Algebra 2 Unit 1 worksheet: Shifting a graph up, down, left and right

Name _____ Date _____ Period _____

1. For each graph, name the parent graph, describe how it is moved, and give the point where the parent's anchor lands (the vertex, the center, the starting point, or the point where the asymptotes cross).

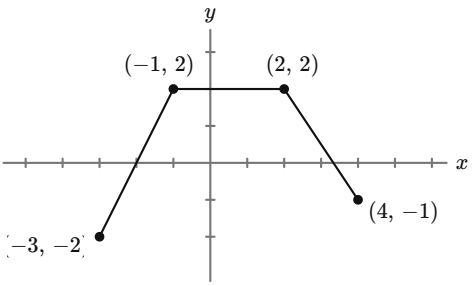
(a) $y = x^3 - 4$

(b) $y = \dfrac{1}{x - 3} - 2$

(c) $y = (x + 2.5)^3$

(d) $y = 6 + \sqrt{x - 1}$

2. The figure shows the whole graph of a function f: three segments joining the marked points, with closed dots at both ends. Let $g(x) = f(x + 3) - 2$.



(a) Where do the four marked points land on the graph of g?

(b) Give the domain and the range of g.

(c) Find $g(0)$.

3. Find the x-intercepts and the y-intercept of each graph. Give exact values, or explain why a graph has no x-intercept.

(a) $y = (x + 4)^2 - 9$

(b) $y = \sqrt{x + 9} - 2$

(c) $y = (x - 1)^3 - 8$

(d) $y = (x - 3)^2 + 2$

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4. Let $f(x) = x^2 - 4x$. Move the graph of f 6 units right and 3 units up to get the graph of g. Write $g(x)$ in the form $x^2 + bx + c$. Then check your formula: (0, 0) is on the graph of f, so find where it lands and test that point in your formula.

5. A function f has domain $-7 \le x \le 7$ and range $-1 \le y \le 8$, and the highest point of its graph is (6, 8).

(a) The graph of g is a translation of the graph of f, with domain $-12 \le x \le 2$ and range $-3 \le y \le 6$. Write $g(x)$ in terms of f, and give the highest point of the graph of g.

(b) Explain why no translation of the graph of f has domain $0 \le x \le 16$.

6. (a) The graph of $y = (x - h)^2$ passes through (5, 9). Find every possible value of h, and explain why there is more than one.

(b) The graph of $y = \sqrt{x} + k$ passes through (16, 1). Find k.

(c) The graph of $y = (x - h)^3$ passes through (5, −8). Find every possible value of h, and explain why this time there is only one.

7. The water depth at a fishing dock t hours after midnight on Monday is $D(t)$ meters:

t	0	2	4	6	8	10	12
$D(t)$	4	5	6	5	3	2	3

On Tuesday the tide follows the same pattern 1 hour later, and a storm keeps the water 0.5 meter deeper all day. Let $T(t)$ be the depth t hours after midnight on Tuesday.

(a) Write $T(t)$ in terms of D.

(b) A boat needs water at least 5.5 meters deep to tie up. At which of the times $t = 1, 3, 5, \ldots, 13$ on Tuesday can it tie up?

(c) Explain why $D(t + 1) + 0.5$ would be the wrong rule.

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