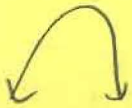
 Name_____
Date_____ Pd_____

6.1 I can graph polynomial functions and demonstrate understanding of the significant features of its graph and their relationship to real-world solutions.

NO CALCULATOR!!!

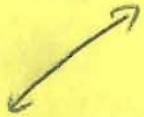
Level 1:

1. Sketch the end behavior of the functions:
   a. $f(x) = -2x^4 + 3x - 1$



   b. $f(x) = -.5x^3 + 4x^2 - x - 5$

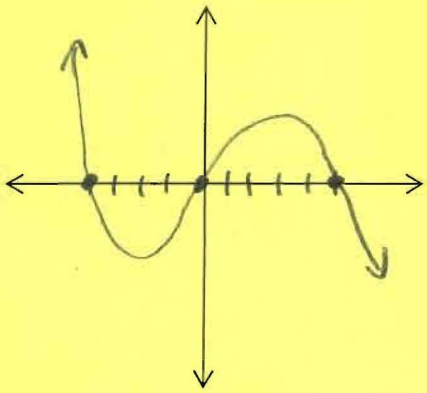
   c. $f(x) = ax^3 + bx^2 + cx + d$ where a > 1



Identify the significant features of the polynomial functions and use them to sketch their graph:

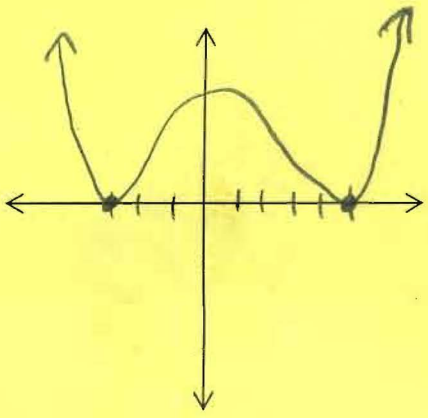
2. $f(x) = -2x(x+4)(x-5)$
   $x=0 \quad x=-4 \quad x=5$
   a. End behavior sketch:

   b. x-intercepts and their multiplicity:
   $x=0 \quad x=-4 \quad x=5$
   Multiplicity of 1 for all three



3. $f(x) = (x+3)^2(x-5)^2$
   a. End behavior sketch:

   b. x-intercepts and their multiplicity:
   $x=-3 \quad x=5$
   Multiplicity of 2 for both.



 Name_____
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Level 2/3:

4. Graph the cubic function and identify the features of the graph: $f(x) = x^3 + 5x^2 - 9x - 45$ given x = 3 is a zero.

odd (+) y-int = -45

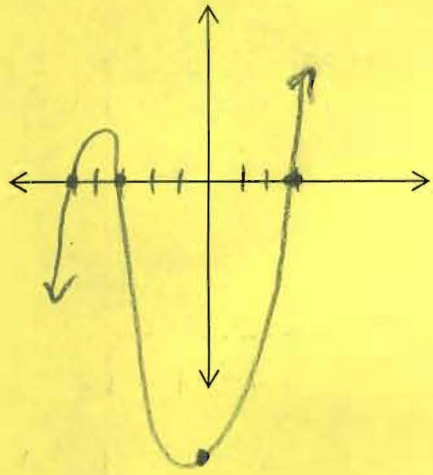
x=3 | 1 | 5 | -9 | -45
3 | 24 | 45
1 | 8 | 15 | 0
x^2 | x | c | r

$x^2 + 8x + 15 = 0$

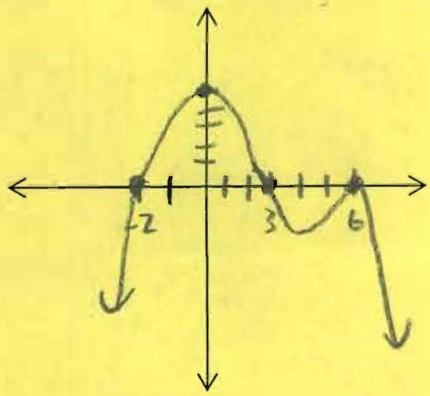
$(x+3)(x+5) = 0$

$x+3=0$ $x+5=0$

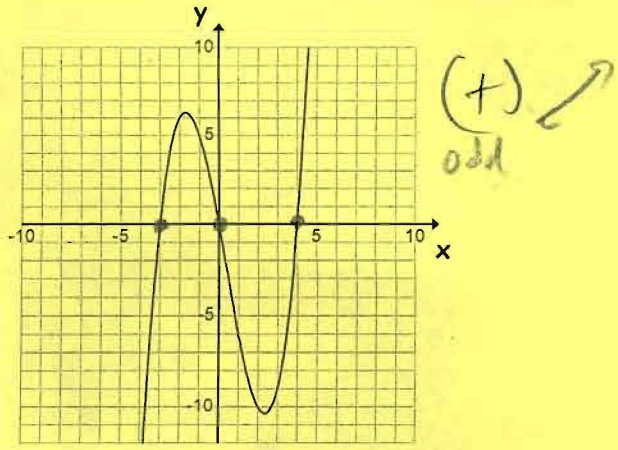
$x = -3$ $x = -5$



5. Sketch a graph that meets the following requirements:
   - Zeros at x = -2 , 3, and 6 x-int's.
   - Zeros -2 and 3 have multiplicity 1 and 6 has a multiplicity of 2 Even
   - Negative leading coefficient
   - Y-intercept at (0, 5)



6. Write an equation in standard form – assume the leading coefficient is 1 or -1. Make sure to match the end behavior with your equation.



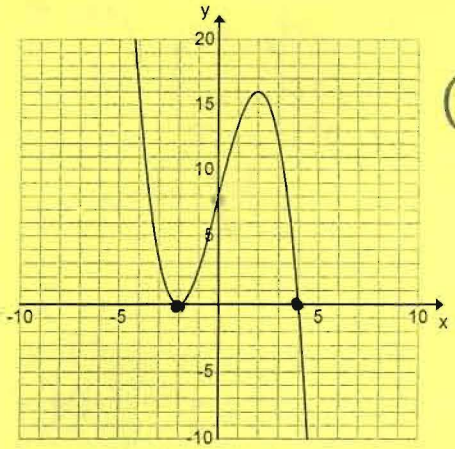
(+) odd ↗

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

$y = (x^2+3x)(x-4)$

$y = x^3 - 4x^2 + 3x^2 - 12x$

$y = x^3 - x^2 - 12x$



(−) odd ↕

$y = -1(x+2)(x+2)(x-4)$

$y = -1(x^2+2x+2x+4)(x-4)$

$y = -1(x^2+4x+4)(x-4)$

$y = -1(x^3 - 4x^2 + 4x^2 - 16x + 4x - 16$

$y = -1(x^3 - 12x - 16)$

$y = -x^3 + 12x + 16$

6.3 I can demonstrate understanding of how to solve polynomial equations.

Level 1

7. Find all of the roots of the function $f(x) = x^3 - 5x^2 - 2x + 24$ given x = -2 is a zero.

$-2 \mid 1 \quad -5 \quad -2 \quad 24$

$\quad\quad -2 \quad 14 \quad -24$

$1 \quad -7 \quad 12 \quad 0$

$x^2 \quad x \quad c \quad r$

$x^2 - 7x + 12 = 0$

$(x-3)(x-4) = 0$

$x = 3 \quad x = 4$

$x = -2$
$x = 3$
$x = 4$

8. Find the roots of the polynomial given that f(2)=0.

$$f(x) = x^3 + 5x^2 - 4x - 20$$

$2 \mid 1 \quad 5 \quad -4 \quad -20$

$\quad\quad 2 \quad 14 \quad 20$

$1 \quad 7 \quad 10 \quad 0$

$x^2 \quad x \quad c \quad r$

$x^2 + 7x + 10 = 0$

$(x+2)(x+5) = 0$

$x = -2 \quad x = -5$

$x = 2$
$x = -2$
$x = -5$

9. Find all the zeros of the polynomial given that (x + 6) is a factor.

$$f(x) = 2x^3 + 7x^2 - 33x - 18$$

$x = -6$

	2	7	−33	−18
		−12	30	18
	2	−5	−3	0
	x^2	x	c	r

$2x^2 - 5x - 3 = 0$

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

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

$-1 \quad -1 \qquad +3 \quad +3$

$\frac{2x}{2} = \frac{-1}{2} \qquad x = 3$

$x = -\frac{1}{2}$

Level 2/3:

10. Find all roots of the polynomial:

$$f(x) = x^3 + 2x^2 - 17x - 10$$

$x = -5$

	1	2	−17	−10
		−5	15	10
	1	−3	−2	0
	x^2	x	c	r

$x^2 - 3x - 2 = 0$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-2)}}{2(1)}$$

$$x = \frac{3 \pm \sqrt{17}}{2}$$

11. Find all of the zeros of the polynomial:

$$f(x) = x^3 - 2x^2 + 16x - 32$$

$x = 2$

	1	−2	16	−32
		2	0	32
	1	0	16	0
	x^2	x	c	r

$x^2 + 16 = 0$

$-16 \quad -16$

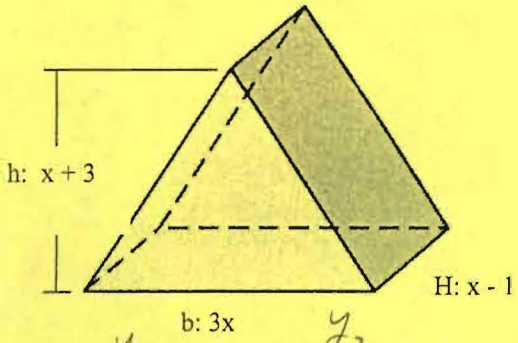
$\sqrt{x^2} = \sqrt{-16}$

$x = \pm 4i$

Show all work! Write and solve a polynomial equation to find the dimensions of the solid with the given volume.

12. Volume = 54 ft^3

$V = \frac{1}{2} \cdot b \cdot h \cdot H$



y_1 y_2

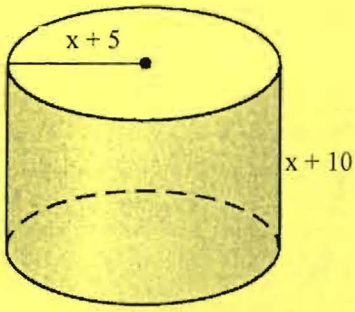
$54 = \frac{1}{2}(3x)(x+3)(x-1)$

$x = 3$

6ft. x 9ft. x 2ft.

13. Volume = 72π m^3

$V = \pi r^2 h$

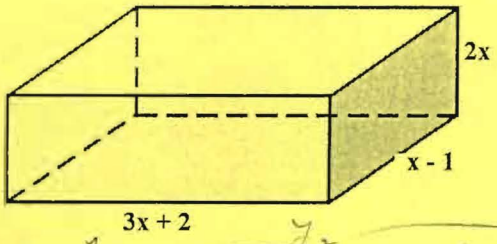


$72\pi = \pi(x+5)^2(x+10)$

$x = -2$

r = 3 m. h = 8 m.

14. Volume = 336 in^3



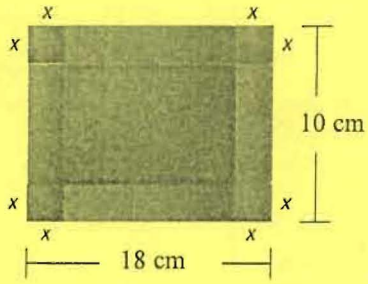
y_1 y_2

$336 = (3x+2)(x-1)(2x)$

$x = 4$

14 in. x 3 in. x 8 in.

15. Find the maximum volume and the value of x that would give the maximum volume.



$f(x) = (18-2x)(10-2x)(x)$

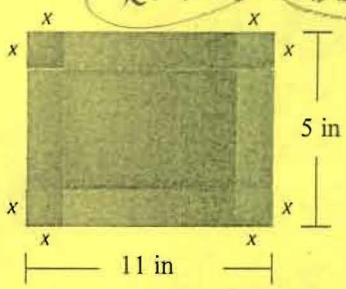
$x = 2.06$

Max Volume = 168.126 cm^3

16. Find the maximum volume and the value of x that would give the max volume.

$f(x) = (11-2x)(5-2x)(x)$

$x = 1.08$ Max Volume = 27.11 in^3



17. Find the maximum volume and the value of x that would give the max volume.

$f(x) = (6-2x)(4-2x)(x)$

$x = .78$

Max Volume

$x = 8.45$ in^3