]$ is the hydrogen-ion concentration in moles/litre.
- The hydrogen-ion concentration in a sample of watermelon is 7.9×10^{-6} moles/litre. Determine the pH of the watermelon, to the nearest tenth.
 - A sample of lemon juice has a pH of 2.2. Determine the hydrogen-ion concentration of the lemon juice, to four decimal places.

37. The value of a car depreciates by 14% each year.
- Determine a function that models the value of the car after t years as a percent, P , of its initial value
 - How long will it take, to the nearest year, before the car is worth about 25% of its initial value?
38. Given $\log 3 \doteq 0.4771$ and $\log 7 \doteq 0.8451$, determine the approximate value of $\log\left(\frac{270}{49}\right)$ without using a calculator.
39. The Richter scale measures the intensity of an earthquake. The magnitude, M , of an earthquake can be determined using the function $M = \log\left(\frac{I}{S}\right)$, where I microns is the intensity of the earthquake, and S microns is the intensity of a standard earthquake.

Determine the magnitude of an earthquake that is one-third as intense as an earthquake with magnitude 5.1. Give the answer to the nearest tenth.

Difficult (Show work for non-MC)

40. For what values of k does the equation $4^x = 32^{(x^2 + k)}$ have no real solution?
41. The 12 semitones are C, C#, D, D#, E, F, F#, G, G#, A, A#, B. Each octave is double the frequency of the previous octave. Each semitone frequency has the same ratio to the previous semitone. The first note of the musical scale is C_0 ; it is the semitone and octave number. A_1 has a frequency of 55 Hz. Use this as a given initial value to create a function $Y(n)$ to calculate the frequency of any note up to 4185.6 Hz, where n is the note relative to C_0 .
Hint: The very first note is name C_0 and it is the 0th note, so $C\#_0$ is the 1th note, C_1 is the 12th note.
- Calculate the number of semitones from C_0 to A_1 .
 - Now create the function $Y(n) = Y_i \cdot (r)^{\frac{n - n_i}{k}}$. Recall that your given initial value is not at offset 0. Test your function with A_1 to make sure you get 55 Hz.
 - Use your function to calculate the frequency for $G\#_2$.