

Name Schlansky  
Mr. Schlansky

Date \_\_\_\_\_  
Pre Calculus

$\frac{\text{power}}{4}$	1	.0	$i^0$
	$i$	.25	$i^1$
	-1	.50	$i^2$
	$-i$	.75	$i^3$

**Powers of  $i$**

For examples 1-4, simplify the given powers of  $i$ .

1.  $i^6$

$$\frac{6}{4} = 1.5(-1)$$

$$\boxed{-1}$$

2.  $2i^{23}$

$$\frac{23}{4} = 5.75(-i)$$

$$2(-i) = -2i$$

3.  $4i^{97}$

$$\frac{97}{4}$$

$$24.25(i)$$
$$4(i) = 4i$$

4.  $-3i^{203}$

$$\frac{203}{4} = 50.75(-i)$$

$$-3(-i) = 3i$$

For examples 5-8, perform the given operation and simplify to lowest terms.

5.  $i^{20} \cdot i^3$

$$i^{23} \quad \frac{23}{4} = 5.75(-i)$$

$$5(-i) = -5i$$

6.  $2i^6 \cdot 3i^7$

$$6i^{13}$$

$$6(i)$$

$$\boxed{6i}$$

$$\frac{13}{4} = 3.25(i)$$

7.  $8i^5 \cdot 2i^{16}$

$$16i^{21} \quad \frac{21}{4} = 5.25(i)$$

$$16(i)$$

$$\boxed{16i}$$

8.  $-3i^{71} \cdot 2i^{13}$

$$-6i^{84}$$

$$-6(1)$$

$$\boxed{-6}$$

$$\frac{84}{4} = 21.0(1)$$

1 .0  
i .25  
-1 .50  
-i .75

For examples 9-148, perform the given operations and simplify to lowest terms.

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

$2i^4 - 2i^6$   
 $\frac{4}{4} = 1.0 (1)$   
 $\frac{6}{4} = 1.5 (-1)$   
 $2(1) - 2(-1)$   
 $2 + 2$   
 $\frac{4}{4}$

10.  $3i^3(2i^2 + 5i^5)$

$6i^5 + 15i^8$   
 $6(i^0) + 15(1)$   
 $6 + 15$   
 $15 + 6i$   
 $\frac{5}{4} = 1.25 (i)$   
 $\frac{8}{4} = 2.0 (1)$

11.  $5i^3(6i^7 - 3i^{17})$

$30i^{10} - 15i^{20}$   
 $\frac{10}{4} = 2.5 (-1)$   
 $\frac{20}{4} = 5.0 (1)$   
 $30(-1) - 15(1)$   
 $-30 - 15$   
 $-45$

12.  $-2i^9(3i^3 + 4i^{12})$

$-6i^{12} - 8i^{21}$   
 $-6(1) - 8(i^0)$   
 $-6 - 8i$   
 $\frac{12}{4} = 3.0 (1)$   
 $\frac{21}{4} = 5.25 (i)$

13.  $i^{100} + i^{101} + i^{102}$

$\frac{100}{4} = 25.0 (1)$   
 $\frac{101}{4} = 25.25 (i)$   
 $\frac{102}{4} = 25.5 (-1)$   
 $i + i + 1$   
 $1 + i$

14.  $2i^{151} + 4i^{156} - 3i^{157}$

$\frac{151}{4} = 37.75 (i)$   
 $\frac{156}{4} = 39.0 (1)$   
 $\frac{157}{4} = 39.25 (i)$   
 $2(-i) + 4(1) - 3(i)$   
 $-2i + 4 - 3i$   
 $4 - 5i$

15.  $5i^{105} + 6i^{106} + 7i^{107}$

$\frac{105}{4} = 26.25 (i)$   
 $\frac{106}{4} = 26.5 (-1)$   
 $\frac{107}{4} = 26.75 (i)$   
 $5i - 6 - 7i$   
 $-6 - 2i$

16.  $-6i^{108} + 2i^{258} - i^{30}$

$\frac{108}{4} = 27.0 (1)$   
 $\frac{258}{4} = 64.5 (-1)$   
 $\frac{30}{4} = 7.5 (-1)$   
 $-6(1) + 2(-1) - (-1)$   
 $-6 - 2 + 1$   
 $-7$