



hp calculators

HP 10BII Logarithmic and exponential functions

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Practice solving problems involving logarithmic and exponential functions



### Logarithmic and exponential functions

The HP 10BII can solve basic problems involving logarithms and exponential problems using the built-in  $\ln$  and  $e^x$  functions. These functions compute the natural logarithm and exponential functions.

Before calculators like the HP 10BII became easily available, logarithms were commonly used to simplify multiplication. They are still used in many subjects, to represent large numbers, solve for unknowns in certain equations and in number theory.

Natural logarithms are also called "log to base  $e$ " and the natural logarithm of a number "x" is written  $\ln x$ .

### Practice solving problems involving logarithmic and exponential functions

Example 1: What is the value of X, in the equation:  $2^x = 8$ ?

Solution: To solve this example, we'll apply one of the properties of logarithms which states that the logarithm of an base taken to a power is equal to the power multiplied by the log of the base. This involves taking the logarithm of both sides of the equation. The original equation would then look like this:

$$X \ln(2) = \ln(8) \quad \text{Figure 1}$$

X is therefore equal to:

$$X = \frac{\ln(8)}{\ln(2)} \quad \text{Figure 2}$$

$$\boxed{8} \boxed{\ln} \boxed{\div} \boxed{2} \boxed{\ln} \boxed{=}$$

Answer: The value of X is 3.

Example 2: Find  $e^{4.5}$ .

$$\boxed{4} \boxed{\cdot} \boxed{5} \boxed{e^x}$$

Answer: 90.02.

Example 3: Evaluate:  $5000 = 4000(1 + 0.05)^N$

Solution: First, rearrange the equation so that the part of the expression taken to the power of "N" is isolated on one side of the equal side.

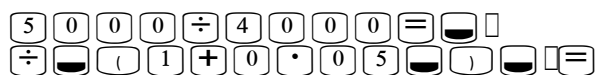
$$\frac{5000}{4000} = (1 + 0.05)^N$$

Then, take the logarithm of each side.

$$LN\left(\frac{5000}{4000}\right) = N \times LN(1 + 0.05)$$

Finally, rearrange the equation so that N is by itself and solve for N.

$$\frac{LN\left(\frac{5000}{4000}\right)}{LN(1 + 0.05)} = N$$



Answer: 4.57