**49.** What is the value of  $log_2 8$ ?

A. 3B. 4C. 6

**D.** 10

**E.** 16

**60.** What is the real value of x in the equation  $log_2 24 - log_2 3 = log_5 x$ ?

**F.** 3

**G.** 21

**H.** 72

**J.** 125

**K.** 243

## **17.** What is the value of $log_464$ ?

- **a.** 3
- **b.** 16
- **c.** 2
- **d.** –4
- **e.** 644

**27.** If  $\log_3 x = 2$ , then x = ?

- **a.** 6
- **b.** 9
- **c.**  $\frac{2}{3}$
- **d.** 4
- **e.**  $\frac{1}{2}$

- **49.** In the real numbers, what is the solution of the equation  $8^{2x+1} = 4^{1-x}$ ?
  - **A.**  $-\frac{1}{3}$
  - **B.**  $-\frac{1}{4}$
  - C.  $-\frac{1}{8}$
  - **D.** 0
  - **E.**  $\frac{1}{7}$

53. Whenever x, y, and z are positive real numbers, which of the following expressions is equivalent to  $2 \log_3 x + \frac{1}{2} \log_6 y - \log_3 z$ ?

A. 
$$\log_3\left(\frac{x^2y}{z}\right)$$

**B.** 
$$\log_3\left(\frac{x^2}{z}\right) + \log_6(\sqrt{y})$$

C. 
$$\log_3\left(\frac{z}{x^2}\right) + \log_6\left(\frac{y}{2}\right)$$

**D.** 
$$\log_3(x-z) + \log_6(\sqrt{y})$$

$$\mathbf{E.} \quad 2 \log_3(x-z) + \log_6\left(\frac{y}{2}\right)$$

27

## Which of the following is a value of x that satisfies $log_X 25=2$ ?

## Possible Answers:

4
12.5
5
125
10



## Correct answer:

## **Possible Answers:**



1.68794

1.36903

1.39794

1.69897



## Correct answer:

1.69897

## Explanation:

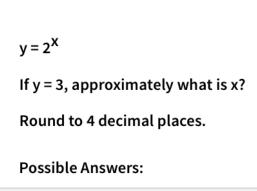
Using properties of logs:

$$\log(xy) = \log x + \log y$$

$$\log (x^n) = n \log x$$

log 10 = 1

So  $\log 50 = \log (10 * 5) = \log 10 + \log 5 = 1 + 0.69897 = 1.69897$ 



1.5850

0.6309

1.3454

2.0000

1.8580



## Correct answer:

1.5850

## Explanation :

To solve, we use logarithms. We log both sides and get:  $log3 = log2^{X}$ 

which can be rewritten as log3 = xlog2

Then we solve for x: x = log 3/log 2 = 1.5850...

## Evaluate

log<sub>3</sub>27

## **Possible Answers:**

3

30

9

10

27



## Correct answer:

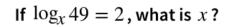
3

## Explanation:

You can change the form to

$$3^{X} = 27$$

$$x = 3$$



## **Possible Answers:**

0

10

2401

24.5



## Correct answer:

7

## Explanation:

If 
$$\log_x y = z$$
, then  $x^z = y$ 

$$x^2 = 49$$

$$x = 7$$

# If $log_4 x = 2$ , what is the square root of x?

## Possible Answers:

3

16

4

12

2



## Correct answer:

7

## Explanation :

Given  $log_4x = 2$ , we can determine that 4 to the second power is x; therefore the square root of x is 4.



 $\log_2 24 - \log_2 3 = \log_X 27$ 

#### Possible Answers:

3

**-**2

C

2

1



## **Correct answer:**

3

## Explanation:

Since the two logarithmic expressions on the left side of the equation have the same base, you can use the quotient rule to re-express them as the following:

$$\log_2 24 - \log_2 3 = \log_2 (24/3) = \log_2 8 = 3$$

Therefore we have the following equivalent expressions, from which it can be deduced that x = 3.

 $\log_X 27 = 3$ 

### Solve for x in the following equation:

 $\log_2 24 - \log_2 3 = \log_X 27$ 

#### Possible Answers:

3

**-**2

9

2

1



#### **Correct answer:**

3

## Explanation:

Since the two logarithmic expressions on the left side of the equation have the same base, you can use the quotient rule to re-express them as the following:

$$\log_2 24 - \log_2 3 = \log_2 (24/3) = \log_2 8 = 3$$

Therefore we have the following equivalent expressions, from which it can be deduced that x = 3.

$$\log_X 27 = 3$$

$$x^3 = 27$$

## What value of x satisfies the equation $\log_x 64 = 2$ ?

## **Possible Answers:**

6

2

4

8

10



## Correct answer:

8

## **Explanation**:

The answer is  ${\bf 8}$ .

 $\log_x 64 = 2$  can by rewritten as  $x^2 = 64$ .

In this form the question becomes a simple exponent problem. The answer is 8 because  $8^2 = 64$ .

If  $\log_2 64 = x$ , what is x?

## **Possible Answers:**

3

6

4

5

7



## **Correct answer:**

6

## Explanation:

Use the following equation to easily manipulate all similar logs:

 $\log_a b = x$  changes to  $a^x = b$ .

Therefore,  $\log_2 64 = x$  changes to  $2^x = 64$ .

2 raised to the power of 6 yields 64, so x must equal 6. If finding the 6 was difficult from the formula, simply keep multiplying 2 by itself until you reach 64.

## Which of the following is a value of x that satisfies $\log_x 64 = 2$ ?

#### Possible Answers:

8

4

2

32

16



## Correct answer:

8

## Explanation :

The general equation of a logarithm is  $\log_{\chi} a = b$  , and  $x^b = a$ 

In this case,  $x^2 = 64$ , and thus x = 8 (or -8, but -8 is not an answer choice)

How can we simplify this expression below into a single logarithm?

$$3log(x) + \frac{1}{2}log(4y) - log(z)$$

#### **Possible Answers:**

$$log(2x^3 + y^{\frac{1}{2}} - z)$$

$$log(\frac{4x^3y^{\frac{1}{2}}}{z})$$

Cannot be simplified into a single logarithm

$$\frac{3}{2}log(\frac{4xy}{z})$$

$$log(\frac{2x^3y^{\frac{1}{2}}}{z})$$



Correct answer:

$$log(\frac{2x^3y^{\frac{1}{2}}}{7})$$

#### Explanation:

Using the property that  $log(x^n) = nlog(x)$ , we can simplify the expression to  $log(x^3) + log((4y)^{\frac{1}{2}}) - log(z)$ .

Given that 
$$log(xy) = log(x) + log(y)$$
 and  $log(\frac{x}{y}) = log(x) - log(y)$ 

We can further simplify this equation to  $log(\frac{2x^3y^{\frac{1}{2}}}{z})$ 

What is the value of  $\log_2(64)$ ? Round to the nearest hundredth.

<b>Possib</b>	le A	۱ns	wers
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1.81

4.5

4.16

7

6



#### Correct answer:

6

## Explanation:

You could solve this by using your calculator. Remember that you will have to translate this into:

## $\frac{log(64)}{log(2)}$

Another way you can solve it is by noticing that  $64 = 2^6$ 

This means you can rewrite your logarithm:

 $log_2(2^6)$ 

Applying logarithm rules, you can factor out the power:

$$log_2(2^6) = 6log_2(2)$$

For any value n,  $log_n(n) = 1$ . Therefore,  $log_2(2) = 1$ . So, your answer is 6.

#### Solve for x

$$5^{x+1} = 60.$$

Round to the nearest hundredth.

#### **Possible Answers:**

3.73

1.75

1.54

2.54

4.73



#### Correct answer:

1.54

## Explanation:

To solve an exponential equation like this, you need to use logarithms. This can be translated into:

$$log5(60) = x + 1$$

Now, remember that your calculator needs to have this translated. The logarithm log 5(60) is equal to the following:

$$\frac{log(60)}{log(5)}$$
 , which equals approximately  $2.54\,.$ 

Remember that you have the equation:

$$2.54 = x + 1$$

Thus, x = 1.54.

### Solve the following equation

$$3^{2x-4} = 44$$
.

#### Possible Answers:

7.31

4

2.11

3.44

3.72



## Correct answer:

3.72

#### Explanation:

In order to solve a question like this, you will need to use logarithms. First, start by converting this into a basic logarithm:

$$log 3(44) = 2x - 4$$

Recall that you need to convert  $log_3(44)$  for your calculator:

 $\frac{log(44)}{log(3)}$  , which equals approximately 3.44

Thus, you can solve for x:

$$3.44 = 2x - 4$$

$$2x = 7.44$$

$$x = 3.72$$

At the end of each year, an account compounds interest at a rate of 4.5%. If the account began with \$1400, how many years will it take for it to reach a value of \$5000, presuming no withdrawals or deposits occur?

Possible Answers:

28

40

39

21

29



Correct answer:

29

#### Explanation:

The general function that defines this compounding interest is:

 $value = 1.045^{t} * 1400$ , where t is the number of years.

What we are looking for is:

$$1.045^t * 1400 = 5000$$

You can solve this using a logarithm. First, isolate the variable term by dividing both sides:

$$1.045^t = \frac{5000}{1400}$$

Which is:

$$1.045^t = \frac{25}{7}$$

Next, recall that this is the logarithm:

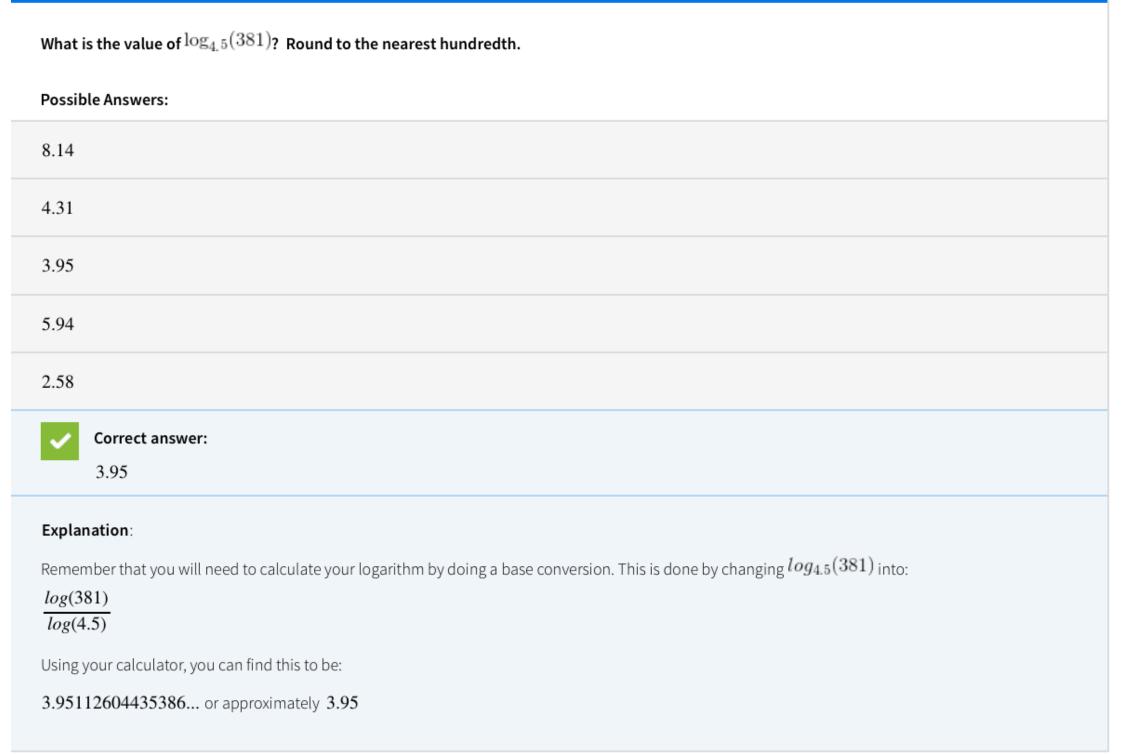
$$t = log_{1.045}(\frac{25}{7})$$

For this, you will need to do a base conversion:

$$log_{1.045}(\frac{25}{7}) = \frac{log(\frac{25}{7})}{log(1.045)}$$

This is 28.9199397858296...

This means that it will take 29 years. 28 is too few and at the end of 29, you will have over 5000.



if  $log_4(16) = x$ , what is  $log_2(x)$ ?

### **Possible Answers:**

x = 2

x = 0

x = 1/2

x = 4

x = 1



## Correct answer:

x = 1

## Explanation:

The first step of this problem is to find

 $log_4(16)$  by expanding to the formula

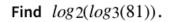
$$4^{y} = 16$$
.

y is found to be 2. The next step is to plugy in to the second log.

 $log_2(2)$ , which expands to

$$2^x = 2$$
,

x = 1





x = 0

x = 1

x = 1/3

x = 2

x = 1/2



## Correct answer:

x = 2

## Explanation:

log3(81)

expands to

$$3^y = 81, y = 4$$

log2(4)

expands to

$$2^x = 4, x = 2$$

### Simplify:

 $\log a^2 + \log b + \log c^3$ .

#### **Possible Answers:**

 $\log\left(\frac{2ab}{3c}\right)$ 

 $\log\left(\frac{ab}{c}\right)$ 

 $\log (a^2bc^3)$ 

 $\log\left(\frac{a^2b}{c}\right)$ 

 $\log (6abc)$ 



## Correct answer:

$$\log\left(\frac{2ab}{3c}\right)$$

## Explanation:

Here, we need to make use of some logarithm identities:  $\log(a^n) = n * \log(a) log(a) + \log(b) = \log(ab)$ 

and 
$$log(a) - log(b) = log(\frac{a}{b})$$
.

Therefore, putting all of those things together, we get the final answer of  $\log a^2 + \log b + \log c^3 = \log(\frac{2ab}{3c}).$ 

Ιf

$$\log_4 x = \frac{5}{2},$$

then what is x?

#### **Possible Answers:**

16

8

64

32

128



## Correct answer:

32

## Explanation:

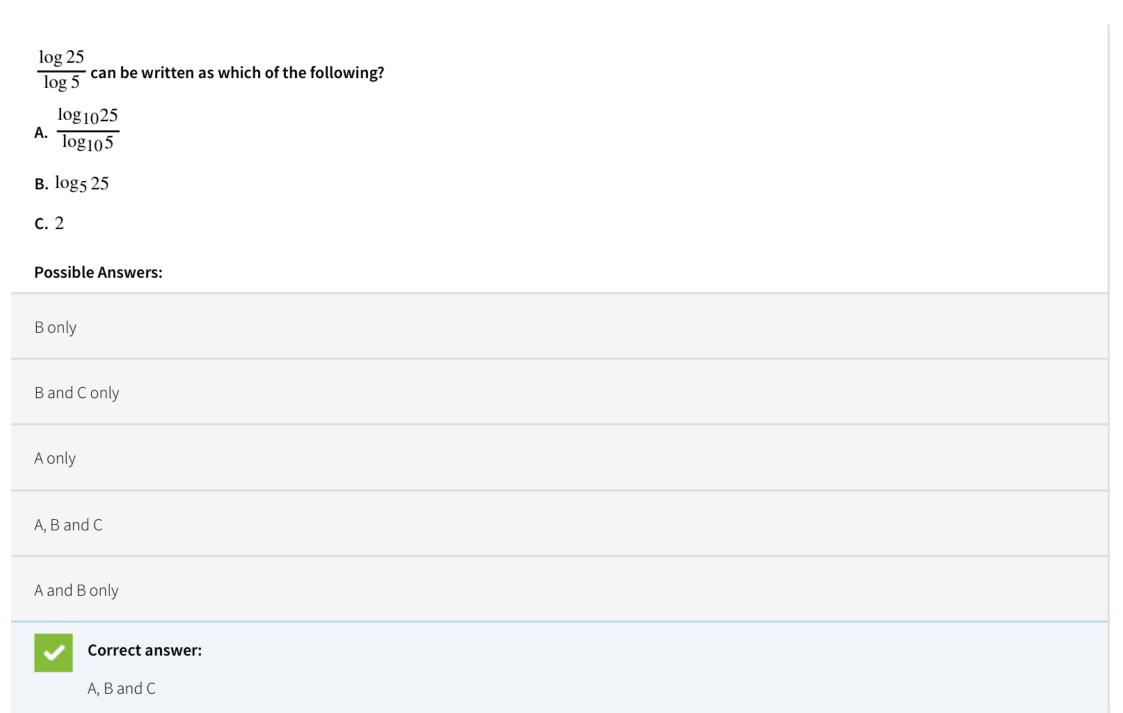
This is a test of translating logarithmic/exponential properties, with the key here being to realize that

$$\log_4 x = \frac{5}{2}$$
 is equivalent to  $x = 4^{5/2}$ .

With that in mind, here is how it works out:

$$4^{5/2} = (\sqrt[2]{4})^5 = 2^5 = 2 * 2 * 2 * 2 * 2 = 32$$

Hence, x = 32.



log 25	
log 5	can be written as which of the following?

A. 
$$\frac{\log_{10}25}{\log_{10}5}$$

B. log<sub>5</sub> 25

**c.** 2

#### Possible Answers:

B only

B and C only

A only

A, B and C

A and B only



#### Correct answer:

A, B and C

#### Explanation:

A is true in two ways. You can use the fact that if a logarithm has no base, you can use base 10, or you can use the fact that you can use this property:

$$\log_a b = \frac{\log_c b}{\log_c a}$$

B is a simple change of base application, and C is simply computing the logarithm.

$$\log_5 25 = \frac{\log_{10} 25}{\log_{10} 5}$$

$$\log_5 25 \to \log_a b = c \to a^c = b$$

log<sub>5</sub> 25

$$5^x = 25$$

$$5^2 = 25$$

$$x = 2$$