

Function Graph Moves

Graph roots, absolute value, and step rules.

HIGH SCHOOL • HSF-IF.C.7b

CCSS.Math.Content.HSF-IF.C.7b "Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions."

NAME _____

DATE _____

BUILD THE GRAPH

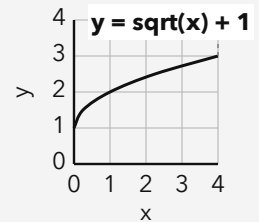
Start with the parent graph, then shift or reflect it as the rule shows. For a piecewise function, graph each rule only on its stated interval, using open and closed endpoints correctly.

WORKED EXAMPLE

Graph $y = \sqrt{x} + 1$. The completed graph is shown.

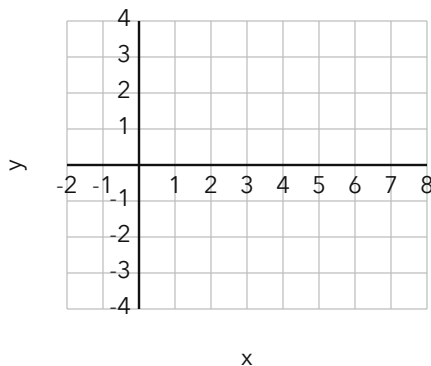
1. Use parent points (0,0), (1,1), and (4,2).
2. Add 1 to each y-value.
3. Plot (0,1), (1,2), and (4,3).
4. Draw the square root curve through the points.

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



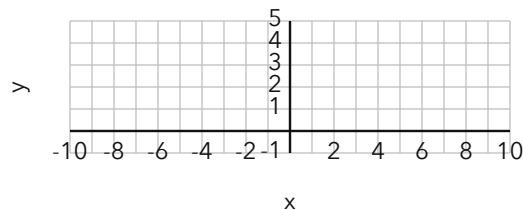
PRACTICE 4 problems

- 1** Graph $y = |x - 3| - 2$ on the grid. State the vertex and any two points symmetric about its vertical axis.



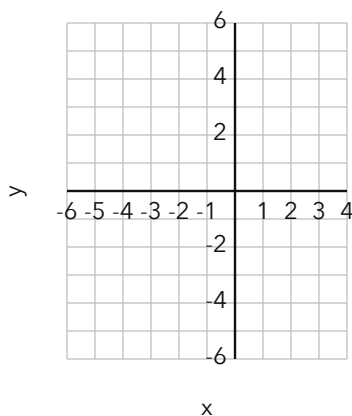
ANSWER _____

- 2** Graph $y = \text{cuberoot}(x + 8) + 2$ on the grid. Label at least three points.



ANSWER _____

- 3** On the grid, graph $y = x + 1$ for $x < -2$ and $y = 3$ for $x \geq -2$. State the two endpoint markers.



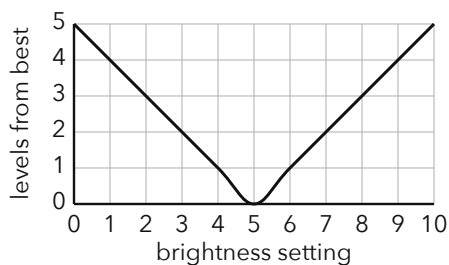
ANSWER _____

- 4** For $f(x) = 1$ on $0 \leq x < 4$, $f(x) = 4$ on $4 \leq x < 8$, and $f(x) = 7$ on $8 \leq x \leq 12$, list the three step segments.

ANSWER _____

APPLY IT Show your work

- 1** A student adjusts a photo's brightness before posting it. The graph shows how many brightness levels the setting is from the best setting. What are the distances at settings 2 and 8?



ANSWER _____

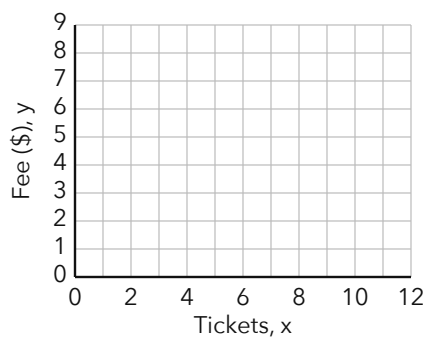
- 2** In a game design project, bonus points are $b = \sqrt{d}$, where d is the number of tiles a character jumps. Give the points for $d = 0$, 9, and 25, then name the graph type.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A club charges a step fee depending on the number of tickets x ordered. The fee is \$2 for $0 \leq x < 4$, \$5 for $4 \leq x < 8$, and \$8 for $8 \leq x \leq 12$. Sketch the graph on the grid, and explain why the point at $x = 4$ is closed at $y = 5$.



WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Graph $y = x - 3 - 2$ on the grid. State the vertex and any two points symmetric about its vertical axis.	V-shaped graph with vertex (3,-2). Sample symmetric points: (1,0) and (5,0). Accept any distinct pair (3-a, a-2) and (3+a, a-2) for $a > 0$.
2	Graph $y = \text{cuberoot}(x + 8) + 2$ on the grid. Label at least three points.	Increasing cube-root curve through (-9,1), (-8,2), (-7,3), and (0,4), with its vertical tangent at (-8,2). Accept any three correctly labeled points on the curve.
3	On the grid, graph $y = x + 1$ for $x < -2$ and $y = 3$ for $x \geq -2$. State the two endpoint markers.	Open circle at (-2,-1) for $y = x + 1$. Closed circle at (-2,3) for $y = 3$.
4	For $f(x) = 1$ on $0 \leq x < 4$, $f(x) = 4$ on $4 \leq x < 8$, and $f(x) = 7$ on $8 \leq x \leq 12$, list the three step segments.	$y = 1$ on $[0,4)$; $y = 4$ on $[4,8)$; $y = 7$ on $[8,12]$.

PART 2 • APPLY IT

1. **At setting 2, the distance is 3 levels. At setting 8, the distance is 3 levels.** Read the y-values where $x = 2$ and $x = 8$. Both points have $y = 3$.
2. **(0,0), (9,3), and (25,5); square root graph.** Substitute each jump distance into $b = \text{sqrt}(d)$. The output values are 0, 3, and 5.

CHALLENGE

Draw $y = 2$ on $[0,4)$, $y = 5$ on $[4,8)$, and $y = 8$ on $[8,12]$. At $x = 4$, the rule $4 \leq x < 8$ applies, so the point (4,5) is closed.

Accept equivalent point order and clear sketches with correct open and closed circles. For graphing items, accept smooth root curves and straight absolute value rays through the stated key points.