

Name: \_\_\_\_\_

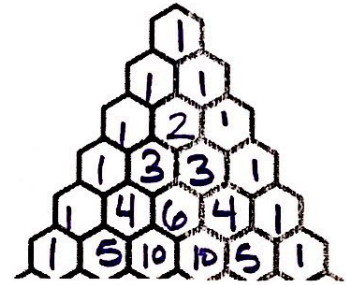
**Add, Subtract, Multiply, Divide, Simplify Polynomials with Complex Numbers**

**Key Ideas to Remember:**

- When adding- combine like terms.
- When subtracting- distribute the negative first and then combine like terms.
- When you adding/ subtracting like terms, you do NOT change the exponents.
- When multiplying like terms, you ADD the exponents.
- To divide complex numbers, you need to multiply by the CONJUGATE (opposite sign of the imaginary term)
- Complex Number Chart:

Power of i	Answer	Remainder
$i^1$	$i$	0.25
$i^2$	-1	0.5
$i^3$	$-i$	0.75
$i^4$	1	Whole number

- Pascal's Triangle and the Binomial Theorem



1.  $(1 + 2i)^3$

2.  $(2 - 5i)^4$

$$\begin{aligned}
 1 (2)^4 (-5i)^0 &= 1(16)(1) = 16 = 16i^0 \\
 4 (2)^3 (-5i)^1 &= 4(8)(-5i) = -160i = -160i^1 \\
 6 (2)^2 (-5i)^2 &= 6(4)(25i^2) = 600i^2 = -600 \\
 4 (2)^1 (-5i)^3 &= 4(2)(-125i^3) = -1000i^3 = 1000i \\
 1 (2)^0 (-5i)^4 &= 1(1)(625i^4) = 625i^4 = 625
 \end{aligned}$$

$$16 - 160i - 600 + 1000i + 625 =$$

3.  $(2x + i)^3$

4.  $-i(2 + 4i)^2$

$$-i(2 + 4i)(2 + 4i)$$

$$-i(4 + 16i - 16)$$

$$-i(-12 + 16i)$$

$$12i - 16i^2 = \boxed{12i + 16}$$

5.  $(4 - 3i)^3$

6.  $i(2 - i)^4$

$$7. (-2x + 3i)^3$$

$$1(-2x)^3 (3i)^0 = 1(-8x^3)(1) = -8x^3$$

$$3(-2x)^2 (3i)^1 = 3(4x^2)(3i) = 36x^2i$$

$$3(-2x)^1 (3i)^2 = 3(-2x)(9i^2) = -54xi^2 = 54x$$

$$1(-2x)^0 (3i)^3 = 1(1)(27i^3) = 27i^3 = -27i$$

$$\boxed{-8x^3 + 36x^2i + 54x - 27i}$$

$$9. 2i^{15} - 3i^6 + 8i^4 - i^2$$

$$10. 2i(-3i) + 6(-7i)$$

$$11. (-i+3)^3$$

$$12. (3+i)^2$$

$$13. (-i+3)^3 + (3+i)^2$$