

Complex Numbers Practice

Simplify.

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

$$-7 + i$$

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

$$-8 + 3i$$

3) $-4 - 5i - 6 - 6i + 6$

$$-4 - 11i$$

4) $-7 - 2i - (8 + 2i) + 5$

$$-10 - 4i$$

5) $2i(-8 + 8i)(3 + 2i)$

$$2i(-24 + 8i + 16i^2)$$

$$2i(-24 + 8i - 16)$$

$$2i(-40 + 8i) = -80i + 16i^2 = -16 - 80i$$

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

$$(15 - 9i - 6i^2)$$

$$(15 - 9i + 6)$$

$$(21 - 9i)(-6 - 2i)$$

$$(-126 + 12i + 18i^2)$$

$$-126 + 12i - 18$$

$$-144 + 12i$$

7) $-3i(-6 + 7i)(6 + 2i)$

$$-3i(-36 + 30i - 14)$$

$$-3i(-50 + 30i)$$

$$150i - 90i^2 = 90 + 150i$$

8) $(-4 - 4i)(8 + 7i)(-4 - 6i)$

$$(-32 - 60i - 28i^2)$$

$$(-4 - 60i)(-4 - 6i)$$

$$16 + 264i + 360i^2$$

$$-344 + 264i$$

9) $2i - 4 - 4i + 8i + (-2 - 4i)(5 - 4i)$

$$-10 - 12i + 16i^2$$

$$-30 - 6i$$

10) $-8i(8 + 3i)(1 + 5i)$

$$-8i(8 + 43i + 15i^2)$$

$$-8i(-7 + 43i)$$

$$56i - 344i^2 = 344 + 56i$$

11) $6i(7 - 7i)(-1 + 3i)$

$$6i(-7 + 28i - 21i^2)$$

$$6i(28i + 14)$$

$$168i^2 + 84i = -168 + 84i$$

12) $2i - 6i - 1 - 4i + (-4 - 8i)(-6 + 5i)$

$$(24 + 28i - 40i^2)$$

$$63 + 20i$$

13) $7i(-7 + 8i)(7 + 2i)$

$$7i(-49 + 42i + 16i^2)$$

$$7i(42i - 65)$$

$$294i^2 - 455i = -294 - 455i$$

14) $(-1 - 3i)(2 - 7i)(5 - 7i)$

$$(-2 + i + 21i^2)$$

$$(-23 + i)(5 - 7i)$$

$$-115 + 166i - 7i^2$$

$$-108 + 166i$$

15) $\frac{(3 - 3\sqrt{5})(2 + 10\sqrt{6})}{(2 - 10\sqrt{6})(2 + 10\sqrt{6})} = \frac{6 + 30\sqrt{6} - 6\sqrt{5} - 30\sqrt{30}}{4 - 100(6)}$

$$= \frac{6(1 + 5\sqrt{6} - \sqrt{5} - 5\sqrt{30})}{-596} = \frac{3(1 + 5\sqrt{6} - \sqrt{5} - 5\sqrt{30})}{-298}$$

16) $\frac{10}{(5\sqrt{2} - 9)(5\sqrt{2} + 9)} = \frac{50\sqrt{2} + 90}{25(2) - 81} = \frac{50\sqrt{2} + 90}{-31}$

$$17) \frac{8}{\sqrt[3]{36}} = \frac{8}{\sqrt[3]{6^2}} = \frac{8}{\sqrt[3]{6}} = \frac{8\sqrt[3]{6}}{6} = \frac{4\sqrt[3]{6}}{3}$$

$$18) \frac{2}{\sqrt{20}} = \frac{2}{4\sqrt{5}} = \frac{2}{4\sqrt{20^3}} = \frac{2\sqrt[4]{8000}}{20} = \frac{4\sqrt[4]{500}}{20} = \frac{\sqrt[4]{5}}{5}$$

$$\frac{3}{\sqrt[3]{225}} = \frac{3}{\sqrt[3]{15^2}} = \frac{3}{\sqrt[3]{15}} = \frac{3\sqrt[3]{15}}{15} = \frac{\sqrt[3]{15}}{5}$$

$$19) \frac{5}{-4i} \cdot \frac{i}{i} = \frac{5i}{-4i^2} = \frac{5i}{4}$$

$$20) \frac{5}{2i} \cdot \frac{i}{i} = \frac{5i}{2i^2} = -\frac{5i}{2}$$

$$21) \frac{7}{(-9-9i)(-9+9i)} = \frac{-63+63i}{81-81i^2} = \frac{9(-7+7i)}{162}$$

$$= \frac{-7+7i}{18} = \frac{7(-1+i)}{18}$$

$$22) \frac{4i}{(6+2i)(6-2i)} = \frac{24i-8i^2}{36-4i^2} = \frac{8+24i}{40} = \frac{8(1+3i)}{40}$$

$$= \frac{1+3i}{5}$$

$$23) \frac{(-4+2i)(6-5i)}{(6+5i)(6-5i)} = \frac{-24+32i-10i^2}{36-25i^2} = \frac{-14+32i}{61}$$

$$\frac{2(-7+16i)}{61}$$

$$24) \frac{10(3+6i)}{(3-6i)(3+6i)} = \frac{30+60i}{9-36i^2} = \frac{30(1+2i)}{45}$$

$$= \frac{2(1+2i)}{3}$$

Simplify each complex number and write in $a + ib$ form.

$$25) \sqrt{-63} \quad 3i\sqrt{7}$$

$$26) -\sqrt{-5} \cdot \sqrt{-10}$$

$$= -i\sqrt{5} \cdot i\sqrt{10} = -i^2\sqrt{50} = \sqrt{50} = 5\sqrt{2}$$

$$27) (\sqrt{-5}-4)^2$$

$$\text{~~not~~ } (i\sqrt{5}-4)(i\sqrt{5}-4)$$

$$5i^2 - 8i\sqrt{5} + 16$$

$$11 - 8i\sqrt{5}$$

$$28) -(4i)^{-4}$$

$$= -\frac{1}{(4i)^4} = -\frac{1}{256}$$

$$29) 6i^4 - 3i^3 + 4i^2 - i$$

$$6 - 3i \cdot i^2 + 4(-1) - i$$

$$6 - 3i(-1) - 4 - i$$

$$6 + 3i - 4 - i = \boxed{2+2i} = 2(1+i)$$

$$30) \sqrt{-6} \cdot \sqrt{-12}$$

$$i\sqrt{6} \cdot 2i\sqrt{3} = 2i^2\sqrt{18} = -2\sqrt{18} = -6\sqrt{2}$$

Complex Numbers Practice

Simplify.

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

3) $-4 - 5i - 6 - 6i + 6$

4) $-7 - 2i - (8 + 2i) + 5$

5) $2i(-8 + 8i)(3 + 2i)$

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

7) $-3i(-6 + 7i)(6 + 2i)$

8) $(-4 - 4i)(8 + 7i)(-4 - 6i)$

9) $2i - 4 - 4i + 8i + (-2 - 4i)(5 - 4i)$

10) $-8i(8 + 3i)(1 + 5i)$

11) $6i(7 - 7i)(-1 + 3i)$

12) $2i - 6i - 1 - 4i + (-4 - 8i)(-6 + 5i)$

13) $7i(-7 + 8i)(7 + 2i)$

14) $(-1 - 3i)(2 - 7i)(5 - 7i)$

15) $\frac{3 - 3\sqrt{5}}{2 - 10\sqrt{6}}$

16) $\frac{10}{5\sqrt{2} - 9}$

17) $\frac{8}{\sqrt[3]{36}}$

18) $\frac{2}{\sqrt[4]{20}}$

19) $\frac{5}{-4i}$

20) $\frac{5}{2i}$

21) $\frac{7}{-9-9i}$

22) $\frac{4i}{6+2i}$

23) $\frac{-4+2i}{6+5i}$

24) $\frac{10}{3-6i}$

Simplify each complex number and write in $a + ib$ form.

25) $\sqrt{-63}$

26) $-\sqrt{-5} \cdot \sqrt{-10}$

27) $(\sqrt{-5} - 4)^2$

28) $-(4i)^{-4}$

29) $6i^4 - 3i^3 + 4i^2 - i$

30) $\sqrt{-6} \cdot \sqrt{-12}$