

Math 002 – Hints For Logarithmic Function Graphs

So far we know the graph of $y = f(x) = \log_a x$ and we will be able to graph the following :

- $y = f(-x) = \log_a(-x)$: By reflecting the graph of $y = f(x)$ across the y-axis .
- $y = -f(x) = -\log_a x$: By reflecting the graph of $y = f(x)$ across the x-axis .
- $y = f(|x|) = \log_a |x|$: By joining the graph of $y = f(x)$ and $y = f(-x)$.
- $y = |f(x)| = |\log_a x|$: By reflecting only the negative part of the graph of $y = f(x)$ across the x-axis and keeping the positive part as it is .
- $y = \left| f(|x|) \right| = \left| \log_a |x| \right|$: By reflecting only the negative part of the graph of $y = f(|x|)$ across the x-axis and keeping the positive part as it is .
- $y = f(x - b) = \log_a(x - b)$: By translating the graph of $y = f(x)$, $|b|$ units to the right if $b > 0$ and to the left if $b < 0$. For example to graph $y = \log(x - 3)$, just translate the graph of $y = \log x$, 3 units to the right .
- $y = f(b - x) = \log_a(b - x)$: By reflecting the graph of $y = f(x - b)$ across the line $x = b$. For example to graph $y = \log(2 - x)$, first graph $y = \log(x - 2)$, then reflect this graph across the line $x = 2$.
- $y = f(|x - b|) = \log_a |x - b|$: By joining the graph of $y = f(x - b)$ and $y = f(b - x)$. For example to graph $y = \log|x + 1|$, just join the graph of $y = \log(x + 1)$ and $y = \log -(x + 1)$.
- $y = \left| f(|x - b|) \right| = \left| \log_a |x - b| \right|$: By reflecting only the negative part of the graph of $y = f(|x - b|)$ across the x-axis and keeping the positive part as it is .
- $y = f(x) + c = \log_a x + c$: By translating the graph of $y = f(x)$, $|c|$ units upward if $c > 0$ and downward if $c < 0$. For example to graph $y = \log(x) - 5$, just translate the graph of $y = \log x$, 5 units downward .
- $y = f(x - b) + c = \log_a(x - b) + c$: First by translating the graph of $y = f(x)$, $|b|$ units to the right if $b > 0$ and to the left if $b < 0$, then translate the new graph , $|c|$ units upward if $c > 0$ and downward if $c < 0$. For example to graph $y = \log(x + 2) + 3$, first translate the graph of $y = \log x$, 2 units to the left , then translate the graph of $y = \log(x + 2)$, 3 units upward .

We may have more types of log. func. graphs which can be done by using these hints or combination of some of them .

BY : A . AL-SHALLALI