

### Quadratic equation in standard form

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

When we need to solve this type of questions our first step should be to check if coefficient of  $x^2$  i.e. a, here is positive or negative.

For example we have equation:

$$-8x^2 - 10x - 3 = 0$$

Here coefficient of  $x^2$  is negative, i.e. -8 so we should make it positive.

So multiply by -1 both sides we get

$$8x^2 + 10x + 3 = 0$$

There are many ways of solving this but in bank exams time is precious so we need to devise a one step solution to this problem

Now on to solving part:

First we need to find out sign of factors, whether they are positive or negative or one is positive or one is negative or other way around.

So put opposite of what ever sign coefficient of x has

Here coefficient of b is +ve that is 10 so our first factor sign is -ve

So write  $x = -$  , now second factor sign.

Multiply this sign (i.e. sign of coefficient of x) with the sign of constant. Here sign of constant is + or =ve. So sign of our next factor will be -ve.

Remember: +ve \* -ve = -ve ; -ve \* -ve = +ve and +ve \* +ve = +ve

So two factor sign are  $x = -$  and -

Now to find factors of  $8 * 3$  {coefficient of  $x^2$  \* constant}

We need factor such that sum of factors 10 i.e. coefficient of x

$$\text{Factors of } 8 * 3 = 24 = 6 * 4$$

$$6 + 4 = 10$$

So our factors are 6 and 4 {Always write greater factor with the first sign}

Our solution will be  $x = -6/8$  and  $x = -4/8$  {we need to divide by coefficient of  $x^2$ }

**Let's take another example:**

$$18x^2 - 9x + 1 = 0$$

Here coefficient of  $x^2$  is +ve so no need to multiply

Now factor sign

Coefficient of  $x$  is -ve here so first factor sign is +ve

Second factor sign =  $+ * + = +$

So two factor sign =  $+ , +$

Now factor part: we need sum of 9 from multiples of  $18 * 1 = 6 * 3$

$$\text{So } 6 + 3 = 9$$

Our solution =  $x = 6/18, 3/18 = 1/3$  and  $1/6$

**Next example:**

$$\text{Equation: } 2x^2 - 5x - 3 = 0$$

Coefficient of  $x^2$  is positive, so no need to multiply with -1

Now factor sign. Sign of Coefficient of  $x$  is -ve. So sign of first factor's will be opposite of it i.e. +ve.

Second factor sign:  $+ * - = -$  so second factor sign is -ve.

So  $x = + , -$

Now we need to make sum as +5. Factors are  $3 * 2 = 6 = 6 * 1$

$$\text{So } 5 = 6 - 1$$

Our solution  $x = +6/2, -1/2 = 3, -1/2$ .

In exams we are given two quadratic equations and we are required to find relation between two variables. Let's say we have two quadratic equations in  $x$  and  $y$  and we are asked to find relation between them. As we all know total 5 cases are possible.

1.  $X > Y$
2.  $X \geq Y$
3.  $X < Y$
4.  $X \leq Y$
5. Relation cannot be established.

Let us assume after solving two equations you get value of x as (-2, -1) and y value as (-6, -2)

To establish relation, we need to compare factors here. So first take  $x=-2$  and compare it with both the factors of y. so  $-2 > -6$  and  $-2 = -2$

Now take  $x=-1$  and repeat the above process, you'll get  $-1 > -6$  and  $-1 > -2$

So from the above steps we can conclude that X i.e. either greater than Y or X is equal to Y

$$\Rightarrow X \geq Y.$$

One thing we need to consider is if you see sign change then there will be no relation between x and y, i.e. while comparing if you get  $X > Y$  in one case, and  $X < Y$  in another case then there will be no relation between two variables.



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