Algebra 2 Unit 1 worksheet: Reflecting a graph across the axes

Name _____ Date _____ Period _____

1. For each pair, decide whether $g(x) = -f(x)$, $g(x) = f(-x)$, both, or neither. Show the rewriting that decides it.

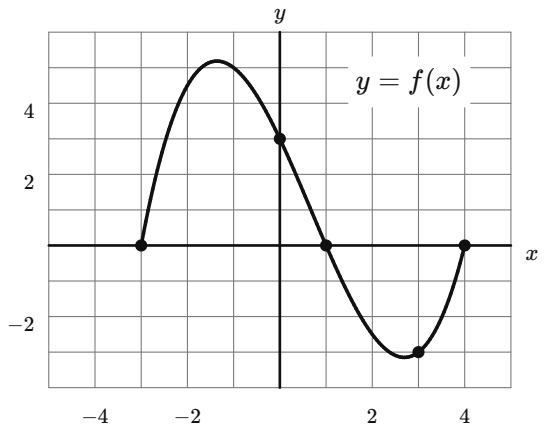
(a) $f(x) = x^2 - 6x,\ g(x) = x^2 + 6x$

(b) $f(x) = \dfrac{1}{x-4},\ g(x) = \dfrac{1}{4-x}$

(c) $f(x) = 2x^2 - 3,\ g(x) = -2x^2 - 3$

(d) $f(x) = x^3 - x,\ g(x) = x - x^3$

2. The figure shows the whole graph of f: a smooth curve with closed dots at its ends, through the marked points (−3, 0), (0, 3), (1, 0), (3, −3) and (4, 0).



(a) Give the domain of f, its x-intercepts and its y-intercept.

(b) Sketch the graph of $y = f(-x)$ on the same grid, and give the points that the five marked points go to.

(c) Give the domain, the x-intercepts and the y-intercept of $y = f(-x)$.

(d) For which inputs is $f(-x)$ negative?

Free sample from math.wiki for classroom use. Do not post. math.wiki

3. Aisha reflects the graph of $f(x) = x^2 - 4x + 1$ across the y-axis. She changes the sign of every term that has an x in it and writes $f(-x) = -x^2 + 4x + 1$.

(a) The point $(1, f(1))$ is on the graph of f. Find it, say where the reflection across the y-axis should send it, and show that Aisha's rule does not pass through that point.

(b) Write $f(-x)$ correctly and simplify it.

(c) Give the vertex of each graph, $y = f(x)$ and $y = f(-x)$, and say whether it is a highest or a lowest point. Give the range of each.

4. Start with $f(x) = \sqrt{x + 3} + 2$.

(a) Reflect its graph across the x-axis, then reflect the result across the y-axis. Write the rule after each step.

(b) Do the two reflections in the other order, writing the rule after each step. Do you reach the same function?

(c) Explain, by following a point (a, b) of the graph of f, why the order of the two reflections never matters.

(d) Give the starting point, the domain and the range of the final graph.

5. A stone footbridge crosses a canal. The underside of its arch follows $y = 4 - \dfrac{x^2}{4}$ for $-4 \le x \le 4$, where x is meters from the middle of the canal and y is meters above the water. On a still day the water shows the arch upside down, as its reflection across the water line, the x-axis.

(a) Write a rule $r(x)$ for the reflected arch, simplified.

(b) Give the lowest point of the reflected arch, and the points where it meets the water line.

(c) Give the range of the real arch and the range of the reflected arch.

(d) The arch and its reflection together look like a closed ring. How tall is the ring, from its top edge to its bottom edge, at 2 meters from the middle?

Free sample from math.wiki for classroom use. Do not post. math.wiki