Name: Class Period:

SM3 Worksheet 2.F ~ Multiplicity

1. If a polynomial has a degree as stated below, fill in the table to show how many real and complex solution combinations are possible.

A. Degree 5

Real	Imaginary

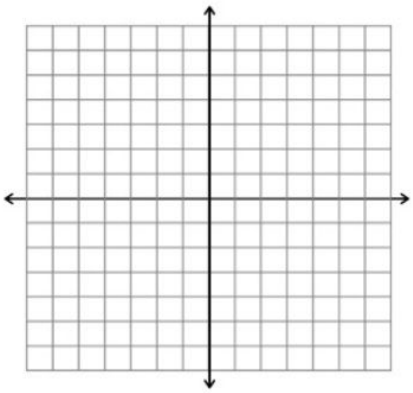
B. Degree 6

Real	Imaginary

Problems 2-3: Given f(x) and one of its zeros:

- Use synthetic division to break down the polynomial to find a quadratic result.
- Then factor your quotient and solve to find the remaining zeros.
- State the total number of zeros, and list how many are real and how many are imaginary.
- Write f(x) in x-intercept (factored) form.
- Use the zeros, y-intercept and end-behavior to sketch the graph of f(x). Verify on your grapher.

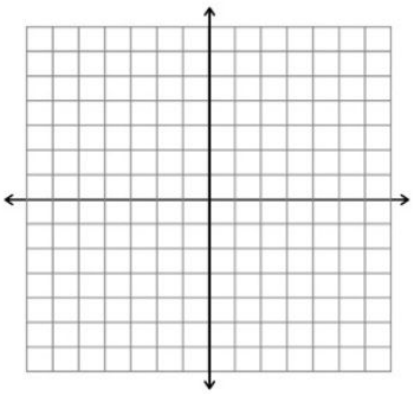
2. $f(x) = 2x^3 + 3x^2 - 3x - 2$; zero @ -2



Zeros are:

The Product of Linear Factors (x-Intercept Form): y=

3. $f(x) = x^3 + 2x^2 - 20x + 24$; zero @ -6



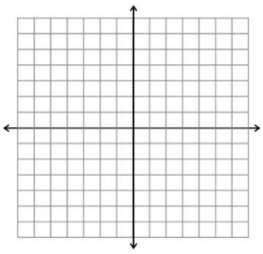
Zeros are:

The Product of Linear Factors (x-Intercept Form): y=

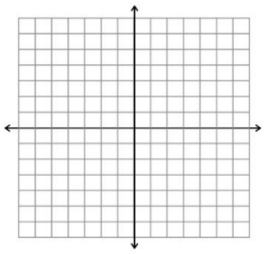
Problem 4-6: Given $f(x) = x^3$

- Sketch the transformation.
- State the number of each type of zero (real or imaginary) produced by each transformation.
- Include any multiplicities.

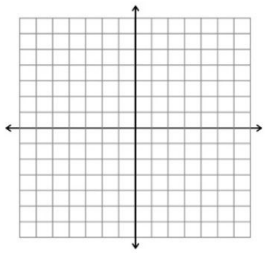
4. $f(x+2)$



5. $f(x)+2$



6. $f(x)-2$



Problems 7-10: Use the given equation and your grapher to determine:

- The total number of zeros of the function
- The number of real zeros of f(x)
- The number of imaginary/complex zeros of f(x)

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

Total:

Real:

Imaginary:

8. $f(x) = x^3 - 3x^2 + x + 1$

Total:

Real:

Imaginary:

9. $f(x) = x^4 - 5x^3 + x^2 - 3x + 6$

Total:

Real:

Imaginary:

10. $f(x) = x^5 - 2x^2 - 3x + 6$

Total:

Real:

Imaginary:

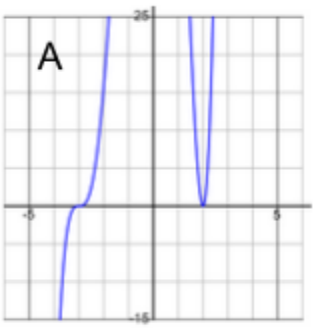
Problems 11-14: Match the polynomial function graphs to the given zeros and multiplicities.

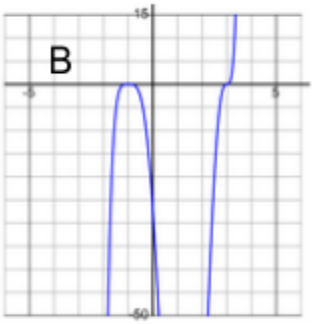
11. -3 (mult=2), 2 (mult=1)

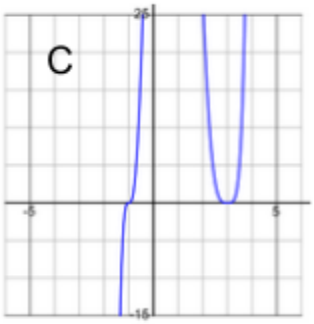
12. -3 (mult=3), 2 (mult=2)

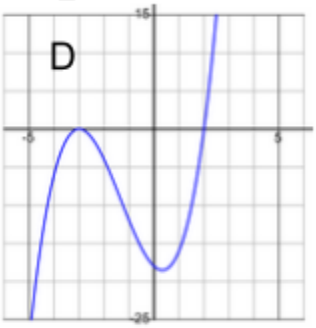
13. -1 (mult=4), 3 (mult=3)

14. -1 (mult=3), 3 (mult=4)



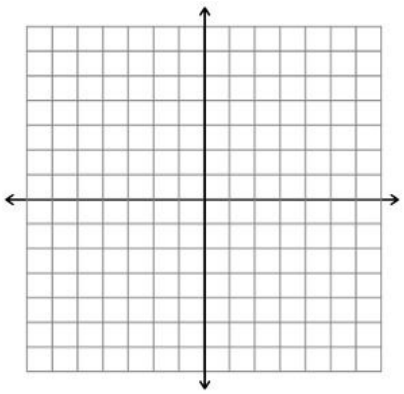






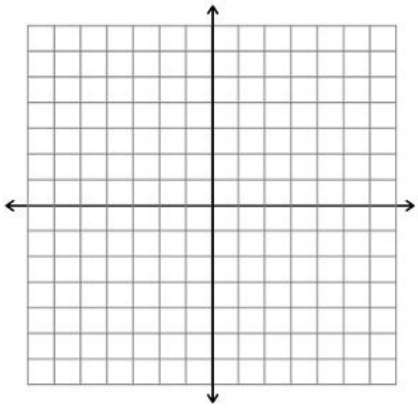
15. Use end-behavior, x and y-Intercepts, and multiplicity to sketch the polynomial. Label the scale on your x and y axis.

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



16. Use end-behavior, x and y-Intercepts, and multiplicity to sketch the polynomial. Label the scale on your x and y axis.

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



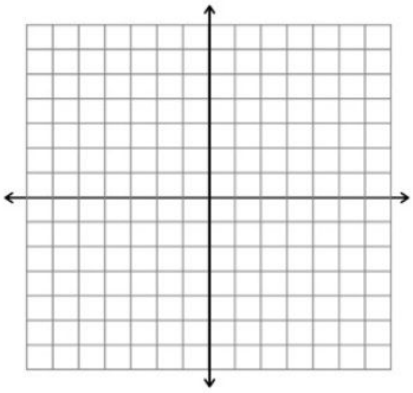
17. Find the Polynomial that fits the following table:

x	-4	-3	-2	-1	0	1	2	3
y	-12	0	0	-6	-12	-12	0	30

Problems 18-19: Use end-behavior, zeros and multiplicity to make a rough sketch of the graph of the given polynomial. *BONUS: Can you find the y-intercept?* Verify your final graph on your grapher.

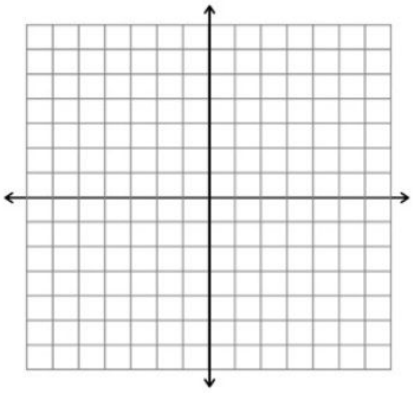
18. $y = -(x+2)^2(x-3)(x-1)$

Zeros *(and mult)*:



19. $y = x(x-3)^2$

Zeros *(and mult)*:



Y-intercept? Y-intercept?

Use a graphing Calculator to find an Integer Zero. Use Synthetic Division to find the Quadratic that goes with this Polynomial. Use the Quadratic Formula to Find all the EXACT solutions for the Polynomial.

20. Given $f(x) = x^3 - + 13x^2 + 54x - 70$

SOLUTIONS
Integer:
Irrational:
Complex:

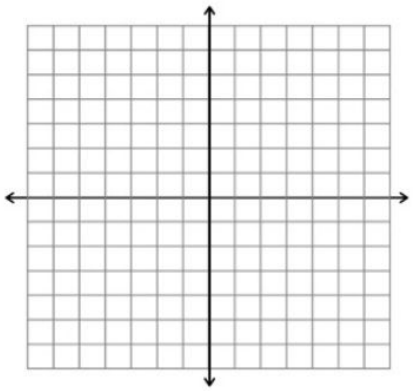
21. $f(x) = x^4 - 8x^3 + 24x^2 - 32x - 609$

Integer Solutions:
Irrational Solutions:
Complex Solutions:
FACTORED FORM:

22. $f(x) = x - 2;\ \ g(x) = x^3 + 3x - 4$

Is f(x) a factor of g(x)?
What is the value of y when x = 2?

23. Sketch and LABEL a graph with the following characteristics:
Increasing from [-4,-1]
Decreasing from $(-\infty,-4]$;
Decreasing: $[-1, \infty)$;
Relative minimum value of -2
Relative maximum value of 3.



24. Divide using long division. Show all work neatly. $\left(x^4 - 3x^3 + 6x^2 - 3x + 5\right) \div \left(x^2 + x\right)$