

Set D

Simplify the expression.

22. i (What does i equal?)

23. i^2

24. i^3

25. i^4

26. i^5

27. i^6

28. i^7

29. i^8

30. i^{10}

31. i^{12}

32. i^{20}

33. i^{30}

- 22. _____
- 23. _____
- 24. _____
- 25. _____
- 26. _____
- 27. _____
- 28. _____
- 29. _____
- 30. _____
- 31. _____
- 32. _____
- 33. _____

Set E

Perform the indicated operation.

34. $(3 + 2i) + (9 + i)$

35. $(9 + 2i) + (3 - i)$

36. $(-4 + i) + (i - 4)$

37. $(1 + i) + (7 - 4i)$

38. $(5 - 3i) - (-1 + i)$

39. $(2 - i) - (5 + i)$

40. $(1 - 3i) - (9 + i)$

41. $(-4 + 6i) - (-3 + 12i)$



Get Initials or Loose ALL Credit

- 34. _____
- 35. _____
- 36. _____
- 37. _____
- 38. _____
- 39. _____
- 40. _____
- 41. _____

Set F

Perform the indicated operation.

42. $i(1 + i)$

43. $i(2 - i)$

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

45. $3i(1 - 2i)$

46. $2i(6 + i)$

47. $-8i(6 + i)$

48. $(3 + i)(2 + i)$

49. $(2 + 7i)(4 + 2i)$

50. $(1 + 4i)(2 + i)$

51. $(9 - 10i)(-8 + 3i)$

52. $(-7 - i)(3 + 2i)$

53. $(-14 + 6i)(1 - i)$



Get Initials or Loose ALL Credit

- 42. _____
- 43. _____
- 44. _____
- 45. _____
- 46. _____
- 47. _____
- 48. _____
- 49. _____
- 50. _____
- 51. _____
- 52. _____
- 53. _____



Get Initials or Loose ALL Credit

5-4 Study Guide and Intervention (continued)**Complex Numbers****Operations with Complex Numbers**

Complex Number	A complex number is any number that can be written in the form $a + bi$, where a and b are real numbers and i is the imaginary unit ($i^2 = -1$). a is called the real part, and b is called the imaginary part.
Addition and Subtraction of Complex Numbers	Combine like terms. $(a + bi) + (c + di) = (a + c) + (b + d)i$ $(a + bi) - (c + di) = (a - c) + (b - d)i$
Multiplication of Complex Numbers	Use the definition of i^2 and the FOIL method: $(a + bi)(c + di) = (ac - bd) + (ad + bc)i$
Complex Conjugate	$a + bi$ and $a - bi$ are complex conjugates. The product of complex conjugates is always a real number.

To divide by a complex number, first multiply the dividend and divisor by the **complex conjugate** of the divisor.

Example 1 Simplify $(6 + i) + (4 - 5i)$.

$$\begin{aligned}(6 + i) + (4 - 5i) \\ &= (6 + 4) + (1 - 5)i \\ &= 10 - 4i\end{aligned}$$

Example 3 Simplify $(2 - 5i) \cdot (-4 + 2i)$.

$$\begin{aligned}(2 - 5i) \cdot (-4 + 2i) \\ &= 2(-4) + 2(2i) + (-5i)(-4) + (-5i)(2i) \\ &= -8 + 4i + 20i - 10i^2 \\ &= -8 + 24i - 10(-1) \\ &= 2 + 24i\end{aligned}$$

Example 2 Simplify $(8 + 3i) - (6 - 2i)$.

$$\begin{aligned}(8 + 3i) - (6 - 2i) \\ &= (8 - 6) + [3 - (-2)]i \\ &= 2 + 5i\end{aligned}$$

Example 4 Simplify $\frac{3 - i}{2 + 3i}$.

$$\begin{aligned}\frac{3 - i}{2 + 3i} &= \frac{3 - i}{2 + 3i} \cdot \frac{2 - 3i}{2 - 3i} \\ &= \frac{6 - 9i - 2i + 3i^2}{4 - 9i^2} \\ &= \frac{3 - 11i}{13} \\ &= \frac{3}{13} - \frac{11}{13}i\end{aligned}$$

Exercises

Simplify.

1. $(-4 + 2i) + (6 - 3i)$

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

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

4. $(-11 + 4i) - (1 - 5i)$

5. $(8 + 4i) + (8 - 4i)$

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

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

8. $(5 - 2i)(4 - i)$

9. $(4 - 2i)(1 - 2i)$

10. $\frac{5}{3 + i}$

11. $\frac{7 - 13i}{2i}$

12. $\frac{6 - 5i}{3i}$