LESSON MAKER PRO

Root Curve Routes

Plot points, then trace square root and cube root graphs.

HIGH SCHOOL · A2S.AF.H.20.e

A2S.AF.H.20.e "Graph square root and cube root functions expressed symbolically."

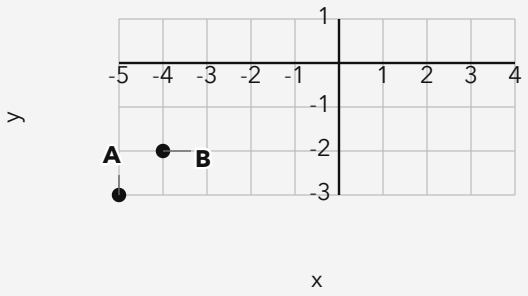
NAME _____ DATE _____

CHOOSE EASY INPUTS

For a square root graph, choose inputs that make the expression inside the root 0, 1, 4, or 9. Its curve starts where that expression is 0. For a cube root graph, use inputs that make the expression inside the root -1, 0, or 1, then draw a smooth curve through the points.

WORKED EXAMPLE

Two points on $y = \sqrt{(x+5)}-3$ are marked. Add two more points and complete the graph.



1. Set x+5=4 and x+5=9. Then x=-1 and x=4.
2. Find y=-1 and y=0. Plot (-1,-1) and (4,0).
3. Draw a smooth curve from A through B and the new points.

Answer: The curve starts at (-5,-3) and passes through (-4,-2), (-1,-1), and (4,0).

PRACTICE 4 problems

1 List the starting point and two other easy-to-plot points for $y = \sqrt{(x-2)}+1$.

ANSWER _____

2 List the starting point and two other easy-to-plot points for $y = -\sqrt{(x+4)}+2$.

ANSWER _____

3 List three easy-to-plot points for $y = 2\sqrt[3]{x}-1$.

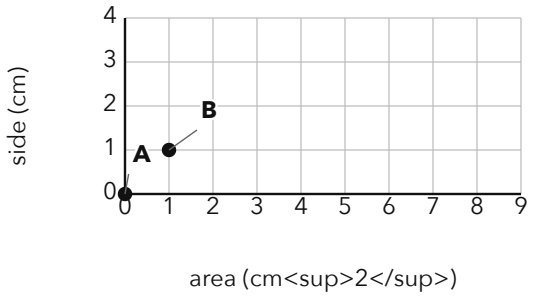
ANSWER _____

4 List three easy-to-plot points for $y = -\sqrt[3]{(x-3)}+1$.

ANSWER _____

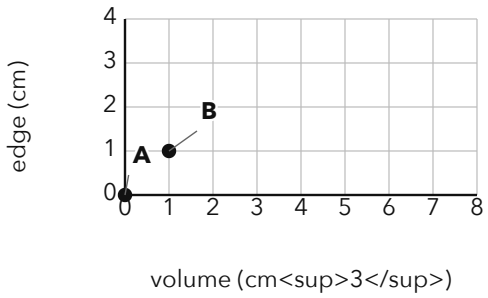
APPLY IT Show your work

1 A square laptop sticker has area x cm^2 and side length $y = \sqrt{x}$ cm. Complete the graph through the marked points for $0 \le x \le 9$. How long is a side when the area is 9 cm^2?



ANSWER _____

2 A cube-shaped game die has volume x cm^3 and edge length $y = \sqrt[3]{x}$ cm. Complete the graph through the marked points for $0 \le x \le 8$. How long is an edge when the volume is 8 cm^3?



ANSWER _____

CHALLENGE One step up

For $y = -2\sqrt[3]{(x+1)}+3$, list three easy-to-plot points. Explain how its graph changes from $y = \sqrt[3]{x}$.

WORK SPACE AND ANSWER

ANSWER KEY

Root Curve Routes

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	List the starting point and two other easy-to-plot points for $y = \sqrt{(x-2)}+1$.	**(2,1), (3,2), (6,3)**
2	List the starting point and two other easy-to-plot points for $y = -\sqrt{(x+4)}+2$.	**(-4,2), (-3,1), (0,0)**
3	List three easy-to-plot points for $y = 2\sqrt[3]{x-1}$.	**(-1,-3), (0,-1), (1,1)**
4	List three easy-to-plot points for $y = -\sqrt[3]{(x-3)}+1$.	**(2,2), (3,1), (4,0)**

PART 2 · APPLY IT

1. **The curve starts at (0,0) and passes through (1,1), (4,2), and (9,3). The side is 3 cm.** Use the square areas 4 and 9 to add (4,2) and (9,3). Connect the points with a smooth square root curve.
2. **The curve passes through (0,0), (1,1), and (8,2). The edge is 2 cm.** Because $\sqrt[3]{8}=2$, add (8,2). Draw a smooth increasing cube root curve through the three points.

CHALLENGE

Points: (-2,5), (-1,3), (0,1). Shift the graph left 1, reflect it across the x-axis, stretch it vertically by a factor of 2, and shift it up 3.

Accept other correct points in the practice problems. Graphs should be smooth and pass through the listed points; the square root graphs start at their endpoints.