Using the log_{ab}(Feature.

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Select the **RUN/MAT** icon from the **Main Menu** by using the arrow keys to highlight the **RUN/MAT** icon followed by [**EXE**] or by pressing the [1] key.



Logarithms were developed in the 17th century by Scottish mathematician, John

Napier. A method used to turn a multiplication problem into an addition problem (and reducing division into a subtraction problem). The use of logarithms has made many branches of mathematics much easier to calculate. When **calculus** was developed later, logarithms became central to solving differential and integral **calculus** problems. Logarithms are still important in many fields of science and engineering and economics, even though we use calculators for most calculations now-a-days.

Use of the **Solve** feature in the **Run/Mat** icon. **Menu trail is:** [**OPTN**] then [**F4**] for CALC, then [**F1**] for Solve, type in the equation, then [,] followed by [**X**] then [)] and [**EXE**] to solve the equation.

Exponential Laws	Logarithm Laws	
$x^a \cdot x^b = x^{a+b}$	$\log(ab) = \log(a) + \log(b)$	
$\frac{x^a}{x^b} = x^{a-b}$	$\log\left(\frac{a}{b}\right) = \log(a) - \log(b)$	
$(x^{a})^{b} = x^{ab}$	$\log(a^b) = b \cdot \log(a)$	
$x^{-a} = \frac{1}{x^a}$	$\log_n\left(\frac{1}{x^n}\right) = -\alpha$	
$x^{0} = 1$	$\log_x 1 = 0$	

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In general: Solve(equation, variable)

Example 1: Solve $(3x = 2x - 8, x)$ Solve $(3x=2x-8, x)$ -8	Example 2: Solve $(3 = 2\ln(x) - 8, x)$ Solve $(3=2\ln \frac{x-8, x}{244.6919323}$	Example 3: Solve($Ln(x) = 2Ln(x) - 8, x$) Solve(ln X=2ln X-8, X) 2980.957987
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Working:		
3x = 2x - 8	$3 = 2\ln(x) - 8$	Ln(x) = 2Ln(x) - 8
3x - 2x = 2x - 2x - 8	$3 + 8 = 2\ln(x) - 8 + 8$	Ln(x) + 8 = 2Ln(x) - 8 + 8
1x = -8	$11 = 2\ln(x)$	Ln(x) + 8 = 2Ln(x)
x = -8	$11/2 = 2\ln(x)/2$	Ln(x) + 8 - ln(x) = 2Ln(x) - ln(x)
	$5.5 = \ln(x)$	8 = Ln(x)
	$e^{5.5} = e^{\ln(x)}$	$e^8 = e^{\ln(x)}$
	$e^{5.5} = x$	$e^8 = x$
	11 1 10 1	

This is great if the base of the logarithm is either 10 or *e*!

The FX9750GII has a 'logab(' function, which means that any base can be used to solve a logarithmic equation in any base.

Menu trail is: [OPTN] then [F4] for CALC, then [F6] for More choices and [F4] for logab(.

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For instance entering $\log_5 25$, bring up **logab(, as above,** then 5 followed by a comma [,] then 25, lastly [)].

Answer is 2, as
$$5^2 = 25$$

logab(5,25)	2
FMin FMax 2(logab	

Example 1:			Checking:
(a) Find the value of $\log_2 1024$. Equation is: $\log_2 1024 = x$	Solve(logab(2,1024)=X ,X) 10		2^10 1024
	FMin FMax Z(logab D	<i>x</i> = 10	PMAT
(b) Find the value of x, if $x = \log_3 81$. Equation is: $\log_3 81 = x$	Solve(logab(3,81)=X,X) 4		3^4 81
	FMin FMàx 20 logab D	<i>x</i> = 4	PMA7
(c) Solve the equations $\log_x 64 = 3$. Equation is: $\log_x 64 = 3$	Solve(logab(X,64)=3,X) 4		4^3 64
	FMin FMax 20 logab D	x = 4	PMA7
(d) Solve the equation $\log_x 343 = 3$ Equation is: $\log_x 343 = 3$	Solve(logab(X,343)=3, X) 7		7^3 343
	FMin FMax 20 logab D	<i>x</i> = 7	EMAP
Example 2: Solve the equation $\log_4(3w + 1) = 2$. Equation is: $\log_4(3x + 1) = 2$	Solve(losab(4,3X+1)=2 ,X) 5		4^2 16 3×5+1 16
	FMin FMáx 20 logab D	<i>x</i> = 5	FINAT
Also using the ' Solve ' feature for equations wi	th exponents.		
(a) Solve the equation $5^x \times 2^{-2x} = 15$	Solve(5^XX2^(-2X)=15,		log 15÷(log 5-2log 2)
Equation is:	12.13591065		12.13591065
	Solve alana alan jurax solun 🕞 🕞	<i>x</i> = 12.136 (3 d.p.)	<u>EMA</u> 7
(b) Solve the equation $3 \times 2^{2x+1} = 96 \times 8^x$ Equation is:	Solve(3×2^(2X+1)=96×8 ^X,X) -4		3×2^(2×-4+1) 96×8^-4 0.0234375 0.0234375
	Solve avaz avaz graz solvn 🕞 🗖	<i>x</i> = -4	FWAT
Note: This logab(feature can also be used in the second s	he Graph icon.		
Menu trail: Graph Func : Y= V2: V2: V3: V4: V5: V6: V6: V6: V6: V6: V6: V7:	Graph Func : Y Y1=logab(Y2: Y3: Y4: Y5: Y6: CALC then [F4] for lo	<u>F ∎ X W B</u> M B L L L L L L L L L L L L L L L L L L	
For example: Sketch $y = \log_2 x$	S ^{Y=} []		
As above then: then type in 2 [,] then [X] and [EXE].		<i>(</i>	

A practice link: <u>http://www.intmath.com/exponential-logarithmic-functions/3-logarithm-laws.php</u>

For further tips, more helpful information and software support visit our websites <u>www.casio.edu.monacocorp.co.nz</u> or <u>http://graphic-technologies.co.nz</u>