

## Complex and Imaginary Numbers

A. Simplify the following

1.  $i^{57}$

2.  $i^{122}$

3.  $i^{451}$

4.  $5i + 6 - 3i - 5$

5.  $2xi + 3i - 7xi + 5i$

6.  $i^5 + i^{19} - i^{28}$

7.  $5i(7 - 4i)$

8.  $(3i^5)(2i^9)(i^{13})$

9.  $(3 - 5i)^2$

10.  $(4i + 3)(2i - 7)$

11.  $\frac{2}{i}$

12.  $\frac{1}{i^3} - \frac{3}{i^5} + \frac{1}{i^{17}}$

13.  $\frac{5i}{2i - 3}$

14.  $\frac{i + 3}{3i + 2}$

B. Simplify the following

1.  $\sqrt{-3} \cdot \sqrt{-5}$

2.  $3i\sqrt{-4} \cdot 2i\sqrt{-5}$

3.  $\frac{5}{\sqrt{-3}}$

4.  $\frac{\sqrt{-6}}{\sqrt{-2}}$

5.  $\sqrt{-3}(\sqrt{-7} + 2i)$

6.  $\frac{\sqrt{5}}{3 - \sqrt{-2}}$

7.  $2\sqrt{-8} + 5\sqrt{-50}$

8.  $4i\sqrt{-2} - 3\sqrt{-27} + 8i^2\sqrt{2} - \sqrt{-48}$

C. Solving equations containing imaginary numbers:

1.  $4xi = 7$

2.  $5xi + 7 = -4i$

3.  $2x + 3 - 7 = -5xi + 6i + 4$

4.  $2xi + 5y + 3 + 2i = 7xi + 3i - 4 - 4y$

5.  $3x - 7yi + 2 = 5y + 6x + 2i$

6.  $5x + 2yi - 4 = 2y + 3xi + 6$

D. Describe the development of the imaginary number and complex number.

E. Determine the following:

1. nature of the roots

2. The sum and product of the roots

3. the roots of the equation (use either factoring or quadratic formula)

a)  $3x^2 - 7x + 6 = 0$

b)  $-4x^2 + 3x + 5 = 0$

c)  $2x^2 + x = 5 = 0$

F. Determine the quadratic equation (practice using both procedures)

a)  $\{-6, 7\}$

b)  $\{-6i, 6i\}$

c)  $\{4 - 7i, 4 + 7i\}$

d)  $\left\{\frac{-3 \pm 2i}{5}\right\}$