Graphing Square Root, Cube Root, and Piecewise Functions

TSIA2 Math •Section 4.7

Name: _____	Date: _____	Score: _____ / 12

Quick Review and Helpful Hints

A function pairs each input with exactly one output. Pay attention to what the input means, what rule is being applied, and whether the question asks for a value, a rule, a domain, or an interpretation.

▷ **Example:** For $f(x) = 2x + 5$, find $f(4)$.
Work: Replace x with 4: $f(4) = 2(4) + 5 = 13$.

★ **Answer:** 13

Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Evaluate $f(x) = \sqrt{x+5}$ at $x = 4$.

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2. Find the domain of $y = \sqrt{x-2}$.

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3. Evaluate $g(x) = \sqrt[3]{x-1}$ at $x = 28$.

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4. Find the domain of $y = \sqrt[3]{x-8}$.

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5. Evaluate $h(x) = \sqrt{2x+1}$ at $x = 12$.

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6. Describe $y = \sqrt{x} + 3$ compared with $y = \sqrt{x}$.

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7. Describe $y = 2\sqrt{x}$ compared with $y = \sqrt{x}$.

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8. If $p(x) = \begin{cases} x+1, & x < 2 \\ 2x, & x \geq 2 \end{cases}$, find $p(3)$.

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9. For the same $p(x)$, find $p(0)$.

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10. For $p(x) = \begin{cases} -x, & x < 0 \\ x^2, & x \geq 0 \end{cases}$, find $p(-4)$.

_____

Word Problems

11. A fee is $\$5$ for the first hour and $\$3$ for each extra hour. Why is a piecewise model useful?

_____

12. A square-root model is only defined after $x = 6$. What domain restriction is required?

_____

Answer Keys

1. 3
2. $x \geq 2$
3. 3
4. All real numbers
5. 5
6. Shift up 3
7. Vertical stretch by 2
8. 6
9. 1
10. 4
11. Different rules apply to different time intervals
12. $x \geq 6$

Step-by-Step Explanations

1. Add inside first: $4 + 5 = 9$, and the square root of 9 is 3.
2. What's under a square root can't be negative, so $x - 2$ has to stay zero or larger.
3. Subtract inside to get 27, then ask what number cubed is 27 — that's 3.
4. Cube roots accept any real input — negatives are fine — so there's no restriction.
5. Compute inside: $2(12) + 1 = 25$, then take the square root for 5.
6. The $+3$ sits outside the radical, so the entire graph rises by 3.
7. Multiplying the output by 2 pulls the graph twice as tall — a vertical stretch.
8. $3 \geq 2$, so use the second piece: $2(3) = 6$.
9. This time $0 < 2$, so the first piece $x + 1$ takes over: $0 + 1 = 1$.
10. $-4 < 0$, so use the first rule: $-(-4) = 4$.
11. One price for the first hour and a different one for the rest — piecewise rules handle that kind of split cleanly.
12. If the model starts at $x = 6$, anything below isn't in its domain — only x values from 6 on count.

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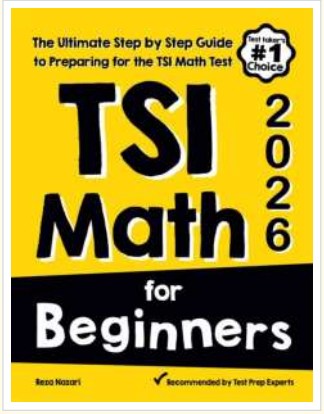

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