Algebra 2 Unit 1 worksheet: Combining transformations and the general form

Name _____ Date _____ Period _____

1. Each rule is built from one of the parents $y = x^2$, $y = x^3$, $y = \sqrt{x}$ or $y = \dfrac{1}{x}$. Write it in the form $y = a\,f\big(b(x-h)\big) + k$ and give a, b, h and k.

(a) $y = \dfrac{3}{x-1} + 8$ (b) $y = (2x+10)^3 - 4$ (c) $y = 6 - \sqrt{3-x}$ (d) $y = -\dfrac{1}{2}\sqrt{4x+12}$

2. A function f takes the value -5 at exactly one input, $x = -19$. Let $g(x) = -2\,f(4x-7) + 7$. Solve $g(x) = 17$.

3. Ryan starts from $y = x^2$. He shifts the graph right 2, then compresses it horizontally by a factor of $\dfrac{1}{3}$ toward the y-axis.

(a) Write Ryan's rule in the form $y = \big(b(x-h)\big)^2$ and find where the vertex ends up.

(b) Ryan wanted the vertex at (2, 0). Keeping his order, a shift right first and then the same compression, how far right should he shift? Write that rule and check its vertex.

4. Naomi describes $g(x) = 3\,f(x) - 12$ as "shift down 12, then stretch vertically by a factor of 3." The point (3, 5) is on the graph of f.

(a) Follow (3, 5) through Naomi's two moves in her order. Then find the point of g that really comes from (3, 5).

(b) Naomi wants to keep her order: a shift down first, then the stretch by 3. How far down must she shift so that the two moves give g? Show that your answer works.

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

5. Let $y = \dfrac{2}{4 - x} + 3$, built from $y = \dfrac{1}{x}$.

(a) Write the rule as $a\, f\big(b(x - h)\big) + k$ with $b = -1$, and describe the moves in order.

(b) Carry the parent's points $(1,\ 1)$ and $(-1,\ -1)$ across with these moves.

(c) Show that the same rule can also be written with $b = 1$. Give its a, h and k, describe its moves, and carry $(1,\ 1)$ across with them. Check that the point you get is on the graph.

6. Elena's weather station logs the air temperature as $C(t)$ degrees Celsius, t hours after midnight. On Monday the lowest reading was -10 degrees at $t = 5$ and the highest was 15 degrees at $t = 14$. Her cousin Arjun lives in a time zone 2 hours behind hers, reads temperatures in degrees Fahrenheit, and posts the same day's readings as

$$F(s) = 1.8\, C(s + 2) + 32,$$

where s is hours after midnight on his clock.

(a) Describe, in order, the moves that take the graph of C to the graph of F.

(b) At what time on Arjun's clock does the day's low appear, and what is its Fahrenheit reading? Do the same for the high.

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