Name Key Class _____ Date _____

5.4-5.9 Review

Chapter 5

Lesson 5-4

Determine whether each binomial is a factor of $x^3 - 5x^2 - 2x + 24$.

1. $x + 2$ yes

2. $x - 3$ yes

3. $x + 4$ NO

Divide.

4. $(x^3 - 3x^2 + 2) \div (x - 1)$

$1 \mid 1 \quad -3 \quad 0 \quad 2$

$\quad\quad 1 \quad -2 \quad -2$

$1 \quad -2 \quad -2 \quad 0$

$x^2 - 2x - 2$

5. $(2x^3 + 5x^2 - 9x - 18) \div (2x + 3)$

$-\frac{3}{2} \mid 2 \quad 5 \quad -9 \quad -18$

$\quad\quad -3 \quad -3 \quad 18$

$2 \quad 2 \quad -12 \quad 0$

$2x^2 + 2x - 12$

Lessons 5-5 and 5-6

Find all of the roots of each polynomial equation.

6. $x^3 + 2x^2 + 3x + 6 = 0$

$-2 \mid 1 \quad 2 \quad 3 \quad 6$

$\quad\quad -2 \quad 0 \quad -6$

$1 \quad 0 \quad 3 \quad 0$

$x^2 + 3 = 0$

$-3 \quad -3$

$x^2 = -3$

$\sqrt{x^2} = \sqrt{-3}$

$x = \pm\sqrt{3}$

$\sqrt{3}, -\sqrt{3}, -2$

7. $45x^3 + 93x^2 - 12 = 0$

$-2 \mid 45 \quad 93 \quad 0 \quad -12$

$\quad\quad -90 \quad -6 \quad 12$

$45 \quad 3 \quad -6 \quad 0$

$45x^2 + 3x - 6 = 0$

$x = \frac{-3 \pm \sqrt{3^2 - 4(45)(-6)}}{2(45)}$

$\frac{-3 \pm \sqrt{9 + 1080}}{90}$

$\frac{-3 \pm \sqrt{1089}}{90}$

$\frac{-3 \pm 33}{90}$

$= \frac{1}{3}, -\frac{2}{5}, -2$

8. $g(x) = 2x^3 + 3x^2 - 17x - 30$

$3 \mid 2 \quad 3 \quad -17 \quad -30$

$\quad\quad 6 \quad 27 \quad 30$

$2 \quad 9 \quad 10 \quad 0$

$-2 \mid 2 \quad 9 \quad 10$

$\quad\quad -4 \quad -10$

$\quad\quad 5 \quad 0$

$2x + 5 = 0$

$-5 \quad -5$

$2x = -5$

$\frac{2x}{2} = \frac{-5}{2}$

$-\frac{5}{2}, 3, -2$

9. $h(x) = x^4 - 5x^3 - 8x + 40$

$2 \mid 1 \quad -5 \quad 0 \quad -8 \quad 40$

$\quad\quad 2 \quad -6 \quad -12 \quad -40$

$1 \quad -3 \quad -6 \quad -20 \quad 0$

$5 \mid 1 \quad -3 \quad -6 \quad -20$

$\quad\quad 5 \quad 10 \quad 20$

$1 \quad 2 \quad 4 \quad 0$

$x^2 + 2x + 4 = 0$

$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(4)}}{2(1)}$

$\frac{-2 \pm \sqrt{4 - 16}}{2}$

$\frac{-2 \pm \sqrt{-12}}{2}$

$\frac{-2 \pm 2i\sqrt{3}}{2}$

$-1 \pm i\sqrt{3}$

$2, 5, -1 \pm i\sqrt{3}$

10 a.) Can a function with complex roots 6, $\sqrt{5}$, and 2i, be a fourth-degree polynomial with rational coefficients? ***Explain.***

No because there would be two more roots so when you multiply it would be at least a fifth degree polynomial

$6, \sqrt{5}, 2i, -\sqrt{5}, -2i$

10 b.) What is the function given the complex roots in 10a? (don't forget about your conjugates)

$y = (x-6)(x-\sqrt{5})(x+\sqrt{5})(x-2i)(x+2i)$

$y = (x-6)(x^2-5)(x^2+4)$

$y = (x-6)(x^4+4x^2-5x^2-20)$

$y = (x-6)(x^4-x^2-20)$

$y = x^5-6x^3-20x-6x^4+6x^2+120$

$y = x^5-6x^4-6x^3+6x^2-20x+120$

Lessons 5-8

Directions: Use the data to answer the following questions...

11.

Let x = the number of years after 1985.

World Gold

Year	Production (millions of troy ounces)
0 1985	49.3
5 1990	70.2
10 1995	71.8
15 2000	82.6

SOURCES: *The World Almanac* and *World Gold*

cubic

11a) What type of function best models this data? EXPLAIN!

cubic because the $R^2 = 1$ so it's an exact fit of the data

11b) Write the function that best fits the data.

$y = .038x^3 - .956x^2 + 8.01x + 49.3$

11c) How much gold will be produced in 2020?

35 yrs

787.8 millions of troy ounces

Name_____ Class _____ Date_____

5.4-5.9 Review (continued)

Chapter 5

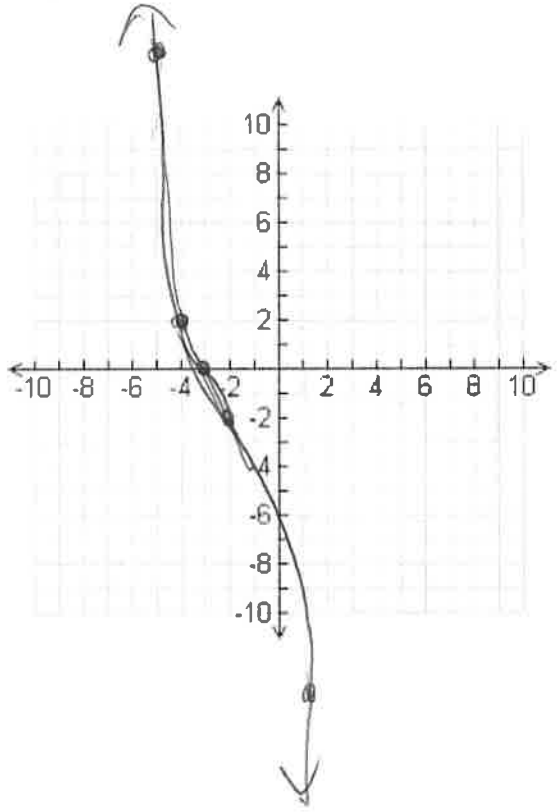
Lesson 5-9

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

12. vertical stretch by a factor of 2;
reflection across the x-axis;
horizontal translation 3 units left

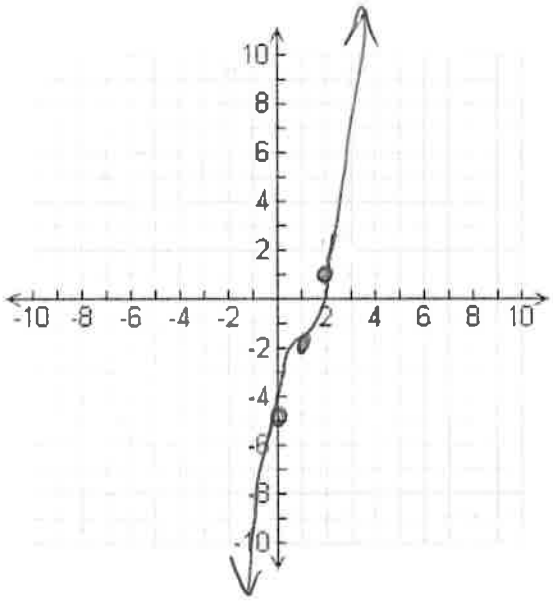
$y = -2(x+3)^3$

X	Y
-5	16
-4	2
-3	0
-2	-2
-1	-16



13. vertical stretch by a factor of 3;
vertical translation down 2 units;
horizontal translation 1 unit right

$y = 3(x-1)^3 - 2$



X	Y
0	-5
1	-2
2	1

Find all the *real* zeros of each function.

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

$0 = 2(x-3)^3 + 2$

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

$\sqrt[3]{-1} = \sqrt[3]{(x-3)^3}$

$-1 = x - 3$

$2 = x$

15. $y = -\frac{1}{3}\left(x + \frac{1}{2}\right)^3 - 5$

$0 = -\frac{1}{3}(x+\frac{1}{2})^3 - 5$

$5 = -\frac{1}{3}(x+\frac{1}{2})^3$

$\sqrt[3]{-15} = \sqrt[3]{(x+\frac{1}{2})^3}$

$\sqrt[3]{-15} = x + \frac{1}{2}$

$-\frac{1}{2} \quad -\frac{1}{2}$

$x = \sqrt[3]{-15} - \frac{1}{2}$