

Algebra II Practice Quiz 7.4- 7.5**Multiple Choice**

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

- _____ 1. Express $\log_3 6 + \log_3 4.5$ as a single logarithm. Simplify, if possible.
- a. 3 c. $\log_3 10.5$
b. $\log_6 10.5$ d. 27
- _____ 2. Express $\log_2 64 - \log_2 4$ as a single logarithm. Simplify, if possible.
- a. $\log_2 4$ c. 4
b. 8 d. $\log_2 60$
- _____ 3. Express $\log_3 27^{-3}$ as a product. Simplify, if possible.
- a. -9 c. $\frac{1}{27}$
b. 3 d. 9
- _____ 4. Simplify the expression $\log_4 64$.
- a. 16 c. 4
b. 64 d. 3
- _____ 5. Evaluate $\log_9 243$. If necessary, round your answer to the nearest tenth.
- a. 3 c. 27
b. 2.5 d. 1.4
- _____ 6. The altitude of an aircraft, h , in miles, is given by $h = -\left(\frac{100}{9}\right) \log \frac{P}{B}$, where P = the outside air pressure, and B = the atmospheric pressure at sea level. Let $B = 31$ inches of mercury (in. Hg). What is the outside air pressure at a height of 3.6 miles? Round your answer to the nearest tenth.
- a. 14.7 in. Hg c. 1.2 in. Hg
b. 65.4 in. Hg d. -0.5 in. Hg
- _____ 7. Simplify $\log_7 x^3 - \log_7 x$.
- a. $\log_7 (x^3 - x)$ c. $\log_7 2x$
b. $2 \log_7 x$ d. $2(x^3 - x)$
- _____ 8. Solve $8^{x+8} = 32^x$.
- a. $x = -12$ c. $x = 12$
b. $x = 22$ d. $x = -22$
- _____ 9. The amount of money in a bank account can be expressed by the exponential equation $A = 300(1.005)^{12t}$ where A is the amount in dollars and t is the time in years. About how many years will it take for the amount in the account to be more than \$900?
- a. 19 years c. 37 years
b. 30 years d. 221 years
- _____ 10. Solve $\log_5 x^{10} - \log_5 x^6 = 21$.
- a. $x = 21^4$ c. $x = 21^{\frac{1}{4}}$
b. $x = 5^{\frac{4}{21}}$ d. $x = 5^{\frac{21}{4}}$

Name: _____

ID: A

_____ 11. Use a table and graph to solve $3^{2x} = 6561$.

a. $x = 8$

b. $x = 4$

c. $x = 19$

d. $x = 6.5$

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Answer Section

MULTIPLE CHOICE

1. A

$$\log_3 6 + \log_3 4.5 = \log_3 27$$

3

To add the numbers, multiply the logarithms

Think. What exponent on base 3 gives 27? $3^3 = 27$

	Feedback
A	Correct!
B	To add logarithms of two numbers with the same base, multiply the numbers. Then simplify if possible.
C	To add logarithms of two numbers with the same base, multiply the numbers. Then simplify if possible.
D	This is the product. Take the logarithm of this number to the given base.

2. C

To subtract the logarithms divide the numbers.

$$\log_2 64 - \log_2 4 = \log_2 \left(\frac{64}{4}\right) = \log_2 16 = 4$$

	Feedback
A	Divide the values, then take the logarithm of that value.
B	This is what we'd get if we were adding the logarithms. To subtract logarithms, divide the values and then take the logarithm.
C	Correct!
D	To subtract logarithms, divide the values and then take the logarithm.

3. A

$$\log_3 27^{-3}$$

$$= -3 \log_3 27$$

$$= -3(3)$$

$$= -9$$

The Power Property of Logarithms says $\log_b a^p = p \log_b a$.Because $3^3 = 27$, $\log_3 27 = 3$.

	Feedback
A	Correct!
B	Use the Power Property of Logarithms when simplifying.
C	Use the Power Property of Logarithms when simplifying.
D	Use the Power Property of Logarithms when simplifying.

4. D

Factor 64. Then write it in the form of 4^3 , and apply the Inverse Properties of Logarithms and Exponents.

	Feedback
A	Factor, then apply the Inverse Properties of Logarithms and Exponents.
B	Factor, then apply the Inverse Properties of Logarithms and Exponents.
C	Apply the Inverse Properties of Logarithms and Exponents; this is the base, not the answer.
D	Correct!

5. B

Method 1 Change to base 10.

$$\log_9 243 = \frac{\log 243}{\log 9} = \frac{2.3856}{0.9542} \quad \text{Use a calculator.}$$

$$\log_9 243 = 2.5$$

Method 2 Change to base 3, because both 9 and 243 are powers of 3.

$$\log_9 243 = \frac{\log_3 243}{\log_3 9} = \frac{5}{2} = 2.5$$

	Feedback
A	To find the base b logarithm of a number n , divide the base 10 logarithm of n by the base 10 logarithm of b .
B	Correct!
C	To find the base b logarithm of a number n , divide the base 10 logarithm of n by the base 10 logarithm of b .
D	To find the base b logarithm of a number n , divide the base 10 logarithm of n by the base 10 logarithm of b .

6. A

$$3.6 = -\left(\frac{100}{9}\right) \log_{31} \frac{P}{31}$$

Substitute 3.6 for h .

$$-\frac{9}{100} (3.6) = \log_{31} \frac{P}{31}$$

Multiply both sides by $-\frac{9}{100}$.

$$-0.324 = \log_{31} \frac{P}{31}$$

Simplify.

$$-0.324 = \log P - \log 31$$

Apply the Quotient Property of Logarithms.

$$-0.324 = \log P - 1.491$$

Calculate.

$$1.167 = \log P$$

Add 1.491 to both sides.

$$P = 10^{1.167}$$

Apply the Inverse Property of Exponents and Logarithms.

$$P \approx 14.7$$

Calculate.

	Feedback
A	Correct!
B	You are given B , the pressure at sea level, and need to find P .
C	Use the Inverse Property of Exponents and Logarithms.
D	Use the fact that $\log(a/b) = \log a - \log b$.

7. B

$$\log_7 x^3 - \log_7 x$$

$$= 3 \log_7 x - \log_7 x$$

Use the Power Property of Logarithms.

$$= 2 \log_7 x$$

Simplify.

	Feedback
A	To subtract the logarithms, divide x cubed by x .
B	Correct!
C	The logarithm of a power is the product of the exponent and the logarithm of the base.
D	Use the Power Property of Logarithms, and simplify.

8. C

$$\left(2^3\right)^{x+8} = \left(2^5\right)^x$$

Rewrite each side as powers of the same base.

$$2^{3(x+8)} = 2^{5x}$$

To raise a power to a power, multiply the exponents.

$$3(x+8) = 5x$$

The bases are the same, so the exponents must be equal.

$$x = 12$$

The solution is $x = 12$.

	Feedback
A	Rewrite each side as powers of the same base and then set the exponents equal.
B	Rewrite each side as powers of the same base and then set the exponents equal.
C	Correct!
D	Rewrite each side as powers of the same base and then set the exponents equal.

9. A

$$900 = 300(1.005)^{12t}$$

$$3 = 1.005^{12t}$$

$$\log 3 = \log 1.005^{12t}$$

$$\log 3 = (12t) \log 1.005$$

$$\frac{\log 3}{12 \log(1.005)} = t$$

$$t = 18.36$$

$$t \approx 19 \text{ years}$$

Write 900 for the amount.

Divide both sides by 300.

Take the log of both sides.

Use the Power Property.

Divide by $12 \log(1.005)$.

Evaluate with a calculator.

Round to the next year.

	Feedback
A	Correct!
B	First divide by 300, then take the log of both sides. Use the Power Property to solve for t .
C	First divide by 300, then take the log of both sides. Use the Power Property to solve for t .
D	First divide by 300, then take the log of both sides. Use the Power Property to solve for t .

10. D

$$\log_5 \frac{x^{10}}{x^6} = 21$$

Apply the Quotient Property.

$$\log_5 x^4 = 21$$

Simplify.

$$4 \log_5 x = 21$$

Use the Power Property.

$$\log_5 x = \frac{21}{4}$$

Divide.

$$5^{\log_5 x} = 5^{\frac{21}{4}}$$

Use 5 as the base for both sides.

$$x = 5^{\frac{21}{4}}$$

Use inverse properties.

	Feedback
A	Use the base of the logarithm when solving.
B	Isolate the logarithm before using the inverse property.
C	Use the base of the logarithm when solving.
D	Correct!

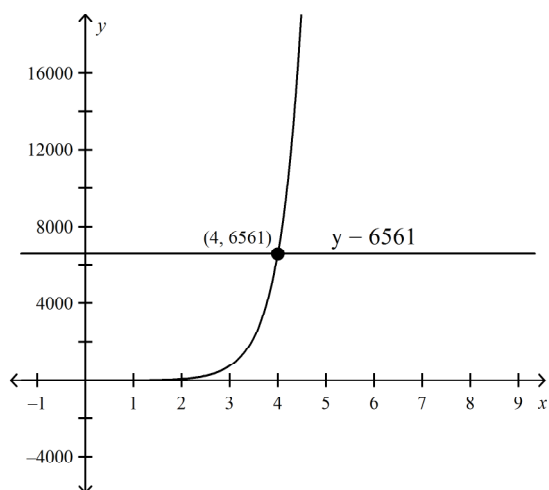
11. B

Use a graphing calculator. Enter 3^{2x} as Y1 and 6561 as Y2. Use the table to locate the value of x where $Y1 = Y2$.

X	Y1	Y2
1	9	6561
2	81	6561
3	729	6561
4	6561	6561
5	59049	6561

←

The graph shows $x = 4$ as the point of intersection of Y1 and Y2.



	Feedback
A	Solve for x , not the exponent.
B	Correct!
C	Graph the intersection of $y = 6561$ and $y = 3^{(2x)}$.
D	The base is 3 and the exponent is $2x$.