Name_____ Class _____ Date_____

5-9 Practice

Form G

Transforming Polynomial Functions

Determine the cubic function that is obtained from the parent function $y = x^3$ after each sequence of transformations.

1. a reflection in the *x*-axis; a vertical translation 3 units down; and a horizontal translation 2 units right

2. a vertical stretch by a factor of 4; a reflection in the *x*-axis; and a horizontal translation $\frac{1}{2}$ unit left

3. a vertical stretch by a factor of $\frac{1}{3}$; a reflection in the *y*-axis; and a vertical translation 6 units up

4. a vertical stretch by a factor of 3; a reflection in the *x*-axis; a vertical translation 2 units down; and a horizontal translation 2 units left

Find all the real zeros of each function.

5. $y = 2(x + 1)^3 - 3$

6. $y = -3(x - 2)^3 + 24$

7. $y = -\frac{1}{2}(x + 4)^3 - 1$

8. $y = 8(-x - 2)^3 + 5$

9. $y = -(x + 5)^3 + 1$

10. $y = 4(x - 6)^3 - 2$

Find a quartic function with the given *x*-values as its only real zeros.

11. $x = 2$ and $x = 8$

12. $x = 3$ and $x = -1$

13. $x = 1$ and $x = 3$

14. $x = -2$ and $x = 6$

15. $x = 5$ and $x = -2$

16. $x = -1$ and $x = 2$

17. $x = -3$ and $x = -5$

18. $x = -4$ and $x = 4$

19. **Physics** If you stretch a spring to 5 ft, it has 310 ft-lb of potential energy (*PE*). Potential energy varies directly as the square of the stretched length (*l*). The potential energy can be represented by the formula $PE = \frac{1}{2}kl^2$, where *k* is the spring constant.

a. What is the value of the spring constant for this spring?

b. How many ft-lbs of *PE* would an 8 ft length of spring have?