

Graphing Functions and Transformations

Algebra 1 • Section 4.4

Name: _____

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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. For $g(x) = f(x) + 4$, describe the transformation. _____

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

2. For $g(x) = f(x - 3)$, describe the transformation. _____

7. For $h(x) = |x| + 2$, find the vertex. _____

3. For $g(x) = -f(x)$, describe the transformation. _____

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

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

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

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

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

◆ 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 starts only after $x = 6$. What domain restriction should you expect? _____



Answer Keys

- Shift up 4
- Shift right 3
- Reflect over the x -axis
- 3
- $x \geq 2$
- 3
- $(0, 2)$
- 6
- 1
- Vertical stretch by 2
- Different rules apply to different time intervals
- $x \geq 6$

Step-by-Step Explanations

- That $+4$ sits outside, touching the output, so the whole graph rises 4 units.
- Changes inside with x feel backwards: $x - 3$ slides the graph right, not left.
- Slapping a negative on the output flips every y -value, mirroring the graph over the x -axis.
- Inside first: $4 + 5$ makes 9, and the square root of 9 is a clean 3.
- Whatever lives under a square root can't be negative, so $x - 2$ must stay zero or higher.
- Subtract inside to get 27, then ask what cubed equals 27 — that's 3.
- The basic $|x|$ has its corner at $(0, 0)$, and $+2$ lifts that corner up to $(0, 2)$.
- Check which zone 3 falls in: since $3 \geq 2$, follow the $2x$ rule to get 6.
- This time $0 < 2$, so the other branch takes over: $x + 1$ gives 1.
- Multiplying the whole output by 2 pulls the graph taller — a vertical stretch.
- One price covers the first hour and a different one covers the rest — piecewise is built for exactly this split.
- If the model wakes up at $x = 6$, anything smaller simply isn't part of its domain.



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