LESSON MAKER PRO

Where Graphs Meet

Solve exponential equations by finding intersections.

HIGH SCHOOL · MT.CORE.ALG.EXP.5

MT.CORE.ALG.EXP.5 "Solve exponential equations graphically, while using technology strategically."

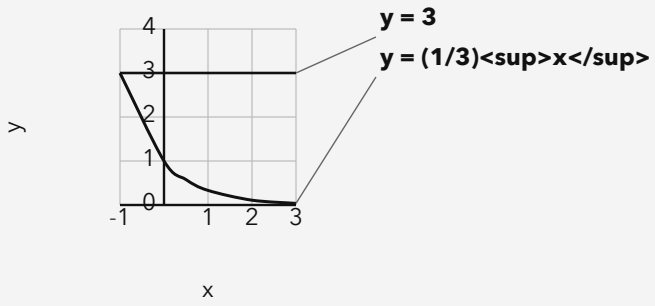
NAME _____ DATE _____

THE INTERSECTION RULE

Graph each side of an equation as its own y-value. The x-coordinate where the graphs cross solves the equation. Use easy points to locate a crossing, then substitute to check it. A graphing app can help check crossings that are hard to locate by hand.

WORKED EXAMPLE

Use the graph to solve $(1/3)^x = 3$.



1. Find where the curve crosses the horizontal line.
2. Read the crossing's x-coordinate: -1.
3. Check: $(1/3)^{-1} = 3$.

Answer: x = -1

PRACTICE 4 problems

1 Where do $y = 2^x$ and $y = 16$ meet? Find x.

ANSWER _____

2 Where do $y = 4^x$ and $y = 1/16$ meet? Find x.

ANSWER _____

3 Where do $y = 10^x$ and $y = 100$ meet? Find x.

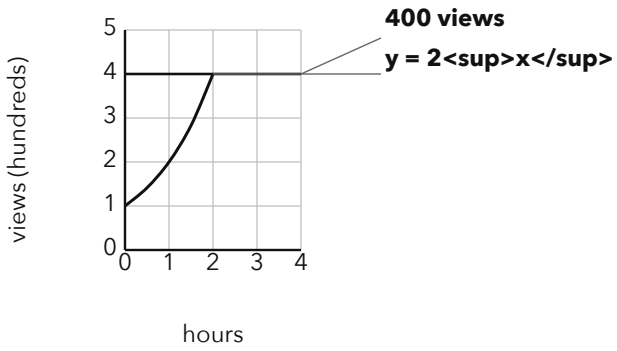
ANSWER _____

4 Where do $y = 8(1/2)^x$ and $y = 1$ meet? Find x.

ANSWER _____

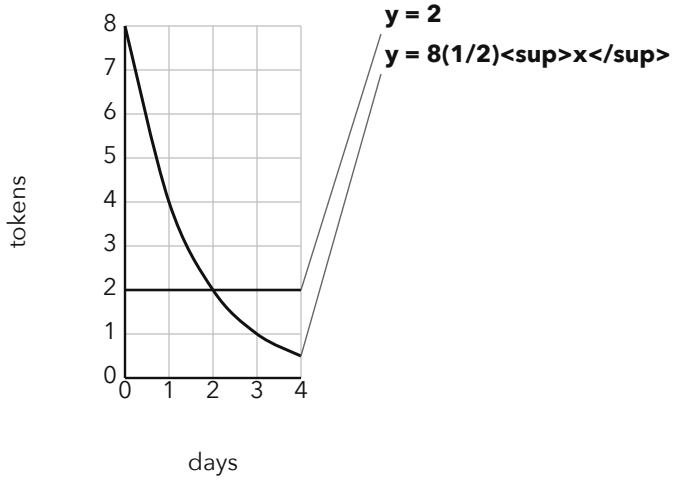
APPLY IT Show your work

1 A clip's views follow $y = 2^x$ hundred, where x is hours since posting. Use the graph to find when the clip reaches 400 views.



ANSWER _____

2 A video game item's value follows $y = 8(1/2)^x$ tokens, where x is days. Use the graph to find when it is worth 2 tokens.



ANSWER _____

CHALLENGE One step up

Solve $2^x = 16(1/2)^x$. Explain why the two graphs meet only once.

WORK SPACE AND ANSWER

ANSWER KEY

Where Graphs Meet

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Where do $y = 2^x$ and $y = 16$ meet? Find x.	**x = 4**
2	Where do $y = 4^x$ and $y = 1/16$ meet? Find x.	**x = -2**
3	Where do $y = 10^x$ and $y = 100$ meet? Find x.	**x = 2**
4	Where do $y = 8(1/2)^x$ and $y = 1$ meet? Find x.	**x = 3**

PART 2 · APPLY IT

1. **2 hours** The graphs cross at (2, 4). At 2 hours, the model gives 4 hundred, or 400, views.
2. **2 days** The graphs cross at (2, 2), so the item is worth 2 tokens after 2 days.

CHALLENGE

x = 2. Both sides equal 4 at x = 2. The graph of 2^x increases as x increases, while the graph of $16(1/2)^x$ decreases, so they cannot meet again.

Accept an intersection coordinate when its x-coordinate is correct. In the challenge, accept any clear explanation that one graph increases while the other decreases.