

# 6-5 Solving Polynomials Homework

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Factor each polynomial expression completely.

1.  $21 - 7x + 3y - xy$

$7(3-x) + y(3-x)$

$(3-x)(7+y)$

2.  $15a^2b - 10ab^2$

$5ab(3a - 2b)$

3.  $45x^2 - 80y^2$

$5(9x^2 - 16y^2)$

$5(3x+4y)(3x-4y)$

4.  $6x^4 - 11x^2 - 2$

$(x^2 - 2)(6x^2 + 1)$

$(x^2 - 2)(6x^2 + 1)$

5.  $8x^3 - 27y^6$

$(2x - 3y^2)(4x^2 + 6xy^2 + 9y^4)$

6.  $x^3 + 216$

$(x+6)(x^2 - 6x + 36)$

7.  $x^2 + 2x - xy - 2y$

$x(x+2) - y(x+2)$

$(x+2)(x-y)$

8.  $36a^3b^2 + 66a^2b^3 - 210ab^4$

$6ab^2(6a^2 + 11ab - 35b^2)$

FA:  $6ab^2(3a-5b)(2a+7b)$

9.  $2x^3y - x^2y + 5xy^2 + xy^3$

$xy(2x^2 - x + 5y + y^2)$

Solve each polynomial equation over the set of complex numbers by factoring.

10.  $16x^2 - 169 = 0$

$(4x+13)(4x-13) = 0$

$x = \pm \frac{13}{4}$

11.  $2x^2 - 242 = 0$

$2(x^2 - 121) = 0$

$2(x+11)(x-11) = 0$

$x = \pm 11$

12.  $8x^3 = 1$

$8x^3 - 1 = 0$

$(2x-1)(4x^2 + 2x + 1) = 0$

$x = \frac{1}{2}, \frac{-1 \pm i\sqrt{3}}{4}$

15.  $5x^5 + 135x^2 = 0$

$5x^2(x^3 + 27) = 0$

$5x^2(x+3)(x^2 - 3x + 9) = 0$

13.  $4x^6 + x^4 = 3x^2$

$4x^6 + x^4 - 3x^2 = 0$

$x^2(4x^4 + x^2 - 3) = 0$

$x^2(x^2 + 1)(4x^2 - 3) = 0$

$x = 0, \pm i, \pm \frac{\sqrt{3}}{2}$

14.  $4x^6 - 4x^2 = 0$

$4x^2(x^4 - 1) = 0$

$4x^2(x^2 + 1)(x^2 - 1) = 0$

$4x^2(x^2 + 1)(x+1)(x-1) = 0$

$x = 0, 0, \pm i, \pm 1$

18.  $x^3 + 3x^2 - 54x = 0$

$x(x^2 + 3x - 54) = 0$

$x(x+9)(x-6) = 0$

16.  $x^3 - 27 = 0$

$(x-3)(x^2 + 3x + 9) = 0$

17.  $x^4 - 81 = 0$

$(x^2 + 9)(x^2 - 9) = 0$

$(x^2 + 9)(x+3)(x-3) = 0$

$x = 0, 9, -3, \frac{3 \pm 3i\sqrt{3}}{2}$

$x = 3, \frac{-3 \pm 3i\sqrt{3}}{2}$

19.  $2x^3 + 32x^2 + 128x = 0$

$2x(x^2 + 16x + 64) = 0$

$2x(x+8)^2 = 0$

$x = 0, -8, -8$

20.  $81x^4 = 16$

$81x^4 - 16 = 0$

$(9x^2 + 4)(9x^2 - 4) = 0$

$(9x^2 + 4)(3x+2)(3x-2) = 0$

$x = \pm \frac{2}{3}i, \pm \frac{2}{3}$

21.  $x^4 + 64x = 0$

$x(x^3 + 64) = 0$

$x(x+4)(x^2 - 4x + 16) = 0$

$x = 0, -4, 2 \pm 2i\sqrt{3}$

(#4)

22.  $4x^6 - 4x^2 = 0$

$4x^2(x^4 - 1) = 0$

23.  $x^3 = 64$

$x^3 - 64 = 0$   
 $(x - 4)(x^2 + 4x + 16)$

24.  $14x^3 + 11x^2 = 9x$

$14x^3 + 11x^2 - 9x = 0$   
 $x(14x^2 + 11x - 9) = 0$   
 $x(2x - 1)(7x + 9) = 0$

$x = 0, 0, \pm i, \pm 1$

25.  $2x^3 + 250 = 0$

$2(x^3 + 125) = 0$   
 $2(x + 5)(x^2 - 5x + 25)$

$x = 4, -2 \pm 2i\sqrt{3}$

26.  $x^4 - 5x^2 = -4$

$x^4 - 5x^2 + 4 = 0$   
 $(x^2 - 4)(x^2 - 1) = 0$   
 $(x + 2)(x - 2)(x + 1)(x - 1)$

$x = 0, \frac{1}{2}, -\frac{9}{7}$

27.  $x^6 = 1$

$x^6 - 1 = 0$   
 $(x^3 + 1)(x^3 - 1)$   
 $(x + 1)(x^2 - x + 1)(x - 1)(x^2 + x + 1)$

$x = -5, \frac{5 \pm 5i\sqrt{3}}{2}$

28.  $x^4 - 1 = 0$

$(x^2 + 1)(x^2 - 1)$   
 $(x^2 + 1)(x + 1)(x - 1)$

$x = \pm 2, \pm 1$

29.  $x^4 - 6x^2 = -8$

$x^4 - 6x^2 + 8 = 0$   
 $(x^2 - 4)(x^2 - 2) = 0$   
 $(x + 2)(x - 2)(x^2 - 2) = 0$

$x = \pm 1, \frac{1 \pm i\sqrt{3}}{2}, \frac{-1 \pm i\sqrt{3}}{2}$

30.  $3x^3 - x^2 + 3x - 1 = 0$

$x^2(3x - 1) + 1(3x - 1)$   
 $(3x - 1)(x^2 + 1)$

$x = \pm i, \pm 1$

31.  $x^3 - 5x^2 - 9x + 45 = 0$

$x^2(x - 5) - 9(x - 5)$   
 $(x - 5)(x^2 - 9)$   
 $(x - 5)(x + 3)(x - 3)$

$x = \pm 2, \pm \sqrt{2}$

32.  $9x^4 + 24x^3 = -16x^2$

$9x^4 + 24x^3 + 16x^2$   
 $x^2(9x^2 + 24x + 16)$   
 $x^2(3x + 4)^2$

$x = \frac{1}{3}, \pm i$

33.  $2x^4 + 250x = 0$

$2x(x^3 + 125) = 0$   
 $2x(x + 5)(x^2 - 5x + 25)$

$x = 5, \pm 3$

$x = 0, 0, \frac{4}{3}, -\frac{4}{3}$

$x = 0, -5, \frac{5 \pm 5i\sqrt{3}}{2}$