Name _____ Class _____ Date _____

Chapter 5 Review

Do you know HOW?

Write each polynomial in standard form. Then classify it by degree and by number of terms.

1. $4x^4 + 6x^3 - 2 - x^4$
   $3x^4 + 6x^3 - 2$; quartic trinomial
2. $9x^2 - 2x + 3x^2$
   $12x^2 - 2x$; quadratic binomial
3. $4x(x - 5)(x + 6)$
   $4x^3 + 4x^2 - 120x$; cubic trinomial

Find the real solutions of each equation by graphing. Where necessary, round to the nearest hundredth.

4. $x^4 + 2x^2 - 1 = 0$
   $-0.64, 0.64$
5. $-x^3 - 3x - 2 = 0$
   -0.60
6. $-x^4 + 4x^3 + 3 = 0$
   $-0.85, 4.05$
7. $-x^3 + 3x + 4 = 0$
   2.20
8. $x^4 + 2x - 3 = 0$
   $-1.57, 1$
9. $-x^3 + 2x^2 + 1 = 0$
   2.21

Write a polynomial function with rational coefficients so that $P(x) = 0$ has the given roots.

10. $2, 3, 5$
    $y = x^3 - 10x^2 + 31x - 30$
11. $-1, -1, 1$
    $y = x^3 + x^2 - x - 1$
12. $\sqrt{3}, 2i$
    $y = x^4 + x^2 - 12$
13. $2-i, \sqrt{5}$
    $y = x^4 - 4x^3 + 20x - 25$

Find the zeros of each function. State the multiplicity of any multiple zeros.

14. $y = (x - 1)^2(2x - 3)^3$
    1, multiplicity 2; $\frac{3}{2}$, multiplicity 3
15. $y = (3x - 2)^5(x + 4)^2$
    -4, multiplicity 2; $\frac{2}{3}$, multiplicity 5
16. $y = 4x^2(x + 2)^3(x + 1)$
    -1, multiplicity 1; -2, multiplicity 3; 0, multiplicity 2

Solve each equation.

17. $(x - 1)(x^2 + 5x + 6) = 0$
    $-3, -2, 1$
18. $x^3 - 10x^2 + 16x = 0$
    $0, 2, 8$
19. $(x + 2)(x^2 + 3x - 40) = 0$
    $-8, -2, 5$
20. $x^3 + 3x^2 - 54x = 0$
    $-9, 0, 6$

Divide using synthetic division.

21. $(x^3 - 4x^2 + x - 5) \div (x + 2)$
    $x^2 - 6x + 13, R -31$
22. $(2x^3 - 4x + 3) \div (x - 1)$
    $2x^2 + 2x - 2, R\ 1$

Use the Rational Root Theorem to list all possible rational roots for each equation. Then find any actual roots.

23. $x^3 + 2x^2 + 3x + 6 = 0$
    -2
24. $x^4 - 7x^2 + 12 = 0$
    $-2, 2$

25. What is $P(-5)$ if $P(x) = -x^3 - 4x^2 + x - 2$? 18

Expand each binomial.

26. $(x + y)^4$
$x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$

27. $(4 - 3x)^3$
$64 - 144x + 108x^2 - 27x^3$

28. $(2r + q)^5$
$32r^5 + 80r^4q + 80r^3q^2 + 40r^2q^3 + 10rq^4 + q^5$

29. $(a + 4b)^3$
$a^3 + 12a^2b + 48ab^2 + 64b^3$

30.

Estimated Number of Deaths in the United States						
Year	1960	1970	1980	1990	2000	2003
Deaths (millions)	1.71	1.92	1.99	2.15	2.40	2.42

SOURCE: *www.infoplease.com*

a. Find a cubic function to model the data. (Let x = years after 1960.) $y = 0.00001065x^3 - 0.000584x^2 + 0.02241x + 1.71758$

b. Estimate the deaths for the year 2006. 2.55 million

c. Is 1985 interpolation or extrapolation? Interpolation

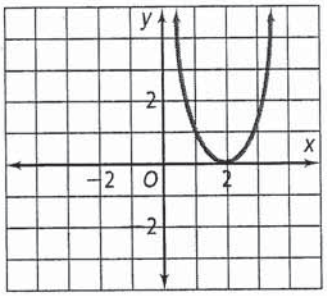
Determine the cubic function that is obtained from the parent function $y = x^3$ after each sequence of transformations.

31. a vertical stretch by a factor of 5, a reflection across the y-axis, and a horizontal translation 2 units left
$y = 5(-x - 2)^3$

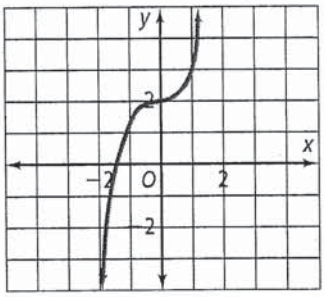
32. a reflection across the x-axis, a horizontal translation 3 units right, and a vertical translation 7 units down
$y = -(x - 3)^3 - 7$

Sketch the graph. (3 points each)

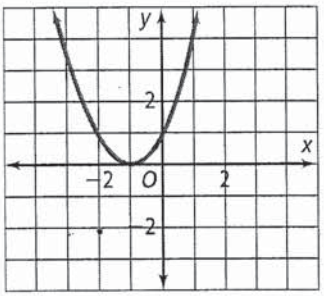
5. The graph of the fourth degree parent moved 2 units to the right.



6. The graph of the cubic parent function is moved 2 units up.

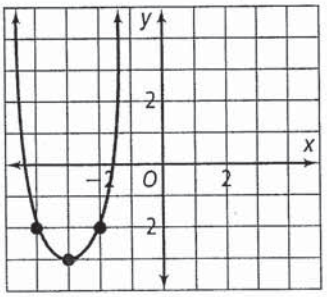


7. The graph of the quadratic parent function is moved 1 unit to the left.



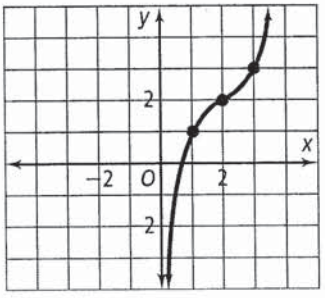
Write the function. (5 points each)

8.



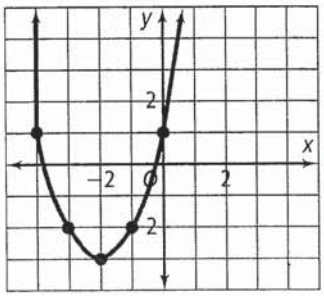
$y = (x + 3)^4 - 3$

9.



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

10.

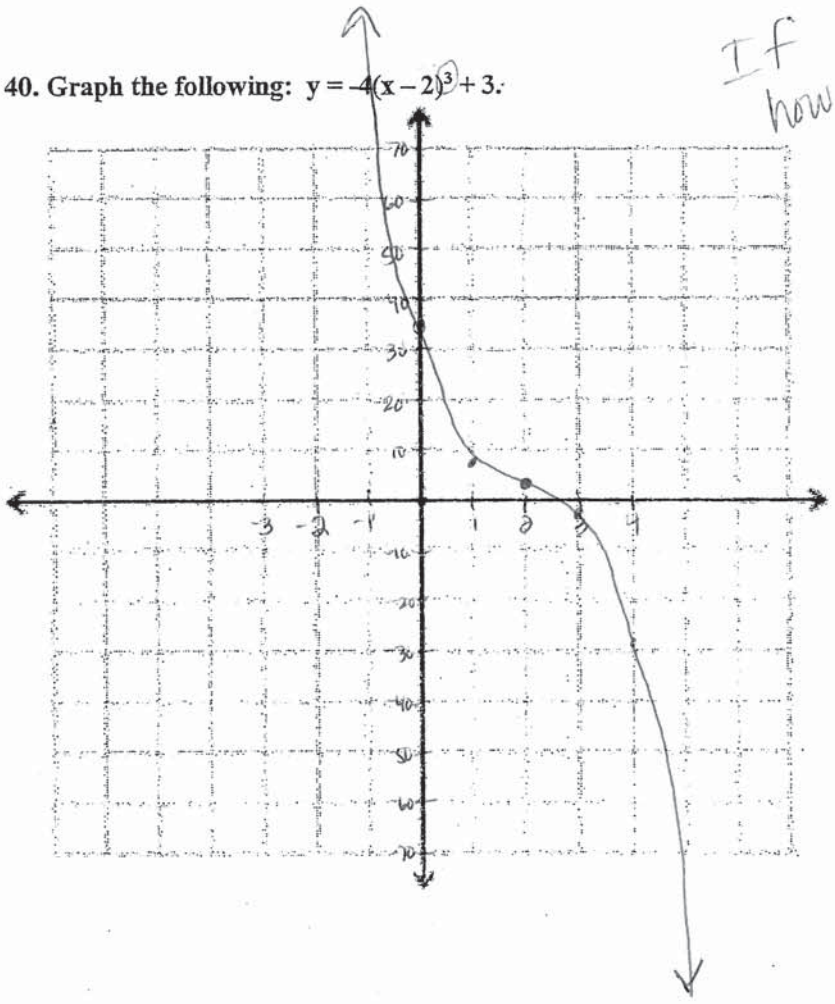


$y = (x + 2)^2 - 3$

39. A cubic box is 5 in. on each side. If each dimension is increased by x in., what is the polynomial function modeling the new volume V?

$$V = x^3 + 15x^2 + 75x + 125 \text{ in.}^3$$

40. Graph the following: $y = -4(x-2)^3 + 3$.



If you don't know how to graph, bust out a table!

x	y
-2	$-4(-2-4)^3+3=$
-1	$-4(-1-2)^3+3=111$ $-4(-3)^3$
0	$-4(0-2)^3+3=35$ $-4(-8)+3$ $32+3$
1	$-4(1-2)^3+3=7$ $-4(-1)^3+3$ $4+3$
2	$-4(2-2)^3+3=3$
3	$-4(3-2)^3+3=-1$ $-4(1)^3+3$ $-4+3$
4	$-4(4-2)^3+3=-29$ $-4(2)^3+3$ $-4(8)+3$ $-32+3$