

GS FOUNDATION**BATCH FOR CSE 2023****Ace CSAT 2023 – Booklet 7****Quantitative Aptitude 5 Solving Linear and Quadratic Equations**

Solving Linear and Quadratic Equations**Contents**

1) Solution of an Equation	2
2) Solving Linear Equations	2
Linear Equations in one variable	2
Linear Equation in one variable with fractions.....	2
Linear Equation with two variables:	2
3) Quadratic Equations	3
4) PYQs	3

1) SOLUTION OF AN EQUATION

Solving equation means finding value of unknown variable which satisfies the equation.

For example: $x + 2 = 5$ is a linear equation satisfied by $x = 3$. We say that, $x = 3$ solves the equation.

2) SOLVING LINEAR EQUATIONS

Linear Equations in one variable

This equation is of the type $ax + b = 0$.

Example: $3x - 6 = 0$

$3x = 6$ (adding 6 on both sides)

$$x = \frac{6}{3} = 2$$

- In case, you have variable on both sides, bring variables on one side and constants on other

For example: $2x + 8 = 5x - 1$

$$8 + 1 = 5x - 2x \Rightarrow 3x = 9 \Rightarrow x = 3$$

Linear Equation in one variable with fractions

We simply find LCM of denominators and multiply by that throughout to clear the denominator. Alternatively, we can multiply by the product of all the denominators if they aren't large to complicate calculations.

Example:

$\frac{2}{7}x - \frac{3}{2} = 0$: Here, 7 and 2 are not large – so we simply multiply throughout by their product (14)

$$14 \times \frac{2}{7}x - 14 \times \frac{3}{2} = 0 \Rightarrow 4x - 21 = 0 \Rightarrow x = \frac{21}{4}$$

Q. Solve following linear equations:

1. $5x + 10 = 15$
2. $2y - 9 = \frac{5}{2}$
3. $x - \frac{3}{8}x = 5x + \frac{2}{3}x - 11$
4. $2.3x - 2.3 = 4.6$
5. $0.25y - 10 = -5$
6. $10 - (5x + 2) = 2 - x$

Linear Equation with two variables:

A general linear equation with two variables will look like: $ax + by + c = 0$

For example: $x + 2y - 3 = 0$ or $2p - 2q + 5 = 0$

Can you find values of two variables from these equations?

We need at least 'n' equations to solve equations with 'n' variables

- So, we need two equations to solve above equation i.e., $x + 2y - 3 = 0$
- Consider another equation: $4x - 3y - 1 = 0$.
- Can we solve the equations now?

$$4x - 3y - 1 = 0$$

$$x + 2y - 3 = 0$$

- Multiply equation 2 by 4 and subtract it from equation 1
- Now we have linear equation with one variable.

Q. Solve following linear equations in two variables:

1. $3x + 5y - 11 = 0$; $2x - y = 3$
2. $p + q - 7 = 0$; $q - p + 1 = 0$
3. $3x + y = 13$; $2x + 3y = 18$
4. $\frac{2}{3}x - \frac{5}{8}y = \frac{1}{24}$; $x - y = 0$
5. $\frac{1}{3}x + \frac{2}{5}y - 3 = 0$; $\frac{23}{3}x - \frac{3}{5}y = 20$

3) QUADRATIC EQUATIONS

Equation with degree 2 is quadratic equation.

Example: $xy = 2$; $x^2 + 3 = 9$ etc.

Quadratic Equation in one variable: $ax^2 + bx + c = 0$

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

For example: For equation $x^2 - 2x - 8 = 0$ – calculate solutions

4) PYQS

CSE 2023: For five children with ages $a < b < c < d < e$; any two successive ages differ by 2 years.

Question: What is the age of the youngest child?

Statement-1: The age of the eldest is 3 times the youngest.

Statement-2: The average age of the children is 8 years

Which one of the following is correct in respect of the above Question and the Statements?

- (a) The Question can be answered by using one of the Statement alone.
- (b) The Question can be answered by using either Statement alone.
- (c) The Question can be answered by using both the Statement together, but cannot be answered using either Statement alone.
- (d) The Question cannot be answered even by using both the Statements together.

CSE 2023: In a party, 75 persons took tea, 60 persons took coffee and 15 persons took both tea and coffee. No one taking milk takes tea. Each person takes at least one drink.

Question: how many persons attended the party?

Statement-1: 50 persons took milk.

Statement-2: Number of persons who attended the party is five times the number of persons who took milk only.

Which one of the following is correct in respect of the above Question and the Statements?

- (a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other Statement alone.
- (b) The Question can be answered by using either Statement alone.
- (c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
- (d) The Question cannot be answered even by using both the Statements together.

CSE 2022: The sum of three consecutive integers is equal to their product. How many such possibilities are there?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) No such possibility is there

CSE 2022:

Consider the Question Statements given below:

Question: What is the age of Manisha?

Statement-1: Manisha is 24 years younger than her mother.

Statement-2: 5 years later, the ages of Manisha and her mother will be in the ratio 3:5.

Which one of the following is correct in respect of the Question and the Statements?

- (a) Statement-1 alone is sufficient to answer the Question
- (b) Statement-2 alone is sufficient to answer the Question
- (c) Both Statement and Statement-2 are sufficient to answer the Question
- (d) Both Statement-1 and Statement-2 are not sufficient to answer the Question

CSE 2022:

A bill for 1,840 is paid in the denominations of 50, 20 and 10 notes. 50 notes in all are used. Consider the following statements:

1. 25 notes of 50 are used and the remaining are in the denominations of 20 and 10.
2. 35 notes of 20 are used and the remaining are in the denominations of 50 and 10.
3. 20 notes of 10 are used and the remaining are in the denominations of 50 and 20.

Which of the above statements are **not** correct

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

CSE 2022:

A person X wants to distribute some pens among six children A B C D E and F. Suppose A gets twice the number of pens received by three times that of four times that of D, five times that of E and six times that of F. What is the minimum number of pens X should buy so that the number of pens each one gets is an even number?

- (a) 147
- (b) 150
- (c) 294
- (d) 300

CSE 2022:

Five friends P, O, X, Y and Z purchased some notebooks. The relevant information is given below:

1. Z purchased 8 notebooks more than X did.
2. P and Q together purchased 21 notebooks.
3. O purchased 5 notebooks less than P did.
4. X and Y together purchased 28 notebooks.
5. P purchased 5 notebooks more than X did.

If each notebook is priced 40, then what is the total cost of all the notebooks?

- (a) 2,600
- (b) 2,400
- (c) 2,360
- (d) 2,320

CSE 2022: A has some coins. He gives half of the coins and 2 more to B. B gives half of the coins and 2 more to C. C gives half of the coins and 2 more to D. The number of coins D has now, is the smallest two-digit number. How many coins does A have in the beginning?

- (a) 76
- (b) 68
- (c) 60
- (d) 52

CSE 2021: The difference between a 2-digit number and the number obtained by interchanging the positions of the digits is 54.

1. The sum of the two digits of a number can be determined only if the product of the two digits is known.
2. The difference between the two digits of the number can be determined.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

CSE 2021: X said to Y, "At the time of your birth I was twice as old as you are at present." If the present age of X is 42 years, then consider the following statements:

1. 8 years ago, the age of X was five times the age of Y.
2. After 14 years, the age of X would be two times the age of Y.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

CSE 2021: A person P asks one of his three friends X as to how much money he had. X replied, "If Y given me Rs. 40, then Y will have half of as much as Z, but if Z gives me Rs. 40, then three of us will have equal amount." What is the total amount of money that X, Y and Z have?

- (a) Rs. 420
- (b) Rs. 360
- (c) Rs. 300
- (d) Rs. 270

CSE 2021: In an objective type test of 90 questions, 5 marks are allotted for every correct answer and 2 marks are deducted for every wrong answer. After attempting all the 90 questions, a student got a total of 387 marks. What is the number of incorrect responses?

- (a) 9
- (b) 13
- (c) 27
- (d) 43

CSE 2021:

Q. Jay and Vijay spent an equal amount of money to buy some pens and special pencils of the same quality from the same store. If Jay bought 3 pens and 5 pencils, and Vijay bought 2 pens and 7 pencils, then which one of the following is correct?

- (a) A pencil costs more than a pen.
- (b) The price of a pencil is equal to that of a pen
- (c) The price of a pen is two times the price of a pencil
- (d) The price of a pen is three times the price of a pencil

CSE 2021:

A person P asks one of his three friends X as to how much money he had. X replied, "If Y given me Rs. 40, then Y will have half of as much as Z, but if Z gives me Rs. 40, then three of us will have equal amount." What is the total amount of money that X, Y and Z have?

- (a) Rs. 420
- (b) Rs. 360
- (c) Rs. 300
- (d) Rs. 270

CSE 2020: Two Statements S1 and S2 are given below with regard to two numbers followed by a Question:

S1: Their product is 21.

S2: Their sum is 10.

Question: What are the two numbers? Which one of the following is correct in respect of the above Statements and the Question?

- (a) S1 alone is sufficient to answer the Question.
- (b) S2 alone is sufficient to answer the Question.
- (c) S1 and S2 together are sufficient to answer the Question, but neither S1 alone nor S2 alone is sufficient to answer the Question.
- (d) S1 and S2 together are not sufficient to answer the Question.

CSE 2020: There are some nectar-filled flowers on a tree and some bees are hovering on it. If one bee lands on each flower, one bee will be left out. If two bees land on each flower, one flower will be left out. The number of flowers and bees respectively are:

- (a) 2 and 4
- (b) 3 and 2
- (c) 3 and 4
- (d) 4 and 3

CSE 2020: In aid of charity, every student in a class contributes as many rupees as the number of students in that class. With the additional contribution of Rs. 2 by one student only, the total collection is Rs. 443. Then how many students are there in the class?

- (a) 12
- (b) 21
- (c) 43
- (d) 45

CSE 2020: A vessel full of water weighs 40 kg. If it is one third filled, its weight becomes 20 kg. What is the weight of the empty vessel?

- (a) 10 kg
- (b) 15 kg
- (c) 20 kg
- (d) 25 kg

CSE 2020: In the sum

$$X + 1X + 5X + XX + X = 1XX$$

for which digit does the X stand?

- (a) 2
- (b) 3
- (c) 4
- (d) 5

$$(x + 10 + x + 50 + x + 10x + x + x = 100 + 10x + x)$$

CSE 2019: Rakesh and Rajesh together bought 10 balls and 10 rackets. Rakesh spent 1300 and Rajesh spent 1500. If each racket costs three times a ball does, then what is the price of a racket?

- (a) Rs. 70
- (b) Rs. 50
- (c) Rs. 210
- (d) Rs. 240

CSE 2019: Ena was born 4 years after her parents' marriage. Her mother is three years younger than her father and 24 years older than Ena, who is 13 years old. At what age did Ena's father get married?

- (a) 22 years
- (b) 23 years
- (c) 24 years
- (d) 25 years

CSE 2018: Consider the following sum:

$$x + 1x + 2x + x^3 + x^1 = 21x$$

In the above sum, x stands for

- (a) 4
- (b) 5
- (c) 6
- (d) 8

CSE 2018: A number consists of three digits of which the middle one is zero and their sum is 4. If the number formed by interchanging the first and last digits is greater than the number itself by 198, the difference between the first and last digits is

- (a) 1
- (b) 2
- (c) 3
- (d) 4

CSE 2018: A bookseller sold ' a ' number of Geography textbooks at the rate of ' x ' per book, ' $a + 2$ ' number of History textbooks at the rate of ' $(x + 2)$ ' per book and ' $a - 2$ ' number of Mathematics textbooks at the rate of ' $(x - 2)$ ' per book. What is his total sale in Rs?

- (a) $3x + 3a$
- (b) $3ax + 8$
- (c) $9ax$
- (d) $3a3x$

CSE 2017: There are certain 2-digit numbers. The difference between the number and the one obtained on reversing it is always 27. How many such maximum 2-digit numbers are there?

- (a) 3
- (b) 4
- (c) 5
- (d) None of the above

CSE 2017: 10. Each of A., B, C and D has Rs 100. A pays Rs 20 to B, who pays Rs 10 to C, who gets Rs 30 from D. In this context, which one of the following statements is not correct?

- (a) C is the richest
- (b) D is the poorest.
- (c) C has more than what A and D have together.
- (d) B is richer than D

CSE 2016: In a class, there are 18 very tall boys. If these constitute three-fourths of the boys and the total number of boys is two-thirds of the total number of students in the class, what is the number of girls in the class?

- (a) 6
- (b) 12
- (c) 18
- (d) 21

CSE 2015: In a parking area, the total number of wheels of all the cars (four-wheelers) and scooters/motorbikes (two-wheelers) is 100 more than twice the number of parked vehicles. The number of cars parked is

- (a) 35
- (b) 45
- (c) 50
- (d) 55

CSE 2015: A father is nine times as old as his son and the mother is eight times as old as the son. The sum of the father's and the mother's age is 51 years. What is the age of the son?

- (a) 7 year
- (b) 5 year
- (d) 4 year
- (d) 3 year

CSE 2015: In a box of marbles, there are three less white marbles than the red ones and five more white marbles than the green ones. If there are a total of 10 white marbles, how many marbles are there in the box?

- (a) 26
- (b) 28
- (c) 32
- (d) 36

CSE 2015: A person ordered 5 pairs of black socks and some pairs of brown socks. The price of a black pair was thrice that of a brown pair. While preparing the bill, the bill clerk interchanged the number of black and brown pairs by mistake which increased the bill by 100%. What was the number of pairs of brown socks in the original order?

- (a) 10
- (b) 15
- (c) 20
- (d) 25

CSE 2014: As per agreement with a bank, a businessman had to refund a loan in some equal instalments without interest. After paying 18 instalments he found that 60 percent of his loan was refunded. How many instalments were there in the agreement?

- (a) 22
- (b) 24
- (c) 30
- (d) 33

CSE 2014: For a charity show, the total tickets sold were 420. Half of these tickets were sold at the rate of Rs. 5 each, one-third at the rate of Rs. 3 each and the rest for Rs. 2 each. What was the total amount received?

- (a) Rs. 900
- (b) Rs. 1,540
- (c) Rs. 1,610
- (d) Rs. 2,000

CSE 2013: There are some balls of red, green and yellow colour lying on a table. There are as many red balls as there are yellow balls. There are twice as many yellow balls as there are green ones. The number of red balls

- (a) is equal to the sum of yellow and green balls.
- (b) is double the number of green balls.
- (c) is equal to yellow balls minus green balls.
- (d) cannot be ascertained

CSE 2011: A person has only Rs. 1 and Rs. 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is Rs. 75, then the number of Rs. 1 and Rs. 2 coins are respectively

- (a) 15 and 35
- (b) 35 and 15
- (e) 30 and 20
- (d) 25 and 25