CHAPTER: Simple Equations

Grade: **7**
Board: **CBSE**
Book: **NCERT**

1.

Chapter Summary and Placement

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>

1. The chapter connects to the concept of plotting a point on the graph from previous grades
2. It introduces about coordinate system at this level
3. And connects to analytical geometry in future grades

2.

LEARNING OUTCOMES

<On completion of the chapter, students will be able to:>

1. Recapitulate definitions of algebra and writing a statement as an equation
2. Acquire the knowledge of transposition of terms
3. Solve the given equations
4. Apply simple equations to real life situations

3. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently

Subtopic and Learning Objective #1

Subtopic: Definitions
LO:
Recapitulate definitions of algebra
1.To make the student recollect definitions what they learnt in grade 6

Teacher Activity

Do recap of definition of constant , variable, term , expression, equation and solution of equation with good number of examples

Check for understanding:

a) Give some examples of constants.
b) Number of angles in a triangle is an example of constant or variable
c) Measure of vertex angle of an isosceles triangle is an example of constant or variable
d) Frame algebraic expression for the following. State each variable which stands for.

a)

Teacher Activity

Eg. Perimeter of square is 4 times side

P=4 s where perimeter=p , side=s

1. Area of triangle is the product of half of its base and height
2. Paisa= 100 rupees
3. Selling price= cost price +profit
4. Circumference of a circle is the product of and diameter
5. Cost price= Selling price + loss
6. The area of a rectangle is product of its length and breadth
7. Dividend= (divisor quotient)+ remainder
8. The area of a parallelogram is the product of its base and height
9. The cost of each pencil , if 5 pencils cost w rupees
10. The total cost of 10 pencils is if each pencil is sold for q rupees

Resources Suggested

Blackboard, pen and paper
Resource 1 can be used for explanation

Subtopic and Learning Objective #2

Sub topic: Transposition
LO:
Acquire the knowledge of transposition of terms
1. To make student to know the method of transposition to solve the given equation

LO:
Solve the given equations
1.To make the student solve given equations by transposition method

Teacher Activity

Introduce method of transposition
Introduce method of solving equations by transposition method

Check for understanding:

a) Solve the following equations

1. x +2=20
2. 3x-2=13
3. 2+4x=82
4. x-3= -5
5. 2(x-3) = 9
6. (x/3) - 6 = 2
7. 2n+5=21
8. (m/3) + 4 = 10
9. (4a/3) + 8 = 20
10. 2(a+3)/5 = 10

Resources Suggested

Blackboard, pen and paper
Resource 2 can be used for explanation

Subtopic and Learning Objective #3

Sub topic:Application of simple equations
LO:
Apply simple equations to real life situations
1. To make student apply simple equations to real life situations

Teacher Activity

Introduce the method of assuming the variable to unknown quantity then write the equation and solve for it

Check for understanding:

a) Sum of two consecutive numbers is 101 find the numbers
b) Ratio of investments of A and B is 3:5 if they invested an amount of 24,000 rupees . Find the individual amounts?
c) Sum of the ages of two cousins is 25 years. Younger one is 3 years younger than elder find their ages?
d) After giving 3 chocolates to my sister who already has 2 iam left over with 5. Find the total number of chocolates

Resources Suggested

Blackboard, pen and paper
Resource 2 can be used for explanation

Activity

Name of the activity- Real life equations
Type of activity – Individual
Use it for – practice
Materials – pen and paper
Procedure –

1. Ask the students to write any 5 real life situations that can be used to frame simple equations
2. Write them in statement form and equation form
3. Make them to solve by balancing method and transposing method

Resource 1

Algebra: A generalization of arithmetic in which letters representing numbers are combined according to the rules of arithmetic.

A variable takes on different values, its value is not fixed. The length of a square can have any value. It is a variable. But the number of angles of a triangle has a fixed value 3. It is not a variable.

We may use any letter n, l, m, p, x, y, z, etc. to show a variable.

A variable allows us to express relations in any practical situation.

Variables are numbers, although their value is not fixed. We can do the operations of addition, subtraction, multiplication and division on them just as in the case of fixed numbers. Using different operations we can form expressions with variables like x – 3, x + 3, 2n, 5m, 3 p , 2y + 3, 3l – 5, etc.

Variables allow us to express many common rules in both geometry and arithmetic in a general way. For example, the rule that the sum of two numbers remains the same if the order in which the numbers are taken is reversed can be expressed as a + b = b + a. Here, the variables a and b stand for any number, 1, 32, 1000 – 7, – 20, etc.

An equation is a condition on a variable. It is expressed by saying that an expression with a variable is equal to a fixed number, e.g. x – 3 = 10.

An equation has two sides, LHS and RHS, between them is the equal (=) sign.

Resource 1

Solution of an Equation: The value of the variable in an equation which satisfies the equation. The LHS of an equation is equal to its RHS only for a definite value of the variable in the equation. We say that this definite value of the variable satisfies the equation. This value itself is called the solution of the equation.

Example: x-2 = 4; For x=6 the equation will be a true statement or in other words 6 satisfies the equation hence 6 is the solution of the equation

Finding the solution of the equation/ solving the given equation:

if we add, Subtract, multiply or divide the same number to both sides of a balanced equation, the balance is undisturbed.

As an example: A balanced equation is like a weighing balance with equal weights on both its pans, in which case the arm of the balance is exactly horizontal. If we add the same weights to both the pans, the arm remains horizontal. Similarly, if we remove the same weights from both the pans, the arm remains horizontal. On the other hand if we add different weights to the pans or remove different weights from them, the balance is tilted; that is, the arm of the balance does not remain horizontal.

Resource 1

We use this method to solve the equation

Consider the equation: x + 3 = 8

We shall subtract 3 from both sides of this equation.

The new L.H.S. is x + 3 – 3 = x and the new R.H.S. is 8 – 3 = 5

Since this does not disturb the balance, we have

New L.H.S. = New R.H.S. or x = 5

which is exactly what we want, the solution of the equation

Example : 8x+7=31

We go stepwise to separate the variable x on the L.H.S. of the equation. The L.H.S. is 8x + 7. We shall first subtract 7 from it so that we get 8x. From this, in the next step we shall divide by 8 to get x.

Remember we must do the same operation on

both sides of the equation. Therefore, subtracting 7 from both sides,

Now divide both sides by 8,

8x / 8= 24/8

x=3

So 3 is the solution of given equation

Resource 1

Writing a statement in algebraic form

(i)Quotient of x by 8 multiplied by z can be written as $\frac{x}{8} \times z$

(ii) Twice x is increased by y can be written as 2x+y

(iii) 5 times a is added to 7 times b can be written as 5a+7b

(iv)Quotient of m and n added to the product of m and n can be written as

$(m \times n) + \frac{m}{n}$

Resource 2

Solving the equation by transposition:

Transposition: Finding a solution can be much easily done by the method called transposition. Transposing a number (i.e. changing the side of the number) is the same as adding or subtracting the number from both sides. In doing so, the operation of the number has to be changed to the opposite one.

Example:

1. Solve 8x+7=31

By transposing 7 to other side, its being in addition operation changes to subtraction. We get

$8x = 31 - 7 = 24$

By transposing 8 to other side, its being in multiplication operation changes to division. We get

$x = 24/8 = 3$

So, x = 3 is the solution of the equation.

2. Solve (2x+5)/3 = 15

Transposing 3 to other side

$2x+5 = 15 \times 3 = 45$

Transposing 5 to other side

$2x = 45 - 5 = 40$

Transposing 2 to other side

$X = 40/2 = 20$

Resource 3

Application in real life situations:

Example:

1. Ben thought of a number and if he adds 19 to it and divides the sum by 5, he will get 8. What is the number he thought?

Sol: The unkown quantity here is the number that has to be assumed as x

Let the number be x

Adding 19 to this and dividing the sum by 5 he gets 8

(x+19)/5 = 8

Transposing 5 which is in division make it multiplication

X+19 = 40

Transposing 19 which is in addition will make it subtraction

X = 40 - 19 = 21



2. Sum of three consecutive even numbers is 60 find them?

Let the three consecutive even numbers be x, x+2, x+4 where x is even

Sum of them is 60

X+x+2+x+4 = 60

3x + 6 = 60

Transposing 6 which is in addition will make it subtraction

3x = 60 - 6 = 54

Transposing 3 which is in multiplication make it division

X = 54/3 = 18

So the even numbers are 18, 20, 22.

4. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Use it like: test after the chapter is complete, homework

Answer the following:

1. Convert the following statements into equations.
   (a) 5 added to a number is 9.
   (b) 3 subtracted from a number is equal to 12.
   (c) 5 times a number decreased by 2 is 4.
   (d) 2 times the sum of the number x and 7 is 13.
2. Convert the following equations to statements
   (a) $p + 4 = 5$
   (b) $m - 7 = 3$
   (c) $2m = 7$
   (d) $3x/5 = 6$

Worksheet 2

Use it like: test after the chapter is complete, homework

Answer the following:

1. Solve the following equations

(a) $7x + 2 = -19$

(b) $3x - 1/3 = 5$

(c) $5x - 4 = 21$

(d) $-7x = 21$

(e) $18 - 7x = -3$

(f) $3(x + 4) = 21$

Worksheet 3

Use it like: test after the chapter is complete, homework

Answer the following:

1. In an isosceles triangle, the base angles are equal and the vertex angle is 80°. Find the measure of the base angles.
2. Twice the number decreased by 22 is 48. Find the number.
3. The sum of three consecutive multiples of 4 is 444. Find these multiples.
4. In a piggy bank, the number of 25 paise coins is 7 times the number of 50 paise coins. If there are 288 coins in the piggy bank, find the total amount of money in the piggy bank.
5. If a number is multiplied by 7, it increases by 102. Find the number.

Worksheet 4

Answer the following:

1. Rene is 6 years older than her younger sister. After 1 0 years, the sum of their ages will be 50 years. Find their present ages.
2. The length of a rectangle is 10 m more than its breadth. If the perimeter of rectangle is 80 m, find the dimensions of the rectangle.
3. A 300 m long wire is used to fence a rectangular plot whose length is twice its width. Find the length and breadth of the plot.
4. The denominator of a fraction is greater than the numerator by 8. If the numerator is increased by 17 and denominator is decreased by 1, the number obtained is 3/2, find the fraction.
5. A sum of ₹2700 is to be given in the form of 63 prizes. If the prize is of either ₹100 or ₹25, find the number of prizes of each type.
6. In a class of 42 students, the number of boys is 2/5 of the girls. Find the number of boys and girls in the class.
7. Among the two supplementary angles, the measure of the larger angle is 36° more than the measure of smaller. Find their measures.

5. SOLUTIONS

This section gives you sample answers for activities and questions listed above.

Worksheet 1

1. (a) $x + 5 = 9$ (b) $x - 3 = 12$ (c) $5x - 2 = 4$ (d) $2(x + 7) = 13$
2. (a) The sum of p and 4 is 15
   (b) 7 subtracted from m is 3
   (c) Twice a number m is 7
   (d) Three fifths of x is 6

Worksheet 2

1. (a) -3 (b) $1\frac{7}{9}$ (c) 5 (d) -3 (e) 3 (f) 3

Worksheet 3

1. 50°
2. 35
3. 144, 148, 152
4. ₹ 81
5. 17

Worksheet 4

1. 12, 18 years
2. 15 cm, 25 cm
3. 50 m, 100 m
4. 13/21
5. 15, 48
6. 30 girls, 12 boys
7. 72°, 108°

6. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them

Teacher can use these videos if time and facilities permit:

1. https://www.youtube.com/watch?v=l3XzepN03KQ
2. https://www.youtube.com/watch?v=Qyd_v3DGzTM