

IMAGINARY AND COMPLEX NUMBERS

OBJECTIVES:

- 1) Add and subtract complex numbers.
- 2) Multiply complex numbers and simplify i^2 .
- 3) Divide complex numbers and rationalize the denominator.
- 4) Simplify powers of i .

COMPLEX NUMBER

Conjugate pair:

IMAGINARY NUMBER

SIMPLIFY/SOLVING WITH IMAGINARY NUMBERS

1) $\sqrt{-25}$

2) $\sqrt{-92}$

3) $\sqrt{-4} \cdot \sqrt{-4}$

5) $6i \cdot 3i$

6) Solve: $-2x^2 = 50$

7) $x = \frac{6 \pm \sqrt{-24}}{4}$

ADDING/SUBTRACTING COMPLEX NUMBERS

8) $(5 - 8i) + (11 + 6i)$

$16 - 2i$

9) $(-6 - 7i) - (10 - 9i)$

10) $-i + (9 - 2i) - (5 + 7i)$

$-i + 9 - 2i - 5 - 7i$
 $-10i + 4$

MULTIPLYING AND DIVIDING COMPLEX NUMBERS:

11) $(3 + i)(2 + i)$

12) $(9 - 10i)(-8 + 3i)$

$-72 + 27i + 80i - 30i^2$
 $-72 + 107i - 30(-1)$
 $-42 + 107i$

13) $(5 + 2i)^2$

$25 + 20i + 4i^2$
 $20i + 21$

$$14) \frac{11+7i}{4i}$$

**SIDE NOTE:
RATIONALIZING THE DENOMINATOR**

$$\frac{2}{\sqrt{3}}$$

$$15) \frac{7-8i}{2i} \cdot \frac{2i}{2i}$$

$$\frac{14i-16i^2}{4i^2} = \frac{14i+16}{-4}$$

$$= \boxed{\frac{7i-8}{-2}}$$

$$16) \frac{2-4i}{1+3i} \frac{(1-3i)}{(1-3i)}$$

$$= \frac{2-4i-6i+12i^2}{1-9i^2}$$

$$= \frac{10i-10}{-8}$$

$$= \boxed{\frac{5i-5}{4}}$$

$$17) \frac{3+4i}{7-i}$$

RECIPROCAL

Find the reciprocal.

$$18) 3-2i$$

$$19) 2+6i$$

$$\frac{1}{2+6i} \cdot \frac{2-6i}{2-6i}$$

$$\frac{2-6i}{4-36i^2} = \frac{2-6i}{40} = \boxed{\frac{1-3i}{20}}$$

SIMPLIFYING POWERS OF i

$$i = \sqrt{-1}$$

$$i^2 =$$

$$i^3 =$$

$$i^4 =$$

$$a) i^{24} =$$

$$b) i^{25} =$$

$$c) i^{26} =$$

$$d) i^{27} =$$

YOU TRY!

$$e) i^{100} = (i^2)^{50} = (-1)^{50} = \boxed{1}$$

$$f) i^{101} = (i^2)^{50} i = (-1)^{50} i = \boxed{i}$$