Algebra 2 Name_____

Review Unit 7

Simplify. Your answer should contain only positive exponents.

1) $(-3m^3)^5$ = $(-3)^5 m^{15}$ = $-243m^{15}$

2) $\frac{5a^{-8}b^{-1}}{ab^3}$ = $5a^{-9}b^{-4}$ = $\frac{5}{a^9b^4}$

Evaluate each function at the given value using synthetic substitution.

3) $f(a) = -2a^3 - 3a^2 + 20a + 2$ at $a = -4$

$-4 \mid -2 \quad -3 \quad 20 \quad 2$

$\quad\quad\quad 8 \quad -20 \quad 0$

$\quad -2 \quad 5 \quad 0 \quad 2$

$f(-4) = 2$

4) $f(m) = m^3 + 4m^2 - 8m - 5$ at $m = 2$

$2 \mid 1 \quad 4 \quad -8 \quad -5$

$\quad\quad 2 \quad 12 \quad 8$

$\quad 1 \quad 6 \quad 4 \quad 3$

$f(2) = 3$

Describe the end behavior of each function.

5) $f(x) = -x^5 + 3x^3 - 2$

As $x \to -\infty$, $f(x) \to \infty$

As $x \to \infty$, $f(x) \to -\infty$

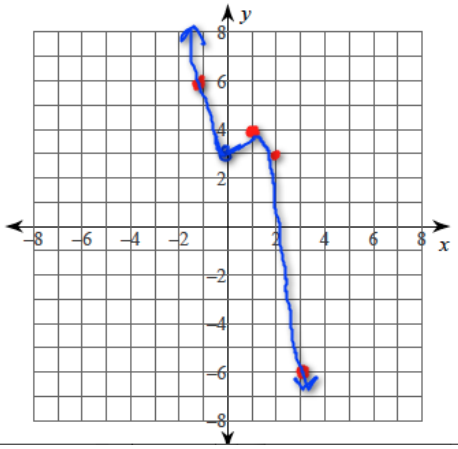
6) $f(x) = -2x^2 - 16x - 29$

As $x \to -\infty$, $f(x) \to -\infty$

As $x \to \infty$, $f(x) \to -\infty$

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

7) $f(x) = -x^3 + 2x^2 + 3$



x	f(x)
-3	48
-2	19
-1	6
0	3
1	4
2	3
3	-6

Simplify each expression.

8) $(4v^3 - 2v + 7) + (v^3 + 5v - 7)$

$5v^3 + 3v$

Find each product.

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

9) $(6p+1)^2$ = $(6p+1)(6p+1)$

$= 36p^2 + 2(1)(6p) + 1$

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

$= x^3 - 6x^2 + 12x - 8$

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

11) $2x^3 + 12x^2 + 10x$

$2x(x^2+6x+5)$

$2x(x+5)(x+1)$

Factor each differe

Difference of Two Cubes

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

12) $27x^3 - 1$

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

$a=3x$, $b=1$

$=(3x-1)(9x^2+3x+1)$

$(5b+4)(4b^2-1)$

Factor each completely by grouping.

13) $16m^3 - 6m^2 + 24m - 9$

$(8m-3)(2m^2+3)$

$2m^2(8m-3)+3(8m-3)$

14) $20b^3 + 16b^2 - 5b - 4$

$4b^2(5b+4)-1(5b+4)$

Solve for x by factoring using the most appropriate method.

15) $12x^4 - 13x^2 + 3 = 0$

This bad boy is a quadratic form

$12x^2 - 13x + 3$

$=(4x-3)(3x-1)$

$0=(4x^2-3)(3x^2-1)$

$4x^2-3=0$ $\quad 3x^2-1=0$

$x^2=\frac{3}{4}$ $\quad x^2=\frac{1}{3}$

$x=\pm\sqrt{\frac{3}{4}}$ $\quad x=\pm\sqrt{\frac{1}{3}}$

$x=\pm\frac{\sqrt{3}}{2}$ $\quad x=\pm\frac{\sqrt{3}}{3}$

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

$x^2(x+3)-1(x+3)$

$(x+3)(x^2-1)=0$

$x=-3$ $\quad x^2-1=0$

$x^2=1$

$x=\pm 1$

Divide using polynomial long division.

17) $(k^4 + 7k^3 - 17k^2 + 2k - 63) \div (k+9)$

$k^3 - 2k^2 + k - 7$

$k+9 \;|\; k^4+7k^3-17k^2+2k-63$

$-k^4-9k^3$

$-2k^3-17k^2$

$-2k^3-18k^2$

k^2+2k

k^2+9k

$-7k-63$

$-7k-63$

0

k^3-2k^2+k-7

18) $(r^3 + 20r^2 + 101r + 2) \div (r+10)$

$r^2+10r+1$

$r+10 \;|\; r^3+20r^2+101r+2$

r^3+10r^2

$10r^2+101r$

$-10r^2+100r$

$r+2$

$-r+10$

-8

$r^2+10r+1+\frac{-8}{r+10}$

Divide using synthetic division.

19) $(x^4 - 101x^2 - 18x - 80) \div (x+10)$

$0x^3$

$-10 \;|\; 1 \quad 0 \quad -101 \quad -18 \quad -80$

$\quad\quad -10 \quad 100 \quad 10 \quad 80$

$\quad 1 \quad -10 \quad -1 \quad -8 \quad 0$

$\quad x^3 \quad x^2 \quad x \quad C \quad R$

$= x^3 - 10x^2 - x - 8$

20) $(k^4 - 12k^3 + 41k^2 - 18k - 72) \div (k-6)$

$6 \;|\; 1 \quad -12 \quad 41 \quad -18 \quad -72$

$\quad\quad 6 \quad -36 \quad 30 \quad 72$

$\quad 1 \quad -6 \quad 5 \quad 12 \quad 0$

$x^3 - 6x^2 + 5x + 12$

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

21) $f(x) = 5x^3 + 21x^2 + 19x + 3;\ (x+3)$

$x=-3$ is zero

$-3 \;|\; 5 \quad 21 \quad 19 \quad 3$

$\quad\quad -15 \quad -18 \quad -3$

$\quad 5 \quad 6 \quad 1 \quad 0$

$\quad x^2 \quad x \quad C \quad R$

$5x^2+6x+1$

$(x+3)(5x^2+6x+1)$

$(x+3)(5x+1)(x+1)$

22. Graph the function. Label all extrema, zeros and intercepts. Round to the nearest hundredth, if necessary.

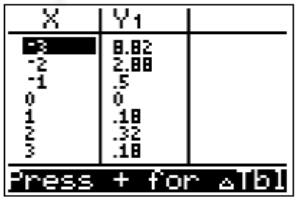
$f(x) = 0.02x^2(x-4)^2$

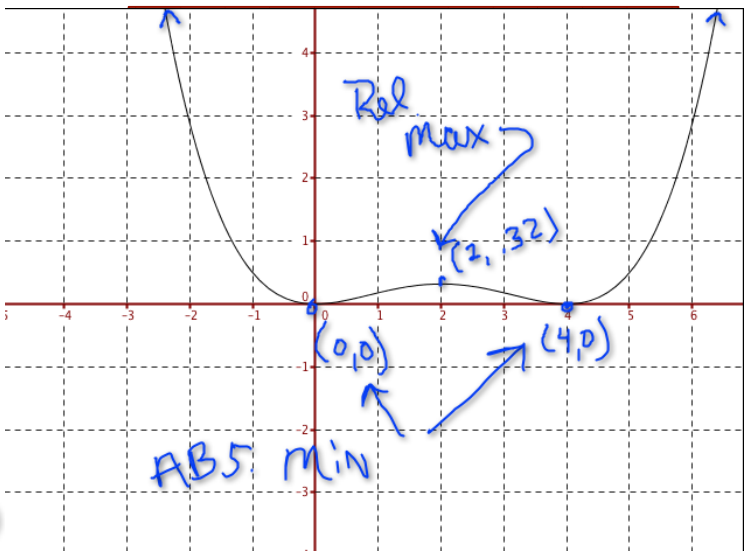
x	f(x)
-3	8.82
-2	2.88
-1	0.5
0	0
1	0.18
2	.32
3	0.18

ZERDS $x = 0$, $x = 4$

MINIMUM (ABSOLUTE) (0,0) (4,0)

RELATIVE MAX (2,.32)





23. 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 $V = s^3$.

$V = (x+3)^3$

$a = x$

$b = 3$

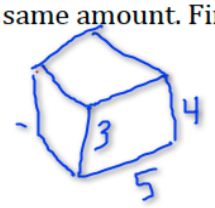
Cube of a Binomial

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

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

$= x^3 + 9x^2 + 27x + 27$

24. A storage company needs to design a new storage box that has twice the volume of its largest box. Its largest box is 5 ft long, 4 ft wide, and 3 ft high. The new box must be formed by increasing each dimension by the same amount. Find the increase in each dimension.



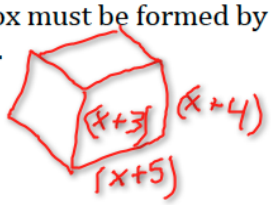
$V = lwh$

$= (3)(4)(5)$

$V = 60$

Small Box

NEW Vol = 120



$120 = (x+3)(x+4)(x+5)$

$(x+3)(x^2+9x+20)$

$120 = x^3 + 12x^2 + 47x + 60$

$0 = x^3 + 12x^2 + 47x - 60$

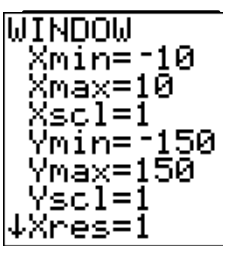
Find zeros of f(x) in graphing calc....

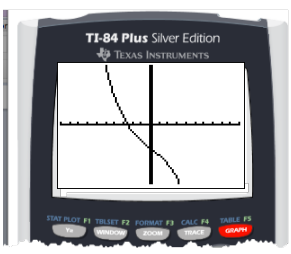
$x = 1$

The increase in each new dimension must be 1 ft.

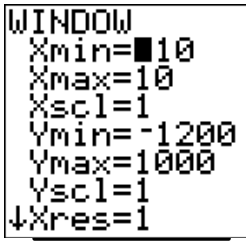
Graph each polynomial below and give an appropriate window. Then, sketch the graph in the window.

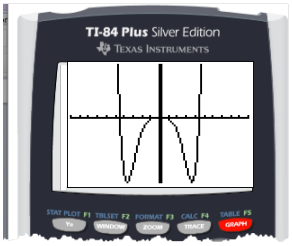
a. $f(x) = -x^3 - 17x - 60$





b. $f(x) = x^6 - 20x^4$





Algebra Skillz

GRAPH

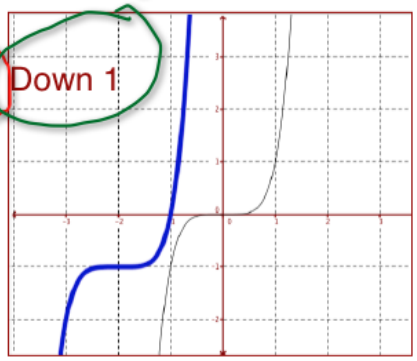
Below, the graph of $f(x) = (x+2)^5 - 1$ is sketched in bold. Its parent function $f(x) = x^5$ is represented by the thin curve.

1. Describe the translation of the parent graph.

Left 2, Down 1

2. How does the translation relate to the equation?

Left 2, Down 1



SIMPLIFY

3. $\sqrt{32} + 2\sqrt{200} - \sqrt{98}$

$4\sqrt{2} + 2 \cdot 10\sqrt{2} - 7\sqrt{2}$

$= 17\sqrt{2}$

4. $2\sqrt{5}(20 - 3\sqrt{5})$

$40\sqrt{5} - 6 \cdot \sqrt{25}$

$40\sqrt{5} - 30$

SOLVE

5. Solve:

$-2(3x-1)(-2x+1) = 0$

$3x - 1 = 0$ $\quad -2x = -1$

$x = \frac{1}{3}$ $\quad x = \frac{1}{2}$

6. Factor and solve.

$4x^2 + 15x - 4 = 0$

$(4x-1)(x+4) = 0$

$x = \frac{1}{4}$ $\quad x = -4$

SAT Review

MUTIPLE CHOICE

Determine the number of zeros that are positive integers for the function:

$f(x) = 6x^3 + x^2 - x$

$0 = x(6x^2 + x - 1)$

$0 = x(3x-1)(2x+1)$

$x = 0$ $\quad x = \frac{1}{3}$ $\quad x = \frac{-1}{2}$

(A) 0
(B) 1
(C) 2
(D) 3
(E) Cannot be determined

none of these are positive!

Free Response

Suppose $(3x + \frac{1}{2})^2 = 9x^2 + bx + \frac{1}{4}$.

Find the value of b.

$a = 3x$

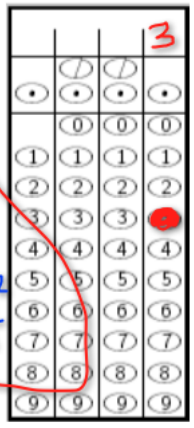
$b = \frac{1}{2}$

$b = 3$

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

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

$= 9x^2 + 3x + \frac{1}{4}$



Difference of Perfect Squares

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

Square of a Binomial

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

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

Cube of a Binomial

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

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

Sum of Two Cubes

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

Difference of Two Cubes

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