LESSON MAKER PRO

Log Curve Clues

Sketch curves, mark intercepts, and track their ends.

HIGH SCHOOL · A2S.AF.H.20.c

A2S.AF.H.20.c "Graph logarithmic functions expressed symbolically, showing intercepts and end behavior."

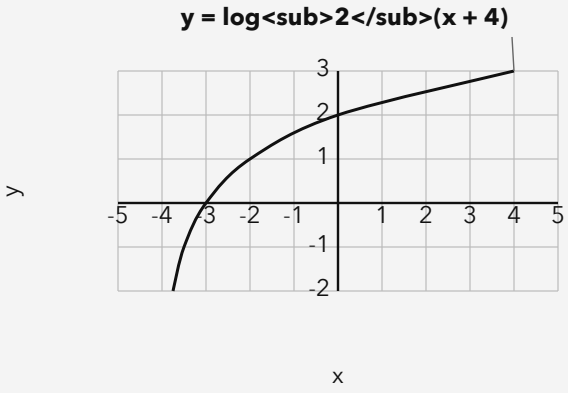
NAME _____ DATE _____

GRAPHING CLUES

For $y = \log_b(u)$, the graph exists only where $u > 0$. Set $y = 0$ to find an x-intercept, use $x = 0$ for a y-intercept if it is in the domain, and check what happens as u approaches 0.

WORKED EXAMPLE

The grid shows $y = \log_2(x + 4)$. Find its intercepts and describe its end behavior.



1. Set $y = 0$: $x + 4 = 1$, so $x = -3$.
2. Set $x = 0$: $y = \log_2(4) = 2$.
3. The graph approaches $x = -4$ from the right and keeps rising to the right.

Answer: Intercepts: (-3, 0) and (0, 2). As x approaches -4 from the right, y decreases without bound; as x increases without bound, y increases without bound.

PRACTICE 4 problems

1 Sketch $y = \log_3(x - 2)$. Mark its intercepts and vertical asymptote. Describe both ends.

ANSWER _____

2 Sketch $y = \log_5(x + 1) - 1$. Mark its intercepts and vertical asymptote. Describe both ends.

ANSWER _____

3 Sketch $y = -\log_3(x + 3)$. Mark its intercepts and vertical asymptote. Describe both ends.

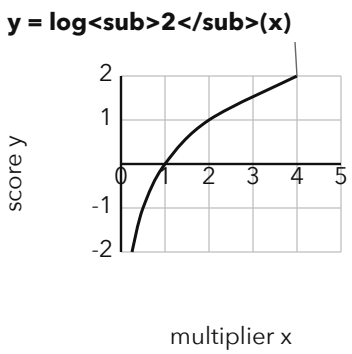
ANSWER _____

4 Sketch $y = \log_3(9 - x)$. Mark its intercepts and vertical asymptote. Describe both ends.

ANSWER _____

APPLY IT Show your work

1 An audio app graphs score $y = \log_2(x)$, where x is a sound intensity multiplier. Use the graph to name its intercepts and describe what happens near $x = 0$ and as x grows.



ANSWER _____

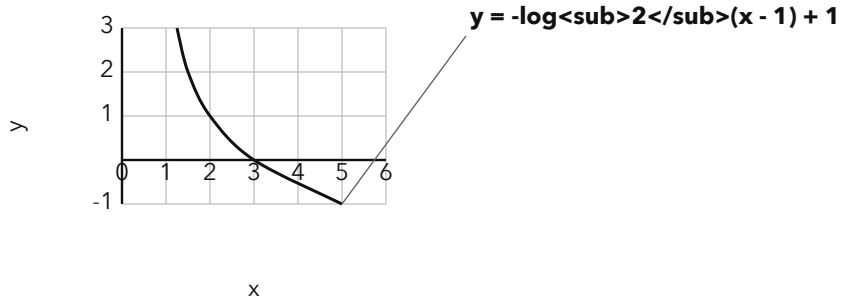
2 A video app assigns a reach score $y = \log_5(x/25)$, where x is daily views in thousands. Sketch the graph. Mark its intercepts and describe what happens as views approach 0 and as they grow.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The grid shows $y = -\log_2(x - 1) + 1$. A student claims it crosses the y-axis at (0, 2). Explain the error. Give the actual intercept and describe both ends.



WORK SPACE AND ANSWER

Log Curve Clues

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Sketch $y = \log_3(x - 2)$. Mark its intercepts and vertical asymptote. Describe both ends.	**x-intercept (3, 0); no y-intercept; asymptote x = 2. As x approaches 2 from the right, y decreases without bound; as x increases without bound, y increases without bound.**
2	Sketch $y = \log_5(x + 1) - 1$. Mark its intercepts and vertical asymptote. Describe both ends.	**Intercepts (4, 0) and (0, -1); asymptote x = -1. As x approaches -1 from the right, y decreases without bound; as x increases without bound, y increases without bound.**
3	Sketch $y = -\log_3(x + 3)$. Mark its intercepts and vertical asymptote. Describe both ends.	**Intercepts (-2, 0) and (0, -1); asymptote x = -3. As x approaches -3 from the right, y increases without bound; as x increases without bound, y decreases without bound.**
4	Sketch $y = \log_3(9 - x)$. Mark its intercepts and vertical asymptote. Describe both ends.	**Intercepts (8, 0) and (0, 2); asymptote x = 9. As x approaches 9 from the left, y decreases without bound; as x decreases without bound, y increases without bound.**

PART 2 · APPLY IT

1. **The x-intercept is (1, 0); there is no y-intercept. As x approaches 0 from the right, y decreases without bound; as x increases without bound, y increases without bound.** The score is 0 when the multiplier is 1. The domain is $x > 0$, so the graph approaches the y-axis but never crosses it.
2. **The x-intercept is (25, 0); there is no y-intercept. As x approaches 0 from the right, y decreases without bound; as x increases without bound, y increases without bound.** Set $x/25 = 1$ for a score of 0, giving $x = 25$. The domain is $x > 0$, so the graph approaches but does not reach the y-axis.

CHALLENGE

x = 0 is outside the domain x > 1, so there is no y-intercept. The x-intercept is (3, 0). As x approaches 1 from the right, y increases without bound; as x increases without bound, y decreases without bound.

Accept freehand curves with the correct domain, intercepts, and end behavior. Students may name the vertical asymptote instead of describing the nearby end in words.