Name: _____ Algebra II Honors

# Solving Polynomial and Other Equations

Solve each equation. $\frac{1}{3} + 26\left(\frac{1}{3}\right)$

1. $3c = 9 - 26c^{\frac{1}{2}}$

$3C + 26C^{1/2} - 9 = 0$

$(3C^{1/2} - 1)(C^{1/2} + 9) = 0$

$3C^{1/2} = 1 \qquad C^{1/2} = -9$

$C^{1/2} = 1/3 \qquad C = 81$ ✗ extraneous

$C = 1/9$

2. $16(a+5)^2 - 5 = 20$

$(a+5)^2 = 25/16$

$a + 5 = \pm 5/4$

$a = -5 \pm 5/4$

$a = -6\frac{1}{4}, -3\frac{3}{4}$

$-25/4 \quad -15/4$

3. $\sqrt{2k+7} - \sqrt{k+3} = 5$

$\left(\sqrt{2k+7}\right)^2 = \left(5 + \sqrt{k+3}\right)^2$

$2k + 7 = 25 + 10\sqrt{k+3} + k + 3$

$k - 21 = 10\sqrt{k+3}$

$k^2 - 42k + 441 = 100k + 300$

$k^2 - 142k + 141 = 0$

$(k - 141)(k - 1) = 0$

$k = 141, 1$ → extraneous

4. $\sqrt{3m-6} - \sqrt{m^2 - 2m} = 0$

$3m - 6 = m^2 - 2m$

$0 = m^2 - 5m + 6$

$0 = (m-2)(m-3)$

$m = 2, 3$

→ $a = (x+3)^{1/4}$

$a^2 - 4a + 4 = 0$

5. $w^4 - 35w^2 + 216 = 0$

$(w^2 - 27)(w^2 - 8) = 0$

$w = \pm\sqrt{27} \qquad w = \pm\sqrt{8}$

$w = \pm 3\sqrt{3} \qquad w = \pm 2\sqrt{2}$

6. $(x+3)^{\frac{1}{2}} - 4(x+3)^{\frac{1}{4}} = -4$

$\left[(x+3)^{1/4} - 2\right]\left[(x+3)^{1/4} - 2\right] = 0$

$(x+3)^{1/4} = 2$

$x + 3 = 16$

$x = 13$

7. $4x^3(2x-1)^{\frac{3}{2}} - 8x^2(2x-1)^{\frac{1}{2}} = 0$

$4x^2(2x-1)^{1/2}\left[x(2x-1) - 2\right]$

$4x^2(2x-1)^{1/2}(2x^2 - x - 2) = 0$

$x = 0, 1/2, \frac{1 \pm \sqrt{17}}{4}$

$\frac{1 \pm \sqrt{1 + 4(4)}}{4}$

8. $(c^2+5)^2 - 8(c^2+5) - 84 = 0$

$\left[(c^2+5) - 12\right]\left[(c^2+5) + 4\right] = 0$

$(c^2 - 7)(c^2 + 9) = 0$

$c = \pm\sqrt{7}, \pm 3i$

9. $14y(2+\frac{y}{2}) = y(y-1) - 20$

$28y + 7y^2 = y^2 - y - 20$

$6y^2 + 29y + 20 = 0$

$(6y+5)(y+4) = 0$

$6y = -5 \quad y = -4$

$y = -5/6, -4$

10. $3x^5 - 3x^3 - 36x = 0$

$3x(x^4 - x^2 - 12) = 0$

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

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

$\frac{2 \pm \sqrt{4 - 4(4)}}{8}$

$\frac{2 \pm \sqrt{-12}}{8} = \frac{2 \pm 2\sqrt{3}i}{8}$

11) $(8y^3 + 1)(y - 5) = (2y+1)(4y^2 - 2y + 1)(y - 5) = 0$

$(8y^4 - 40y^3 + y - 5)$

$-1/2, 5, \frac{1}{4} \pm \frac{\sqrt{3}}{4}i$