

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

## Complex Numbers

Evaluate the expression and write the result in  $a + bi$  form

1.  $(2 - 5i) + (3 + 4i)$

$5 - i$

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

$-6 + 6i$

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

$30 + 10i$

4.  $(6 + 5i)(2 - 3i)$

$27 - 8i$

5.  $\frac{1+6i}{3i}$

$2 - \frac{1}{3}i$

6.  $\frac{2-3i}{1-2i}$

$\frac{8}{5} + \frac{1}{5}i$

7. 
$$\frac{(1+2i)(3-i)}{2+i} = \frac{\cancel{3+5i-2i^2}}{\cancel{2+i}} \cdot \frac{5+5i}{\cancel{2+i}} \left( \frac{2-i}{2-i} \right)$$

$$\frac{10-5i^2+5i}{4-i^2} = \frac{10+5+5i}{4+1} = \frac{15+5i}{5} = \boxed{3+i}$$

8.  $i^{1002}$

$$i^{1000} i^2$$

$$(i^4)^{250} i^2$$

$$i^2 = \boxed{-1}$$

9.  $\sqrt{-25} = 5i$

$\pm 6\sqrt{2}i$

11.  $(3 - \sqrt{-5})(1 + \sqrt{-1})$

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

12.  $(\sqrt{3} - \sqrt{-4})(\sqrt{6} - \sqrt{-9})$

$(\sqrt{3} - 2i)(\sqrt{6} - 3i)$

$$\frac{\sqrt{18} - 3\sqrt{3}i - 2\sqrt{6}i + 6i^2}{3\sqrt{2} - 6 - (3\sqrt{3} + 2\sqrt{6})i}$$

Find all solutions of the equation and express them in the form  $a + bi$ 

13.  $x^2 + 9 = 0$

$$x^2 = -9$$

$$x = \sqrt{-9}$$

$$x = \pm 3i$$

14.  $x^2 - 4x + 5 = 0$

$$\frac{4 \pm \sqrt{(-4)^2 - 4(1)(5)}}{2(1)} = \frac{4 \pm \sqrt{16 - 20}}{2} = \frac{4 \pm \sqrt{-4}}{2} = \frac{4 \pm 2i}{2} = \boxed{2 \pm i}$$

$$15. \quad 2x^2 - 2x + 1 = 0$$

$$\frac{1}{2} \pm \frac{1}{2}i$$

$$16. \quad x(x+4+\frac{12}{x})=0$$

$$x^2 + 4x + 12$$

$$\frac{-4 \pm \sqrt{16-48}}{2}$$

$$\frac{-4 \pm \sqrt{-32}}{2}$$

$$\frac{-4 \pm 4\sqrt{2}i}{2} = \boxed{-2 \pm 2\sqrt{2}i}$$