

Perform the indicated operation. Express in standard form.

1. $(4 - 3i) + (12 - 9i)$

$$16 - 12i$$

2. $(15 + 7i) - (4 + 3i)$

$$11 + 10i$$

3. $5i + (6 - 8i)$

$$6 - 3i$$

4. $4i(5 - 3i)$

$$20i - 12i^2$$

$$20i - 12(-1)$$

$$20i + 12$$

$$12 + 20i$$

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

$$15 + 18i - 20i - 24i^2$$

$$15 - 2i - 24(-1)$$

$$15 - 2i + 24$$

$$39 - 2i$$

6. $(8 - 4i)(5 - 3i)$

$$40 - 24i - 20i + 12i^2$$

$$40 - 44i + 12(-1)$$

$$40 - 44i - 12$$

$$28 - 44i$$

7. $\frac{9-5i}{3}$

$$\frac{9}{3} - \frac{5}{3}i$$

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

8. $\frac{5+7i}{2}$

$$\frac{5}{2} + \frac{7}{2}i$$

9. $\frac{5+4i}{2i} \cdot \frac{i}{i} = \frac{5i+4i^2}{2i^2}$

$$= \frac{5i+4(-1)}{2(-1)}$$

$$= \frac{5i-4}{-2}$$

$$= \frac{-4}{-2} + \frac{5i}{-2} = 2 - \frac{5}{2}i$$

10. $\frac{(2-4i)(3i)}{3i(3i)} = \frac{6i-12i^2}{9i^2}$

$$= \frac{6i-12(-1)}{9(-1)} = \frac{6i+12}{-9}$$

$$= \frac{12+6i}{-9}$$

$$= -\frac{12}{9} - \frac{6}{9}i$$

$$-\frac{4}{3} - \frac{2}{3}i$$

11. $\frac{(3+5i)(6+2i)}{(6-2i)(6+2i)}$

$$= \frac{18+6i+30i+10i^2}{36+12i-12i-4i^2}$$

$$= \frac{18+36i+10i^2}{36-4i^2}$$

$$= \frac{18+36i+10(-1)}{36-4(-1)}$$

$$= \frac{8+36i}{40} = \frac{8}{40} + \frac{36i}{40}$$

$$\frac{1}{5} + \frac{9}{10}i$$

12. $\frac{(2-7i)(4-5i)}{(4+5i)(4-5i)}$

$$= \frac{8-10i-28i+35i^2}{16-20i+20i-25i^2}$$

$$= \frac{8-38i+35(-1)}{16-25(-1)}$$

$$= \frac{-27-38i}{41}$$

$$= -\frac{27}{41} - \frac{38}{41}i$$

Solve. Express your radical solutions in the simplest form.

$$13. (4m+3)^2 + 33 = 3$$

$$\sqrt{(4m+3)^2} = \sqrt{-30}$$

$$4m+3 = \pm i\sqrt{30}$$

$$\frac{4m}{4} = \frac{-3 \pm i\sqrt{30}}{4}$$

$$m = -\frac{3}{4} \pm \frac{\sqrt{30}}{4}i$$

$$14. (3y)^2 = -18$$

$$\frac{3y}{3} = \frac{\pm i\sqrt{18}}{3}$$

$$y = \pm \frac{\sqrt{18}}{3}i$$

$$y = \pm \frac{\sqrt{9 \cdot 2}}{3}i$$

$$y = \pm \frac{3\sqrt{2}}{3}i$$

$$y = \pm i\sqrt{2}$$

$$15. 77 = 5 - 2(2h-4)^2$$

$$\frac{72}{-2} = \frac{-2(2h-4)^2}{-2}$$

$$\sqrt{-36} = \sqrt{(2h-4)^2}$$

$$\pm 6i = 2h-4$$

$$\frac{4 \pm 6i}{2} = \frac{2h}{2}$$

$$\frac{4}{2} \pm \frac{6}{2}i = h$$

$$2 \pm 3i = h$$

$$16. \sqrt{(2x-4)^2} = \sqrt{-20}$$

$$2x-4 = \pm i\sqrt{20}$$

$$\frac{2x}{2} = \frac{4 \pm i\sqrt{20}}{2}$$

$$x = \frac{4}{2} \pm \frac{\sqrt{20}}{2}i$$

$$x = 2 \pm \frac{\sqrt{4 \cdot 5}}{2}i$$

$$x = 2 \pm \frac{2\sqrt{5}}{2}i$$

$$x = 2 \pm i\sqrt{5}$$

$$17. (5p-2)^2 - 48 = 0$$

$$\sqrt{(5p-2)^2} = \sqrt{48}$$

$$5p-2 = \pm \sqrt{48}$$

$$\frac{5p}{5} = \frac{2 \pm \sqrt{48}}{5}$$

$$p = \frac{2}{5} \pm \frac{\sqrt{48}}{5}$$

$$p = \frac{2}{5} \pm \frac{\sqrt{16 \cdot 3}}{5}$$

$$p = \frac{2}{5} \pm \frac{4\sqrt{3}}{5}$$

$$18. 12 = 100 + (7d-14)^2$$

$$\sqrt{-88} = \sqrt{(7d-14)^2}$$

$$\pm i\sqrt{88} = 7d-14$$

$$\frac{14 \pm i\sqrt{88}}{7} = \frac{7d}{7}$$

$$2 \pm \frac{\sqrt{88}}{7}i = d$$

$$2 \pm \frac{\sqrt{4 \cdot 22}}{7}i = d$$

$$2 \pm \frac{2\sqrt{22}}{7}i = d$$

Perform the indicated operation. Express complex numbers in standard form $a + bi$.

$$19. 4(3-2i) + (2+3i)^2$$

$$12 - 8i + (2+3i)(2+3i)$$

$$12 - 8i + 4 + 6i + 6i + 9i^2$$

$$16 + 4i + 9i^2$$

$$16 + 4i + 9(-1)$$

$$16 + 4i - 9$$

$$7 + 4i$$

Perform the indicated operation.

Polynomials

$$20. (2x^2-3)(4x^2+2x-1)$$

$$8x^4 + 4x^3 - 2x^2 - 12x^2 - 6x + 3$$

$$8x^4 + 4x^3 - 14x^2 - 6x + 3$$

Rational Expression

$$21. \frac{3x}{x+1} \cdot \frac{x^2-1}{x} = \frac{3(x-1)}{1}$$

$$3x-3$$

Radicals

$$22. \sqrt{5}(4+3\sqrt{10})$$

$$4\sqrt{5} + 3\sqrt{50}$$

$$4\sqrt{5} + 3\sqrt{25 \cdot 2}$$

$$4\sqrt{5} + 15\sqrt{2}$$