Form A

Pre-Calculus: 2.5 – 2.6

Complex Numbers and the Fundamental Theorem of Algebra

Name: _____

Date: _____ Hour: ___

SCORE: _____ / 88

Percent Correct: ____%

Be sure to SHOW ALL WORK. Answer questions completely. Be sure to write answers in spaces provided. If work or answers are in another location, please make note of that.
There are **88** points possible.

16/8/4	Correct, complete, with appropriate work or explanations.
12/6/3	Correct strategy, minor errors, appropriate work or explanations.
8/4/2	Starts with appropriate strategy, some understanding, some errors.
4/2/1	Attempted appropriate strategy, minimal understanding.
0	Little or no understanding evident – OR – no work shown.

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1. Perform the indicated operation and write the result in standard form. **(16 points)**

A. $(3-2i)+(-2+5i)$

Solution: _____

B. $(5-7i)-(3-2i)$

Solution: _____

C. $(1+2i)(3-2i)$

Solution: _____

D. i^{123}

Solution: _____

2. Write the expression in bi where b is a real number. **(4 points)**

A. $\sqrt{-81}$

Solution: _____

B. $\sqrt{-625}$

Solution: _____

3. Write the following expressions in standard form. **(12 points)**

A. $\frac{(2i)(3-4i)}{3+i}$

Solution: _____

A. $(1+3i)^3$

Solution: _____

4. Find the product of the complex number and its conjugate given that $f(x)=2-9i$. **(4 points)**

Solution: _____

5. Write in standard form a polynomial function that would have with real coefficients and zeros: $5, -1$ and $4 + i$. **(Multiply out)** **(12 points)**

Standard Form: _____

6. Write in standard form a polynomial function that would have with real coefficients and zeros with their multiplicities: **(Multiply out)** **(12 points)**

Zero	Multiplicity
-4	2
$3i$	1

Standard Form: _____

7. Find all of the zeros and write a linear factorization of the function. **(12 points)**

$$f(x) = x^4 + 3x^3 - x^2 + 2x - 40$$

Linear Factorization: _____

8. Given the zero $5 + 3i$, find all of the zeros and write a linear factorization of the function. **(8 points)**

$$f(x) = x^3 - 6x^2 - 6x + 136.$$

Linear Factorization: _____

Conceptual Questions: **(8 Points)**

1. Is it possible to get a 5th degree polynomial with real coefficients and zeros of $3 - 5i$ and $4 - i$? **Explain.**

2. Up to what exponent of i do you need to know in order to solve i^n when n is a positive constant? Why? **Provide an example.**

3. If you have an x^4 polynomial, what do you do if you can only find one zero in the table?

4. When given a polynomial function, how can we determine the number of zeros without actually solving for them? **Explain.**