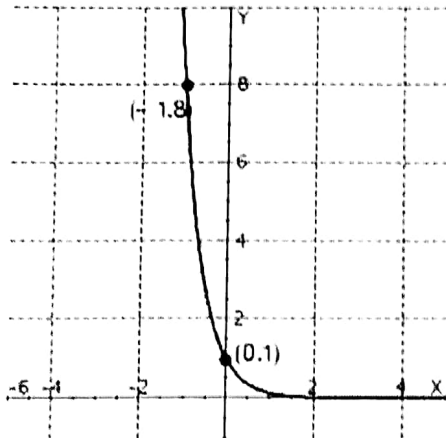


Pre-Calculus Chapter 3 Test (Mixed Practice)

Multiple Choice

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

1. Find the value of b that would cause the graph of $y = b^x$ to look like the graph indicated.



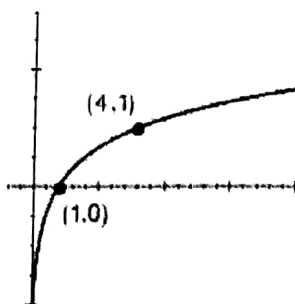
- Ⓐ $b = -8$ Ⓑ $b = \frac{1}{8}$ Ⓒ $b = \frac{3}{8}$ Ⓓ $b = -\frac{1}{8}$ Ⓔ $b = 8$

2. Find the value of x .

$$\log_3 729 = x$$

- Ⓐ $x = 365$ Ⓑ $x = 729$ Ⓒ $x = 3$ Ⓓ $x = 6$

3. Find the value of b , if any, that would cause the graph of $y = \log_b x$ to look like the graph shown.



- Ⓐ $b = 4$ Ⓑ $b = 1$ Ⓒ $b = 4.3$ Ⓓ $b = 3$ Ⓔ $b = 3.7$

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4. A population growing at an annual rate r will triple in a time t given by the formula $t = \frac{\ln 3}{r}$. If the growth rate remains constant and equals 9% per year, how long will it take the population of the town to triple?
- Ⓐ 6.6 years Ⓑ 1 years Ⓒ 5.3 years Ⓓ 2.2 years Ⓔ 12.2 years
5. Solve the equation.
- $$2^x = 5$$
- Ⓐ $x = 0.5541$ Ⓑ $x = 5.8628$ Ⓒ $x = 0.4307$ Ⓓ $x = 1.4307$ Ⓔ $x = 1.6652$
6. Simplify the expression.
- $$\log_3 3^6$$
- Ⓐ 6 Ⓑ 36 Ⓒ 3 Ⓓ 18 Ⓔ none of these
7. Simplify the expression.
- $$9^{\log_9 2}$$
- Ⓐ 2 Ⓑ 18 Ⓒ 4 Ⓓ 9 Ⓔ none of these
8. Tritium, a radioactive isotope of hydrogen, has a half-life of 12.4 years. Of an initial sample of 69 grams, how much will remain after 75 years?
- Ⓐ 1.5848 grams Ⓑ 61.5289 grams Ⓒ 0.0000 grams Ⓓ 1.0426 grams Ⓔ 17.2500 grams

Short Answer

9. Carbon dating presumes that, as long as a plant or animal is alive, the proportion of its carbon that is ^{14}C is constant. The amount of ^{14}C in an object made from harvested plants, like paper, will decline exponentially according to the equation $A = A_0 e^{-0.0001213t}$, where A represents the amount of ^{14}C in the object, A_0 represents the amount of ^{14}C in living organisms, and t is the time in years since the plant was harvested. If an archeological artifact has 40% as much ^{14}C as a living organism, how old would you predict it to be? Round to the nearest year.
10. The chemical acidity of a solution is measured in units of pH: $\text{pH} = -\log[\text{H}^+]$, where $[\text{H}^+]$ is the hydrogen ion concentration in the solution. What is $[\text{H}^+]$ if the $\text{pH} = 8.8$?
11. Rewrite the exponential equation $5^{-3} = \frac{1}{125}$ in logarithmic form.

12. What is the value of the function $f(x) = 25e^{0.4x}$ at $x = 1.3$? Round to 3 decimal places.
13. An initial investment of \$9000 grows at an annual interest rate of 5% compounded continuously. How long will it take to double the investment?
14. Let Q represent a mass of radioactive radium (^{226}Ra) (in grams), whose half-life is 1599 years. The quantity of radium present after t years is

$$Q = 5 \left(\frac{1}{2} \right)^{t/1599}$$

Determine the quantity present after 300 years. Round to the nearest hundredth of a gram.

15. Solve for x : $4^{-x/2} = 0.0052$. Round to 3 decimal places.
16. Use the One-to-One Property to solve the following equation for x .
 $2^{3x} = 128$
17. Solve for x : $9(10^{x-2}) = 23$. Round to 3 decimal places.
18. Write the logarithmic equation $\ln 5 = 1.609\dots$ in exponential form.
19. Evaluate the function $f(x) = \log_3 x$ at $x = \frac{1}{27}$ without using a calculator.
20. Write the exponential equation $e^{1/2} = 1.6487\dots$ in logarithmic form.
21. Solve the equation $\log(1-x) = \log(10)$ for x using the One-to-One Property.
22. Identify the x -intercept of the function $f(x) = 2 \ln(x-3)$.
23. Rewrite the logarithm $\log_3 21$ in terms of the natural logarithm.
24. Simplify the expression $\log_3 \left(\frac{1}{27} \right)^4$.
25. Solve $\left(\frac{1}{5} \right)^x = 125$ for x .
26. Condense the expression $7(\log x - \log y)$ to the logarithm of a single term.

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27. Condense the expression $\frac{1}{5} [\log_4 x + \log_4 7] - [\log_4 y]$ to the logarithm of a single term.
28. Find the exact value of $\log_8 \sqrt[3]{64}$ without using a calculator.
29. Find the exact value of $\ln e^{2.50} - \ln \sqrt{e}$ without using a calculator.
30. Find the exact value of $\log_4 36 - \log_4 9$ without using a calculator.

Pre-Calculus Chapter 3 Test (Mixed Practice)

Answer Section

MULTIPLE CHOICE

1. B
2. D
3. A
4. E
5. C
6. A
7. A
8. D

SHORT ANSWER

9. 7554 years
10. 1.58×10^{-9}
11. $\log_5 \frac{1}{125} = -3$
12. 42.051
13. 13.86 years
14. 4.39 g
15. 7.587
16. $\frac{7}{3}$
17. 2.407
18. $e^{1.609...} = 5$
19. -3
20. $\ln(1.6487...) = \frac{1}{2}$
21. -9
22. $x = 4$
23. $\frac{\ln 21}{\ln 3}$
24. -12
25. -3
26. $\log \left(\frac{x}{y} \right)^7$
27. $\log_4 \frac{\sqrt[5]{7x}}{y}$
28. $\frac{2}{3}$
29. 2
30. 1