LESSON MAKER PRO

Where Curves Go

Plot points, find intercepts, and follow exponential curves.

GRADE 8 · 8A.AF.J.32.c

8A.AF.J.32.c "Graph exponential functions, showing intercepts and end behavior."

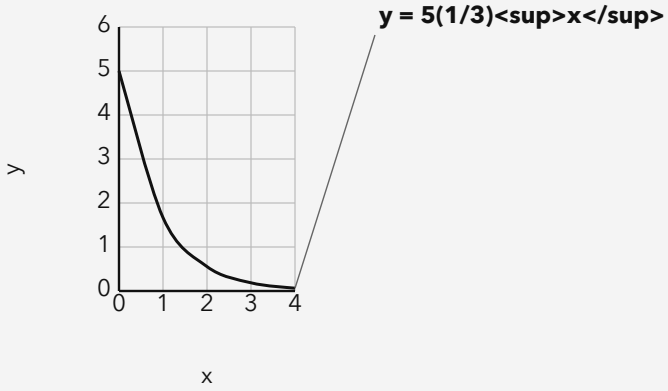
NAME _____ DATE _____

THE BIG IDEA

For $y = a \times b^x$, where a and b are positive and b is not 1, the y-intercept is (0, a) because $b^0 = 1$. The curve stays above the x-axis. One end gets closer to y = 0, while the other rises without bound.

WORKED EXAMPLE

Use the graph. Find its intercepts and describe what happens at both ends.



1. The curve meets the y-axis at (0, 5).
2. It stays above the x-axis, so it has no x-intercept.
3. To the right it approaches y = 0; to the left it rises without bound.

Answer: Y-intercept: (0, 5). No x-intercept. As x increases, y approaches 0; as x decreases, y rises without bound.

PRACTICE 4 problems

1 For $y = 2^x$, list the points at x = 0, 1, and 2. Which is the y-intercept?

ANSWER _____

2 For $y = 4(1/2)^x$, list the points at x = 0, 1, and 2. What happens to y as x increases?

ANSWER _____

3 For $y = 3^x$, give the y-intercept and describe what happens as x moves left and right.

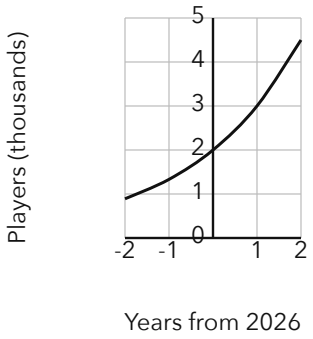
ANSWER _____

4 For $y = 2(1/4)^x$, give both intercepts, if they exist. What happens as x moves right?

ANSWER _____

APPLY IT Show your work

1 A game's player count is shown in thousands. x is years from 2026. Use the graph to find the predicted count in 2026 and describe its long-term trend.



ANSWER _____

2 A used phone's value is shown in hundreds of dollars. x is years since purchase. Use the graph to find its value at purchase and the value it approaches over time.



ANSWER _____

CHALLENGE One step up

Sketch $y = 2^x + 3$ using $x = -1$, 0, and 1. Name its intercepts, if any, and describe what happens at both ends.

WORK SPACE AND ANSWER

Where Curves Go

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For $y = 2^x$, list the points at x = 0, 1, and 2. Which is the y-intercept?	**(0, 1), (1, 2), (2, 4); y-intercept: (0, 1).**
2	For $y = 4(1/2)^x$, list the points at x = 0, 1, and 2. What happens to y as x increases?	**(0, 4), (1, 2), (2, 1); y approaches 0.**
3	For $y = 3^x$, give the y-intercept and describe what happens as x moves left and right.	**Y-intercept: (0, 1). Moving left, y approaches 0; moving right, y rises without bound.**
4	For $y = 2(1/4)^x$, give both intercepts, if they exist. What happens as x moves right?	**Y-intercept: (0, 2); no x-intercept. Moving right, y approaches 0.**

PART 2 · APPLY IT

1. **2,000 players in 2026; the model predicts that the count keeps rising without bound.** At x = 0, the graph shows 2 thousand players. The curve rises as x moves right.
2. **$300 at purchase; its value approaches $0 but does not reach it.** At x = 0, the graph shows 3 hundred dollars. The curve gets closer to the x-axis as time passes.

CHALLENGE

Plot (-1, 7/2), (0, 4), and (1, 5). The y-intercept is (0, 4), and there is no x-intercept. As x decreases, y approaches 3; as x increases, y rises without bound.

Accept equivalent fractions or decimals for plotting points. A correct sketch in the challenge stays above y = 3 and approaches that line on the left.