

Notes Miscellaneous Equations

1. Solving Polynomial Equations by Factoring $a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots = \text{number}$
- If necessary, get the polynomial in general form (Move all the terms to one side of the equal sign and obtain zero on the other).
 - Factor out the Greatest Common Factor (if possible)
 - Factor the remaining polynomial depending on the number of terms left
 - If 2 terms are left – Try factoring by Sum/Difference of cubes
 - If 3 terms are left – Try factoring like you do trinomials
 - If 4 terms are left – Try Factoring by grouping
 - Ensure that all the factors you have are prime (factored completely). If they are not repeat step c
 - Set each factor equal to zero and solve for the variable

Solve the following Equations:

EX1: $6x^3 + 2x^2 - 8x = 0$

EX2: $2x^3 - 5x^2 - 2x = -5$

2. Solving Radical Equations

$$\sqrt[n]{\text{expression}} = \text{number}$$

- If necessary, arrange terms so that one radical is isolated on one side of the equal sign.
- Raise both sides of the equation to the **nth** power to eliminate the isolated **nth** root.
- Simply the resulting equation. If the equation still contains a radical, repeat steps **a** & **b**
- Solve the equation
- CHECK YOUR SOLUTIONS INTO THE ORIGINAL EQUATION AND GET RID OF THE ANSWERS THAT DO NOT WORK

Solve the following Equations:

EX3: $\sqrt{2x-5} + 6 = 0$

EX4: $\sqrt{x+1} + x = 5$

3. Solving Rational Exponent Equations $(\text{expression})^{\frac{m}{n}} = \text{number}$

- a. If necessary, isolate the expression with the rational exponent
- b. Raise both side of the equation to the $\frac{n}{m}$ power (the reciprocal of the power you are raised to).
 - i. If m is EVEN be sure to put a \pm with the number
 - ii. If m is ODD you DO NOT need a \pm sign with the number
- c. CHECK YOUR SOLUTIONS INTO THE ORIGINAL EQUATION AND GET RID OF THE ANSWERS THAT DO NOT WORK

Solve the following Equations:

EX5: $(x^2 + 6x - 7)^{\frac{3}{2}} = 27$

EX6: $(x + 5)^{\frac{2}{5}} = 9$

4. Solving Equations of Quadratic Form $(\text{expression})^2 + \text{expression} + \text{constant} = 0$

- If necessary, get the polynomial in general form (Move all the terms to one side of the equal sign and obtain zero on the other).
- Make a substitution for the original variable that will make the equation into a quadratic

$$ax^2 + bx + c = 0$$

- Solve the new equation by factoring or using the quadratic formula.
- Substitute the original variable back into the equation and finish solving for the variable
- CHECK YOUR SOLUTIONS INTO THE ORIGINAL EQUATION AND GET RID OF THE ANSWERS THAT DO NOT WORK

Solve the following Equations:

EX7: $x^4 - x^2 - 6 = 0$

EX8: $x - 2\sqrt{x} - 8 = 0$