

Graphing Functions and Transformations

TSIA2 Math • 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. Describe $g(x) = f(x) + 5$ compared to f .

2. Describe $g(x) = f(x) - 3$ compared to f .

3. Describe $g(x) = f(x + 2)$ compared to f .

4. Describe $g(x) = f(x - 6)$ compared to f .

5. Describe $g(x) = -f(x)$ compared to f .

6. Describe $g(x) = f(-x)$ compared to f .

7. Describe $g(x) = 3f(x)$ compared to f .

8. Describe $g(x) = \frac{1}{2}f(x)$ compared to f .

9. If $f(x) = x^2$, write the rule for shifting it right 4 and up 1.

10. If $f(x) = |x|$ has vertex $(0, 0)$, find the vertex of $g(x) = |x + 3| - 2$.

◆ Word Problems

11. A graph of f is shifted up 7 to make g . Write g in terms of f .

12. A parent graph f is reflected over the x -axis and shifted left 5. Write the new rule.



Answer Keys

- Shift up 5
- Shift down 3
- Shift left 2
- Shift right 6
- Reflect over the x -axis
- Reflect over the y -axis
- Vertical stretch by 3
- Vertical compression by $\frac{1}{2}$
- $g(x) = (x - 4)^2 + 1$
- $(-3, -2)$
- $g(x) = f(x) + 7$
- $g(x) = -f(x + 5)$

Step-by-Step Explanations

- Adding 5 outside the function lifts every output, so the whole graph slides up by 5 units.
- Subtracting outside takes away from every output, dragging the graph 3 units downward.
- Changes inside the parentheses act in reverse: $+2$ moves the graph to the left, not the right.
- Subtracting 6 inside makes the graph wait 6 extra units before doing what f would do — that's a right shift.
- A negative on the whole output flips every y -value upside down, mirroring the graph across the x -axis.
- Negating the input swaps left and right, so the graph reflects across the y -axis instead.
- Multiplying the output by 3 pulls every point three times farther from the x -axis — a vertical stretch.
- A factor between 0 and 1 outside squishes the graph toward the x -axis, so it's a vertical compression.
- Right shifts subtract inside, up shifts add outside — apply both to the parent x^2 .
- $x + 3$ inside moves the vertex 3 left, and -2 outside drops it 2 down.
- An upward shift is an outside change, so the whole rule becomes $f(x) + 7$.
- The reflection puts a negative outside, and the left shift swaps x for $x + 5$ inside — combine them.



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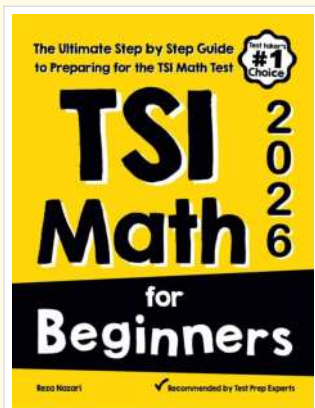
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