

NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

Divide.

$$1. \frac{1-2i}{2i} \cdot \frac{(-2i)}{(-2i)}$$

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

$$= \frac{-2i-4}{4} = \boxed{\frac{-i-2}{2} \text{ or } -1-\frac{1}{2}i}$$

$$2. \frac{5-2i}{5+2i} \cdot \frac{(5-2i)}{(5-2i)}$$

$$\frac{25-10i-10i+4i^2}{25-10i+10i-4i^2}$$

$$\frac{25-20i+4(-1)}{25-4(-1)} = \boxed{\frac{21-20i}{29}}$$

Top equation is wrong should be sub

$$3. \frac{\sqrt{3}+2i}{-2-\sqrt{3}i} \cdot \frac{-2+\sqrt{3}i}{-2+\sqrt{3}i}$$

$$\frac{-2\sqrt{3}+3i+4i-2\sqrt{3}i^2}{4-2\sqrt{3}i+2\sqrt{3}i-3i^2}$$

$$= \frac{-2\sqrt{3}+3i+4i+2\sqrt{3}}{4+3} = \frac{7i}{7} = \boxed{i}$$

$$4. \frac{1+2i}{2i} \cdot \frac{-2i}{-2i}$$

$$\frac{-2i-4i^2}{-4i^2} = \frac{-2i-4(-1)}{-4(-1)}$$

$$= \frac{-2i+4}{4} = \boxed{\frac{2-i}{2}}$$

$$5. \frac{5+2i}{5-2i} \cdot \frac{(5+2i)}{(5+2i)}$$

$$\frac{25+10i+10i+4i^2}{25+10i-10i-4i^2}$$

$$\frac{25+20i-4}{25+4} = \boxed{\frac{21+20i}{29}}$$

$$6. \frac{\sqrt{3}+2i}{\sqrt{3}-2i} \cdot \frac{\sqrt{3}+2i}{\sqrt{3}+2i}$$

$$\frac{3+2i\sqrt{3}+2i\sqrt{3}+4i^2}{3+2i\sqrt{3}-2i\sqrt{3}-4i^2} = \frac{3+4i\sqrt{3}-4}{7}$$

$$\boxed{\frac{-1+4i\sqrt{3}}{7}}$$

$$7. \frac{4i}{1-2i} \cdot \frac{1+2i}{1+2i}$$

$$= \frac{4i+8i^2}{1+2i-2i-4i^2} = \frac{4i+8(-1)}{1-4(-1)}$$

$$= \frac{4i-8}{5} = \boxed{\frac{4i-8}{5}}$$

$$8. \frac{5i}{5-2i} \cdot \frac{(5+2i)}{(5+2i)}$$

$$\frac{25+10i^2}{25+10i-10i-4i^2} = \frac{25+10(-1)}{25-4(-1)}$$

$$= \frac{15}{30} = \boxed{\frac{1}{2}}$$

$$9. \frac{\sqrt{6}-3i}{i} \cdot \frac{-i}{-i} = \frac{-i\sqrt{6}-3i^2}{-i^2}$$

$$= \frac{-i\sqrt{6}-3(-1)}{-(-1)} = \boxed{3-i\sqrt{6}}$$

Write each complex number below in two different ways. For example, we could write $3+2i$ as $(4+i)-(1-i)$ or $\frac{9+6i}{3}$ or $\frac{1}{2}(6+4i)$.

10. $6-21i$

$(2-25i)+(4+4i)$
or
 $2(3-7i)-7i$

11. $-9+4i$

$(15+2i)-(21-2i)$
or
 $3(-3+2i)-2i$
or
 $(2i-3)(2i+3)+4(1+i)$

12. $-24-7i$

$-1(24+7i)$
or
 $-6(5+i)-(6+i)$
or
 $(5-i)(5+i)-(50+7i)$

Spiral REVIEW—Complex Numbers

Evaluate.

13. i^2

$$\boxed{-1}$$

14. i^3

$$\begin{aligned} & i^2 \cdot i \\ & -1 \cdot i \\ & \boxed{-i} \end{aligned}$$

15. i^4

$$\begin{aligned} & i^2 \cdot i^2 \\ & -1 \cdot -1 \\ & \boxed{1} \end{aligned}$$

16. i^9

$$\begin{aligned} & i^4 \cdot i^4 \cdot i \\ & 1 \cdot 1 \cdot i \\ & \boxed{i} \end{aligned}$$

17. i^{14}

$$\begin{aligned} & i^4 \cdot i^4 \cdot i^4 \cdot i^2 \\ & 1 \cdot 1 \cdot 1 \cdot -1 \\ & \boxed{-1} \end{aligned}$$

Write the expression as a complex number in standard form.

18. $(5 + 2i) + (3 - 2i)$

$$\boxed{8}$$

19. $-i(7 - 5i) - 3(2 - 3i)$

$$\begin{aligned} & -7i + 5i^2 - 6 + 9i \\ & 2i + 5i^2 - 6 \\ & 2i + 5(-1) - 6 \\ & 2i - 5 - 6 \\ & \boxed{-11 + 2i} \end{aligned}$$

20. $(-2 + 4i) + (3 - 9i)$

$$\boxed{1 - 5i}$$

21. $(-2 + 4i) - (3 + 9i)$

$$\begin{aligned} & -2 + 4i - 3 - 9i \\ & \boxed{-5 - 5i} \end{aligned}$$

22. $(5 - 2i) - 2(3 + i)$

$$\begin{aligned} & 5 - 2i - 6 - 2i \\ & \boxed{-1 - 4i} \end{aligned}$$

23. $3i(6 - 5i)$

$$\begin{aligned} & 18i - 15i^2 \\ & 18i - 15(-1) \\ & \boxed{15 + 18i} \end{aligned}$$

24. $\frac{4}{i}$

$$\begin{aligned} & \frac{4}{i} \cdot \frac{-i}{-i} = \frac{-4i}{-i^2} = \frac{-4i}{-1(-1)} \\ & \boxed{= -4i} \end{aligned}$$

25. $(2 + 3i)(1 - 4i)$

$$\begin{aligned} & 2 - 8i + 3i - 12i^2 \\ & 2 - 5i - 12i^2 \\ & 2 - 5i - 12(-1) \\ & 2 - 5i + 12 \\ & \boxed{14 - 5i} \end{aligned}$$

26. $(-3 + 7i)(1 - 2i)$

$$\begin{aligned} & -3 + 6i + 7i - 14i^2 \\ & -3 + 13i - 14i^2 \\ & -3 + 13i - 14(-1) \\ & -3 + 13i + 14 \\ & \boxed{11 + 13i} \end{aligned}$$

$$\begin{aligned}
 27. & (3 - 2i)^2 \\
 & (3 - 2i)(3 - 2i) \\
 & 9 - 6i - 6i + 4i^2 \\
 & 9 - 12i + 4(-1) \\
 & 9 - 12i - 4 \\
 & \boxed{5 - 12i}
 \end{aligned}$$

$$\begin{aligned}
 28. & (2i)(1 - 4i)(1 + i) \\
 & (2i - 8i^2)(1 + i) \\
 & 2i - 8(-1) \\
 & (2i + 8)(1 + i) \\
 & 2i + 2i^2 + 8 + 8i \\
 & 2i + 2(-1) + 8 + 8i \\
 & \boxed{6 + 10i}
 \end{aligned}$$

$$\begin{aligned}
 29. & \frac{5i}{2+i} \cdot \frac{2-i}{2-i} = \frac{10i - 5i^2}{4 - 2i + 2i - i^2} \\
 & \frac{10i - 5(-1)}{4 - (-1)} = \frac{10i + 5}{5} \\
 & \boxed{1 + 2i}
 \end{aligned}$$

$$\begin{aligned}
 30. & (3i)(9i) \\
 & 27i^2 \\
 & 27(-1) \\
 & \boxed{-27}
 \end{aligned}$$

$$\begin{aligned}
 31. & \frac{-2}{3i} \cdot \frac{-3i}{-3i} = \frac{6i}{-9i^2} \\
 & \frac{6i}{-9(-1)} = \frac{2i}{3} \cdot \frac{3}{3} \\
 & \boxed{\frac{2i}{3}}
 \end{aligned}$$

$$\begin{aligned}
 32. & 3(2 + 4i) \\
 & \boxed{6 + 12i}
 \end{aligned}$$

$$\begin{aligned}
 33. & 2i(3 + 5i) \\
 & 6i + 10i^2 \\
 & 6i + 10(-1) \\
 & \boxed{-10 + 6i}
 \end{aligned}$$

$$\begin{aligned}
 34. & (5 + 2i)(4 - i) \\
 & 20 - 5i + 8i - 2i^2 \\
 & 20 + 3i - 2(-1) \\
 & 20 + 3i + 2 \\
 & \boxed{22 + 3i}
 \end{aligned}$$

$$\begin{aligned}
 35. & (3 - 4i)^2 \\
 & \boxed{6 - 8i}
 \end{aligned}$$

$$\begin{aligned}
 36. & (3 + 2i)(3 - 2i) \\
 & 9 - \cancel{6i} + \cancel{6i} - 4i^2 \\
 & 9 - 4(-1) \\
 & 9 + 4 \\
 & \boxed{13}
 \end{aligned}$$

$$\begin{aligned}
 37. & i(2 + i) \\
 & 2i + i^2 \\
 & 2i + (-1) \\
 & \boxed{-1 + 2i}
 \end{aligned}$$

$$\begin{aligned}
 38. & (-7i)(3i) \\
 & -21i^2 \\
 & -21(-1) \\
 & \boxed{21}
 \end{aligned}$$

39. $\frac{5}{3-i}$

$$\frac{5}{3-i} \cdot \frac{3+i}{3+i} = \frac{5(3+i)}{(3-i)(3+i)}$$

$$= \frac{15+5i}{9+3i-3i-i^2} = \frac{15+5i}{9-(-1)} = \frac{15+5i}{2 \cdot 10}$$

$$\boxed{\frac{3+i}{2}}$$

40. $(4+3i) + (5-2i)$

$$\boxed{9+i}$$

41. $\frac{2-4-8i}{3-6}$ GCF: -2

$$\boxed{\frac{2+4i}{3}}$$

Simplify.

42. $\sqrt{-121}$

$$\sqrt{-1} \cdot \sqrt{121}$$

$$i \cdot 11$$

$$\boxed{11i}$$

43. $\sqrt{-7}$

$$\sqrt{-1} \quad \sqrt{7}$$

$$i \cdot \sqrt{7}$$

$$\boxed{i\sqrt{7}}$$

44. $\sqrt{-98}$

$$\sqrt{-1} \quad \sqrt{98}$$

$$i \cdot 7\sqrt{2}$$

$$\boxed{7i\sqrt{2}}$$