Quadratic formula:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1.) $x^2 - 81 = 0$

$\underline{\; +81 \quad +81}$

$x^2 = 81$

$\sqrt{x^2} = \sqrt{81}$

$\boxed{x = +9, -9}$

* First, we will move the number on the left side to the right by doing the opposite. Since it was subtraction, we add it to both sides.
* Now to get just X instead of X we will take the square root of both sides.
* $\sqrt{X^2} = X$
* Then when you take a square root of a number, it will always be a positive and a negative.

2.) $x^2 - 15x = 0$

$x(x - 15) = 0$

$\boxed{x = 0}$ $\qquad x - 15 = 0$

$\underline{ +15 \quad +15}$

$\boxed{x = 15}$

* In this problem, both terms on the left side have something in common. The both have an X.
* So we will factor the X out. Then we make a set of parentheses and will put in it what is left over when we factor out the X. (Basically it's like divine each term in the original equation by X.)
* Then, since we have 2 expressions that are multiplied by each other that equal 0, we will set each expression equal to zero and then solve each for X.

3.) $z^2 + 2z - 15 = 0$

$a = 1 \qquad b = 2 \qquad c = -15$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \Big\} \text{Quadratic formula}$$

* we will use the quadratic formula.
* a= the number in front of X^2, b= the number in front of X, and c= the number by itself.
* Replace each letter with the number that it equals.
* Then you will type it into your calculator.
* The first time you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.

$$\frac{-(2) \pm \sqrt{(2)^2 - 4(1)(-15)}}{2(1)}$$

$$x = \boxed{3, -5}$$

4.) $5x^2 - 24x - 5 = 0$

$\uparrow$ $\qquad$ $\uparrow$ $\qquad$ $\uparrow$
$a = 5$ $\quad$ $b = -24$ $\quad$ $c = -5$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$\}$ Quadratic formula

* we will use the quadratic formula.
* a= the number in front of X^2, b= the number in front of X, and c= the number by itself.
* Replace each letter with the number that it equals.
* Then you will type it into your calculator.
* The first time you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.

$$\frac{-(-24) \pm \sqrt{(-24)^2 - 4(5)(-5)}}{2(5)}$$

$$x = \boxed{-\frac{1}{5}, 5}$$

5.) $x(x - 13) + 42 = 0$

$x(x - 13) + 42 = 0$

$x^2 - 13x + 42 = 0$

$\uparrow$ $\qquad$ $\uparrow$ $\qquad$ $\uparrow$
$a = 1$ $\quad$ $b = -13$ $\quad$ $c = 42$

* First we must use the distributive property to get rid of the parentheses. Multiply the term outside the parentheses by each term inside the parentheses.
* Now we are in the form where we can use the quadratic formula.

* a= the number in front of X ,b= the number in front of X, and c= the number by itself.
* Replace each letter with the number that it equals.
* Then you will type it into your calculator.
* The first time you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$\}$ Quadratic formula

$$\frac{-(-13) \pm \sqrt{(-13)^2 - 4(1)(42)}}{2(1)}$$

$$x = \boxed{6, 7}$$

6.) $49x^2 + 25 = 70x$

$\quad\quad -70x \quad\quad -70x$

$49x^2 - 70x + 25 = 0$

$\quad\uparrow \quad\quad\quad \uparrow \quad\quad\quad \uparrow$

$a = 49 \quad b = -70 \quad c = 25$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \Big\} \text{Quadratic formula}$$

$$\frac{-(-70) \pm \sqrt{(-70)^2 - 4(49)(25)}}{2(49)}$$

$$x = \boxed{\frac{5}{7}}$$

* We start by moving the term on the right side to the left by doing the opposite. Here it was addition, so we will subtract it from both sides.
* When you write the equation with all the terms on one side, be sure to put them in defending order according to the exponents.
* Now since they are are really bing numbers, instead of theming to factor it, we will use the quadratic equation.
* When using the equation, a= the number in front of X^2, b= the number in front of X, and c= the number by itself. Don't forget to include the signs with the numbers.
* Then replace each letter in the equation with the number that goes with it.
* Then you will type it into your calculator.
* The first time, you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.
* In this example, the 2 answers were the same, so you only write it down once.

7.) $x^2 - 2x - 14 = 0$

$\quad \uparrow \quad\quad \uparrow \quad\quad \uparrow$

$a = 1 \quad b = -2 \quad c = -14$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \Big\} \text{Quadratic formula}$$

$$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-14)}}{2(1)}$$

$$\boxed{\sqrt{15} + 1 \;,\; -\sqrt{15} + 1}$$

* we will use the quadratic formula.
* a= the number in front of X^2, b= the number in front of X, and c= the number by itself.
* Replace each letter with the number that it equals.
* Then you will type it into your calculator.
* The first time you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.

8.) $5x^2 - 13x + 6 = 0$

$a = 5$ $b = -13$ $c = 6$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$ } Quadratic formula

* we will use the quadratic formula.
* a= the number in front of X^2, b= the number in front of X, and c= the number by itself.
* Replace each letter with the number that it equals.
* Then you will type it into your calculator.
* The first time you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.

$$\frac{-(-13) \pm \sqrt{(-13)^2 - 4(5)(6)}}{2(5)}$$

$$\boxed{2 , \frac{3}{5}}$$

9.) $7x^2 = 7 - 4x$

$\underline{+4x \qquad\qquad +4x}$

$7x^2 + 4x = 7$

$\underline{\qquad\quad -7 \quad -7}$

$7x^2 + 4x - 7 = 0$

$a = 7$ $b = 4$ $c = -7$

* We start by moving the terms on the right side to the left by doing the opposite. We will stay with moving the X's first Here it is subtraction, so we will do the opposite and add it to both sides.
* Then we will move the number to the left side by doing the opposite. Here it was addition, so we will subtract it from both sides.
* When you write the equation with all the terms on one side, be sure to put them in defending order according to the exponents.

* Now we will use the quadratic formula.
* a= the number in front of X^2, b= the number in front of X, and c= the number by itself.
* Replace each letter with the number that it equals.
* Then you will type it into your calculator.
* The first time you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$ } Quadratic formula

$$\frac{-4 \pm \sqrt{(4)^2 - 4(7)(-7)}}{2(7)}$$

$$\boxed{\frac{\sqrt{53} - 2}{7} , \frac{-\sqrt{53} - 2}{7}}$$

10.) $3x(x+2) = 2$

$$3x(x+2) = 2$$

$$3x^2 + 6x = 2$$

$$\underline{ -2 \quad -2}$$

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

$a = 3 \qquad b = 6 \qquad c = -2$

* We will begin by dg the distributive property to get rid of the parentheses.
* We do this by multiplying the number outside the parentheses by terms inside the parentheses.
* Then we will move the number on the right side to the left by dg the opposite. Here it is added, so we will subtract it from both sides.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \Big\} \text{ Quadratic formula}$$

* Now we will use the quadratic formula.
* a= the number in front of X ,b= the number in front of X, and c= the number by itself.
* Replace each letter with the number that it equals.
* Then you will type it into your calculator.
* The first time you will use the + sign.
* The second time you will use the - sign.
* These will be your 2 answers.

$$\frac{-6 \pm \sqrt{(6)^2 - 4(3)(-2)}}{2(3)}$$

$$\boxed{\dfrac{\sqrt{15} - 3}{3} \quad , \quad \dfrac{-\sqrt{15} - 3}{3}}$$