LESSON MAKER PRO

Graphs at a Glance

Find intercepts and end behavior of exponential and logarithmic functions.

HIGH SCHOOL · F.IF.7e

F.IF.7e "Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph exponential and logarithmic functions, showing intercepts and end behavior."

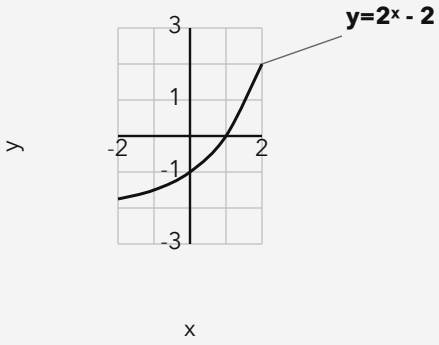
NAME _____ DATE _____

KEY FEATURES

For an exponential function, a constant added after the power gives the horizontal line the graph approaches. For a logarithmic function, the input approaches zero at a vertical boundary. Find intercepts by setting y=0 or x=0.

WORKED EXAMPLE

Use the graph of $y=2^x - 2$. Find the x-intercept and describe both ends.



1. The curve crosses the x-axis at (1, 0).
2. To the left, it approaches y=-2.
3. To the right, y increases without bound.

Answer: x-intercept: (1, 0). As x decreases, y approaches -2. As x increases, y increases without bound.

PRACTICE 4 problems

1 For $y=4^x - 1$, find both intercepts.

ANSWER _____

2 For $y=(1/3)^x + 4$, give the y-intercept and what happens as x increases.

ANSWER _____

3 For $y=\log_5(x)$, find both intercepts.

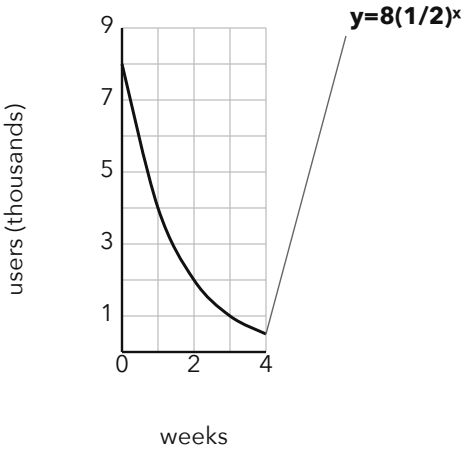
ANSWER _____

4 For $y=\log_4(x - 3)$, find the x-intercept and vertical boundary.

ANSWER _____

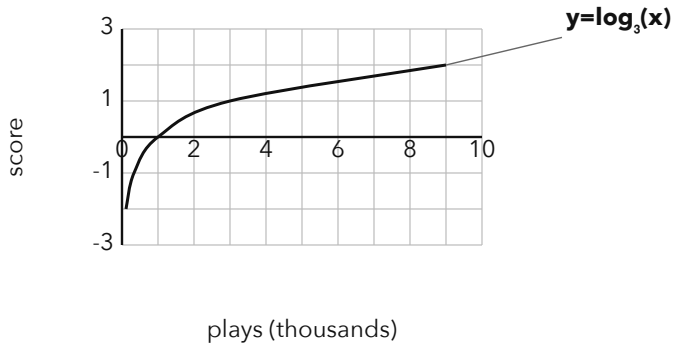
APPLY IT Show your work

1 An app models its weekly users, in thousands, with the graph. Find the y-intercept. What happens to the number of users as weeks pass?



ANSWER _____

2 A music app plots a score against plays in thousands. Use the graph to find the play count for a score of 0. What happens to the score as the play count approaches 0?



ANSWER _____

CHALLENGE One step up

For $y=\log_5(x - 4) + 1$, find the x-intercept and vertical boundary. Describe what happens to y as x approaches that boundary from the right.

WORK SPACE AND ANSWER

ANSWER KEY

Graphs at a Glance

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For $y=4^x - 1$, find both intercepts.	**x-intercept: (0, 0); y-intercept: (0, 0).**
2	For $y=(1/3)^x + 4$, give the y-intercept and what happens as x increases.	**y-intercept: (0, 5). As x increases, y approaches 4 from above.**
3	For $y=\log_5(x)$, find both intercepts.	**x-intercept: (1, 0); no y-intercept.**
4	For $y=\log_4(x - 3)$, find the x-intercept and vertical boundary.	**x-intercept: (4, 0); vertical boundary: x=3.**

PART 2 · APPLY IT

1. **The y-intercept is (0, 8), or 8,000 users at week 0. The model approaches 0 users as weeks pass.** Read the starting value where the curve meets the y-axis. The curve stays above the x-axis and approaches it to the right.
2. **The score is 0 at 1,000 plays. As the play count approaches 0 from above, the score decreases without bound.** The curve crosses the x-axis at x=1 thousand plays. Near x=0, it falls without bound.

CHALLENGE

x-intercept: (21/5, 0); vertical boundary: x=4. As x approaches 4 from the right, y decreases without bound.

Accept "vertical asymptote" for "vertical boundary." Accept "approaches positive infinity" or "approaches negative infinity" where appropriate.