

**Show all work to receive partial credit. (22 Points)**

1. Simplify the following:

a)  $2(3 - 2i) - 4(1 + 2i)$  (2 points)

1a. \_\_\_\_\_

b)  $i^{26}$  (1 point)

1b. \_\_\_\_\_

c)  $\frac{7}{3-i} - \frac{5}{2+i}$  (3 points)

1c. \_\_\_\_\_

d)  $|3 - 8i|$  (1 point)

1d. \_\_\_\_\_

2. Solve for  $z$ . (3 points)

$$(4 - 3i)z + (7 - 2i) = 5 + i$$

2. \_\_\_\_\_

3. Find the roots of the given equations using completing the square. (3 points)

$$y = x^2 - 4x + 13$$

3. \_\_\_\_\_

4. Write a cubic polynomial equation with roots at  $2i$ ,  $-2i$  and 4 and contains the point (1, -5). (3 points)

4. \_\_\_\_\_

## Simplifying $i$

**Standard:** N.CN.1 - Perform arithmetic operations with complex numbers.

N.CN.7 - Solve quadratic equations with real coefficients that have complex solutions.

N.CN.8 - Extend polynomial identities to the complex numbers. *For example, rewrite  $x^2 + 4$  as  $(x + 2i)(x - 2i)$ .*

**Task:** Students will demonstrate their ability by manipulating complex numbers to simplify expressions, solve for variables and determine polynomial equations given imaginary roots.

**Criteria:**

- Use appropriate operations to simplify/solve expressions
- Use the polynomial identity effectively
- Accurately perform mathematics calculations

**Rubric: (for each problem)**

| Criteria                                                  | Done Successfully | Not Done Successfully |
|-----------------------------------------------------------|-------------------|-----------------------|
| Use appropriate operations to simplify/solve expressions  |                   |                       |
| Use the polynomial identity effectively (Problem #4 only) |                   |                       |
| Accurately perform mathematics calculations               |                   |                       |