Difference of Perfect Squares

$(a + b)(a - b) = a^2 - b^2$

Square of a Binomial

$(a + b)^2 = a^2 + 2ab + b^2$

$(a - b)^2 = a^2 - 2ab + b^2$

Sum of Two Cubes

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
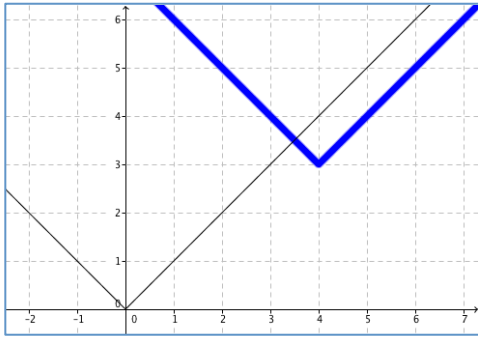
Difference of Two Cubes

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Cube of a Binomial

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

Name_____

Algebra Skillz (+1 pt. Each)

GRAPH	SIMPLIFY	SOLVE
Below, the graph of $f(x) = \|x - 4\| + 3$ is sketched in bold. Its parent function $f(x) = \|x\|$ is represented by the thin curve. 1. Describe the translation of the parent graph. 2. How does the translation relate to the equation? 	3. $\left(4\sqrt{2}\right)^3$ 4. $-\sqrt{2}\left(\sqrt{18} - 3\sqrt{10}\right)$	5. Solve: $-3x(2x - 1)(x + 1) = 0$ 6. Factor and solve. $2x^2 + 3x - 2 = 0$

SAT Review (+2 pts Each)

MUTIPLE CHOICE

Rewrite $(3x - 1)^3$ in standard form.

(A) $27x^3 - 27x^2 + 9x - 1$

(B) $9x^3 - 3$

(C) $9x^3 - 1$

(D) $27x^3 - 3$

(E) $27x^3 - 1$

Free Response

One root of the polynomial function $f(x) = x^3 - x^2 - 8x + 12$ is x = -3. Find the other root(s).

1. The side of a cube is represented by the binomial (x +3). Find, in terms of x, the volume of the cube. Use the formula V = s³. (+ 3 points)

2. For a swimmer doing the breaststroke, the function

$$S = -241t^7 + 1060t^6 - 1870t^5 + 1650t^4 - 737t^3 + 144t^2 - 2.43t$$

models the swimmer's speed S (*in meters per second*) during one complete stroke, where t is the number of seconds since the start of the stroke. According to the model, at what time during the stroke is the swimmer going the fastest?

3.   Suppose the volume of the rectangular prism below is given by $V = x^3 + 12x^2 + 47x + 60$. Find the missing dimension. (+ 3 pts)

(x + 5)

(x + 4)
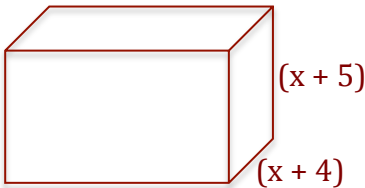
4.   Write a polynomial that has the end behavior as $x \to -\infty, f(x) \to \infty$, and as $x \to \infty, f(x) \to \infty$. (+2 pts)

5. Graph the function. Label all extrema, zeros and intercepts. Round to the nearest hundredth, if necessary. (+10 pts)
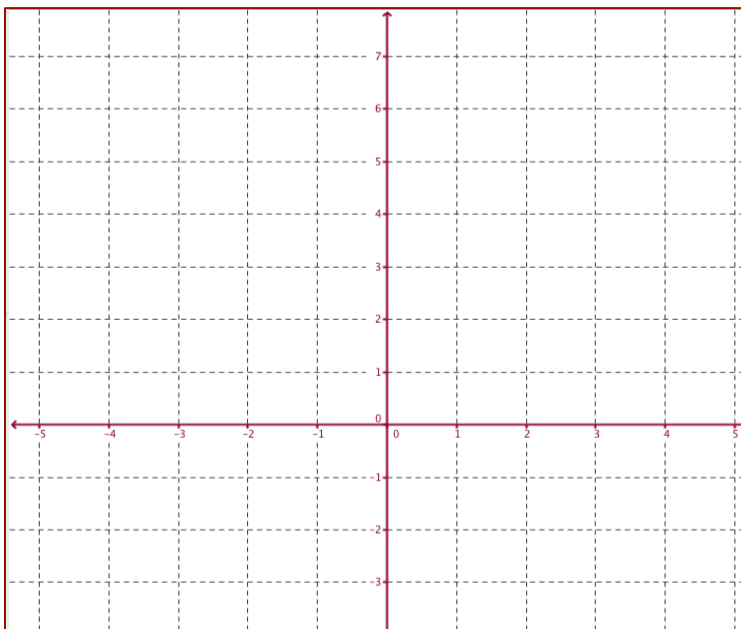
$$f(x) = x^4 - 8x^3 + 22x^2 - 24x + 5$$

x	f(x)
-3	
-2	
-1	
0	
1	
2	
3	

Simplify. Your answer should contain only positive exponents.

6) $\left(-3m^{-1}\right)^2$

7) $\left(\dfrac{5a^{-8}b^{-1}}{ab^3}\right)^2$

Evaluate each function at the given value using synthetic substitution.

8) $f(x) = x^4 + 6x^3 + 15x^2 + 20x - 3$ at $x = -3$

9) $f(x) = -5x^3 + 24x^2 - 21x + 16$ at $x = 4$

Describe the end behavior of each function.
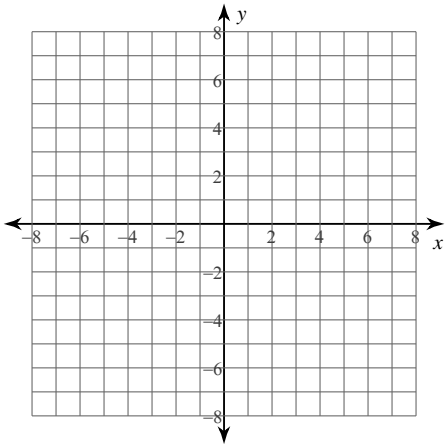
10) $f(x) = x^5 - 3x^3 + x - 1$

11) $f(x) = -x^4 + x^2 + x + 4$

Sketch the graph of each function by making a table of values.

12) $f(x) = -x^4 - x^3 + 3x^2 - 2$

Simplify each expression.

13) $\left(p^3 + 6p + 7\right) + \left(3p^3 - 4p - 5\right)$

Find each product.

14) $\left(8x - 5\right)^2$

15) $\left(5a + 3\right)^2$

Factor completely by factoring out a GCF, then factoring the remaining polynomial.

16) $x^3 - 2x^2 - 3x$

Factor each difference of cubes.

17) $8x^3 - 125 = 0$

Factor each completely by grouping.

18) $3x^3 - 18x^2 - x + 6$

19) $40b^3 - 56b^2 - 5b + 7$

Solve for x by factoring using the most appropriate method.

20) $8x^4 - 38x^2 + 45 = 0$

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

Divide using polynomial long division.

22) $(10x^4 + 90x^3 - 109x^2 - 96x - 60) \div (x + 10)$

23) $(x^3 - 2x^2 - 58x + 75) \div (x - 8)$

Divide using synthetic division.

24) $(v^4 + 13v^3 + 39v^2 + 20v + 32) \div (v + 4)$

25) $(r^4 - 12r^3 + 31r^2 - 112r + 20) \div (r - 10)$

Given a polynomial f(x) and a factor of f(x), factor f(x) completely.

26) $f(x) = 9x^3 - 9x^2 - 13x + 5;\ 3x - 5$

Answers to Corrective Assignment Unit 7

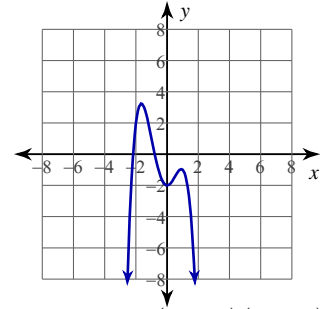6) $\dfrac{9}{m^2}$

7) $\dfrac{25}{a^{18}b^8}$

8) -9

9) -4

10) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to +\infty$ as $x \to +\infty$

11) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to -\infty$ as $x \to +\infty$

12)

13) $4p^3 + 2p + 2$

14) $64x^2 - 80x + 25$

15) $25a^2 + 30a + 9$

16) $x(x-3)(x+1)$

17) $(2x-5)(4x^2 + 10x + 25) = 0$

18) $(3x^2 - 1)(x-6)$

19) $(8b^2 - 1)(5b - 7)$

20) Factors to: $(2x^2 - 5)(2x-3)(2x+3) = 0$

   Roots: $\left\{ \dfrac{\sqrt{10}}{2}, -\dfrac{\sqrt{10}}{2}, \dfrac{3}{2}, -\dfrac{3}{2} \right\}$

21) Factors to: $(x+1)(x^2 - 3) = 0$

   Roots: $\left\{ -1, \sqrt{3}, -\sqrt{3} \right\}$

22) $10x^3 - 10x^2 - 9x - 6$

23) $x^2 + 6x - 10 - \dfrac{5}{x-8}$

24) $v^3 + 9v^2 + 3v + 8$

25) $r^3 - 2r^2 + 11r - 2$

26) Factors to: $f(x) = (3x-1)(x+1)(3x-5)$

   Zeros: $\left\{ \dfrac{1}{3}, -1, \dfrac{5}{3} \right\}$