1. If α, β are the zeroes of a polynomial, such that $\alpha + \beta = 6$ and $\alpha\beta = 4$, then write the polynomial.
2. Find a quadratic polynomial, the sum of whose zeroes is 0 and one zero is 5.
3. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial.
4. Find the zeroes of the quadratic polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$.
5. Find a quadratic polynomial whose one zero is 5 and product of zeroes is 30.
6. Find a quadratic polynomial whose one zero is 7 and sum of zeroes is –18.
7. Form a quadratic polynomial, one of whose zero is $\sqrt{5}$ and the product of the zeroes is $-2\sqrt{5}$.
8. Find a quadratic polynomial whose zeroes are $5 + \sqrt{2}$ and $5 - \sqrt{2}$.
9. Show that $\frac{1}{2}$ and $\frac{-3}{2}$ are the zeroes of the polynomial $4x^2 + 4x - 3$ and verify the relationship between zeroes and co-efficients of polynomial. **[CBSE 2012]**
10. If one zero of the quadratic polynomial $2x^2 + px + 4$ is 2, find the other zero. Also, find the value of p.

1. Without actually performing the long division, state whether the rational number $\frac{129}{2^2 5^7 7^5}$ will have terminating or non-terminating decimal expansion.

2. The HCF of two numbers is 145 and their LCM is 2175. If one number is 725, find the other number.

3. If $\frac{241}{4000} = \frac{241}{2^m 5^n}$, find the values of m and n where m and n are non-negative integers. Hence write its decimal expansion without actual division.

Find HCF and LCM of following using Fundamental Theorem of Arithmetic method (Q.4 and Q.5)

4. 270, 405 and 315

5. 377, 435 and 667

Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or non-terminating repeating decimal expansion (Q. 6 and 7)

6. $\frac{23}{2^3 5^2}$

7. $\frac{77}{210}$

8. Show that $3 + 5\sqrt{2}$ is an irrational number.

9. Prove that $2\sqrt{3} - 1$ is an irrational number.

10. Prove that $\frac{2\sqrt{3}}{5}$ is irrational. [CBSE 2011]

Solve for x and y using elimination method (Q 1 to Q 2):

1. $x + 2y = 5; \frac{3x}{2} + 3y = 10$
2. $7x - 2y = 9; 4x + 6y = 15$
3. The sum of the digits of a two digit number is 8 and the difference between the number and that formed by reversing the digits is 18. Find the number.
4. Students of a class are made to stand in rows. If 4 students are extra in a row, there would be two rows less. If 4 students are less in a row, there would be four more rows. Find the number of students in the class.
5. The sum of the digits of a two digit number is 9. The number obtained by reversing the order of digits of the given number exceeds the given number by 27. Find the given number.

6. The sum of a two digit number and the number formed by reversing the order of digits is 154. If the two digits differ by 4, find the number.

7. Solve for x and y: $a^2x + b^2y = c^2$; $b^2x + a^2y = d^2$

8. Solve for x and y by the method of elimination:

   $2x - 3y = 7$; $5x + 2y = 10$

9. Solve for x and y: $2x + 3y = 9$; $4x + 6y = 15$

10. Solve the following pair of linear equations using elimination method.

$$3x + 5y = 15$$

$$12x + 20y = 60$$

11. If $p_1x + q_1y + r_1 = 0$ and $p_2x + q_2y + r_2 = 0$ are two linear equations in two variables x and y such that p_1, q_1, r_1, p_2, q_2 and r_2 are consecutive positive integers in some order, then find the values of x and y.

Activity 1

Objective

To find the HCF of two numbers experimentally based on Euclid Division Lemma.

Material Required

Cardboard sheets, glazed papers of different colours, scissors, ruler, sketch pen, glue etc.

Method of Construction

1. Cut out one strip of length a units, one strip of length b units ($b < a$), two strips each of length c units ($c < b$), one strip of length d units ($d < c$) and two strips each of length e units ($e < d$) from the cardboard.
2. Cover these strips in different colours using glazed papers as shown in Fig. 1 to Fig. 5:

Fig. 1

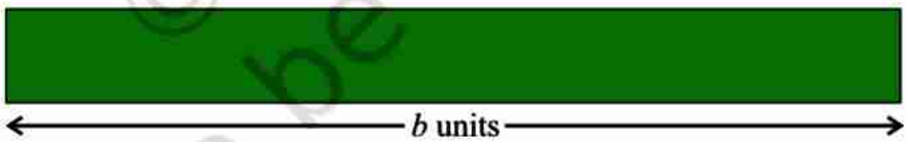

Fig. 2

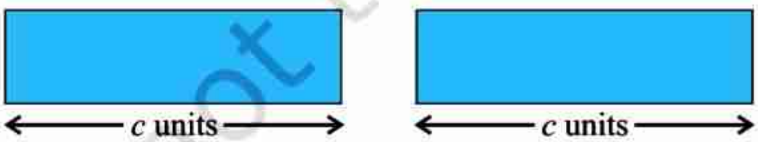

Fig. 3

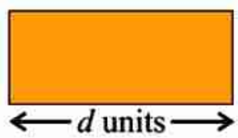

Fig. 4

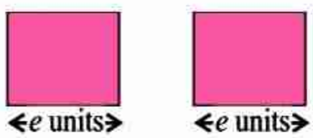

Fig. 5

3. Stick these strips on the other cardboard sheet as shown in Fig. 6 to Fig. 9

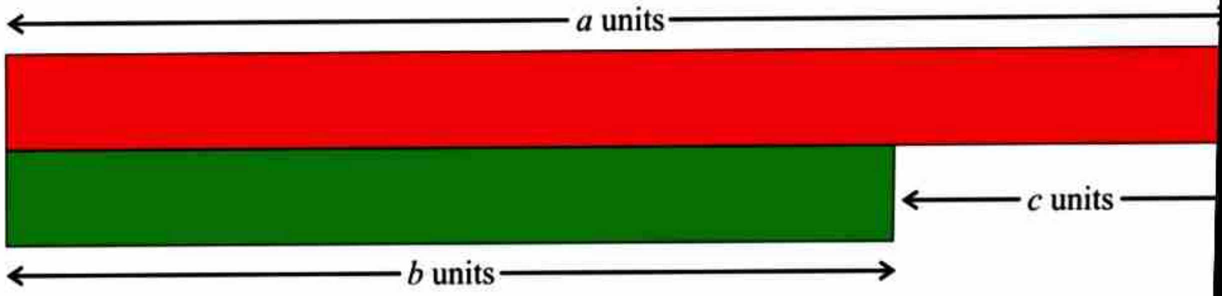

Fig. 6

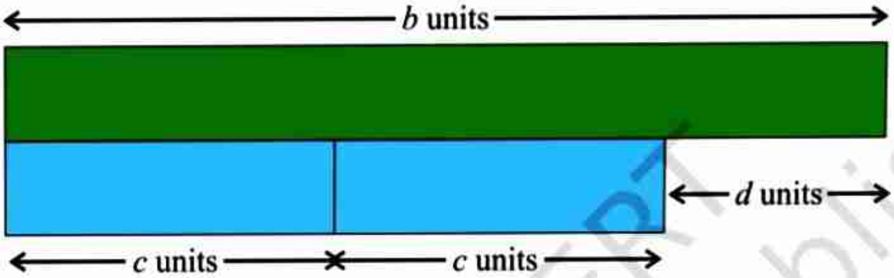

Fig. 7

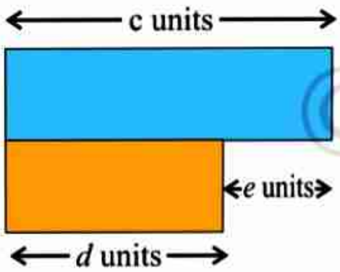

Fig. 8

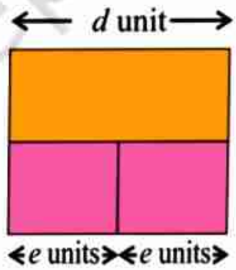

Fig. 9

Demonstration

As per Euclid Division Lemma,

Fig. 6 depicts $a = b \times 1 + c$ ($q = 1, r = c$) (1)

Fig. 7 depicts $b = c \times 2 + d$ ($q = 2, r = d$) (2)

Fig.8 depicts $c = d \times 1 + e$ ($q = 1, r = e$) (3)

and Fig. 9 depicts $d = e \times 2 + 0$ ($q = 2, r = 0$) (4)

As per assumptions in Euclid Division Algorithm,

HCF of a and b = HCF of b and c

= HCF of c and d = HCF of d and e

The HCF of d and e is equal to e, from (4) above.

So, HCF of a and b = e.

Observation

On actual measurement (in mm)

a =......... , b = ... , c = ... , d = ..., e = ...

So, HCF of __________ and __________ = ...

Application

The process depicted can be used for finding the HCF of two or more numbers, which is known as finding HCF of numbers by Division Method.

Activity 2

Objective

To draw the graph of a quadratic polynomial and observe:

(i) The shape of the curve when the coefficient of x^2 is positive.

(ii) The shape of the curve when the coefficient of x^2 is negative.

(iii) Its number of zeroes.

Material Required

Cardboard, graph paper, ruler, pencil, eraser, pen, adhesive.

Method of Construction

1. Take cardboard of a convenient size and paste a graph paper on it.
2. Consider a quadratic polynomial $f(x) = ax^2 + bx + c$
3. Two cases arise:

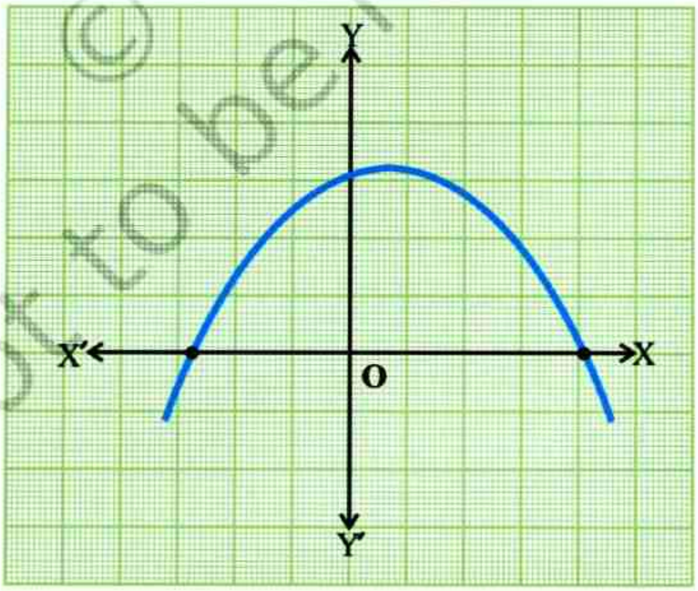

Fig. 1

(i) $a > 0$ (ii) $a < 0$

4. Find the ordered pairs $(x, f(x))$ for different values of x.
5. Plot these ordered pairs in the cartesian plane.

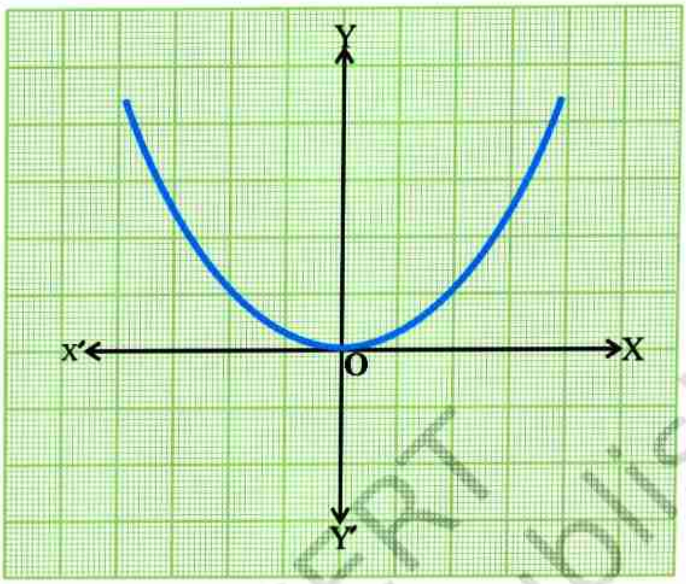

Fig. 2

6. Join the plotted points by a free hand curve [Fig. 1, Fig. 2 and Fig. 3].

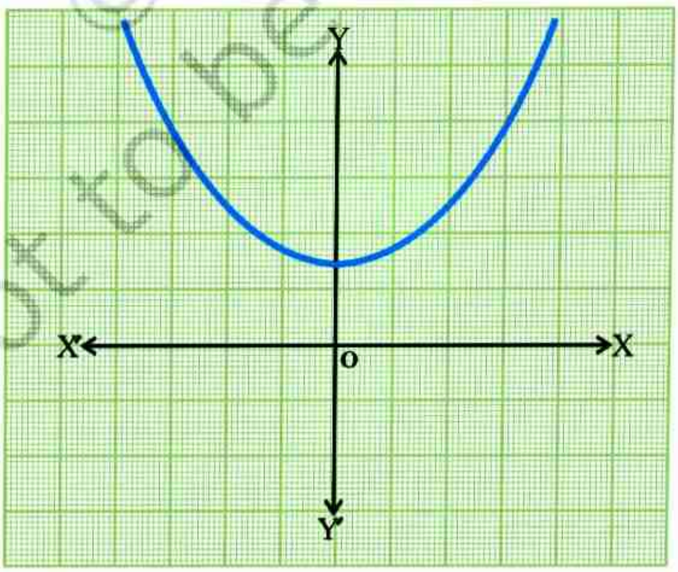

Fig. 3

Demonstration

1. The shape of the curve obtained in each case is a parabola.
2. Parabola opens upward when coefficient of x^2 is positive [see Fig. 2 and Fig. 3].
3. It opens downward when coefficient of x^2 is negative [see Fig. 1].
4. Maximum number of zeroes which a quadratic polynomial can have is 2.

Observation

1. Parabola in Fig. 1 opens ______
2. Parabola in Fig. 2 opens _______
3. In Fig. 1, parabola intersects x-axis at ______ point(s).
4. Number of zeroes of the given polynomial is ________.
5. Parabola in Fig. 2 intersects x-axis at ______ point(s).
6. Number of zeroes of the given polynomial is ______.
7. Parabola in Fig.3 intersects x-axis at ______ point(s).
8. Number of zeroes of the given polynomial is _______.
9. Maximum number of zeroes which a quadratic polynomial can have is ___________.

Application

This activity helps in

1. understanding the geometrical representation of a quadratic polynomial
2. finding the number of zeroes of a quadratic polynomial.

Note

Points on the graph paper should be joined by a free hand curve only.

Activity 3

OBJECTIVE

To verify the conditions of consistency/ inconsistency for a pair of linear equations in two variables by graphical method.

MATERIAL REQUIRED

Graph papers, pencil, eraser, cardboard, glue.

METHOD OF CONSTRUCTION

1. Take a pair of linear equations in two variables of the form

   $a_1x + b_1y + c_1 = 0$ (1)

   $a_2x + b_2y + c_2 = 0,$ (2)

   where a_1, b_1, a_2, b_2, c_1 and c_2 are all real numbers; a_1, b_1, a_2 and b_2 are not simultaneously zero.

There may be three cases :

Case I : $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Case II: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Case III: $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

2. Obtain the ordered pairs satisfying the pair of linear equations (1) and (2) for each of the above cases.

3. Take a cardboard of a convenient size and paste a graph paper on it. Draw two perpendicular lines X′OX and YOY′ on the graph paper (see Fig. 1). Plot the points obtained in Step 2 on different cartesian planes to obtain different graphs [see Fig. 1, Fig. 2 and Fig.3].

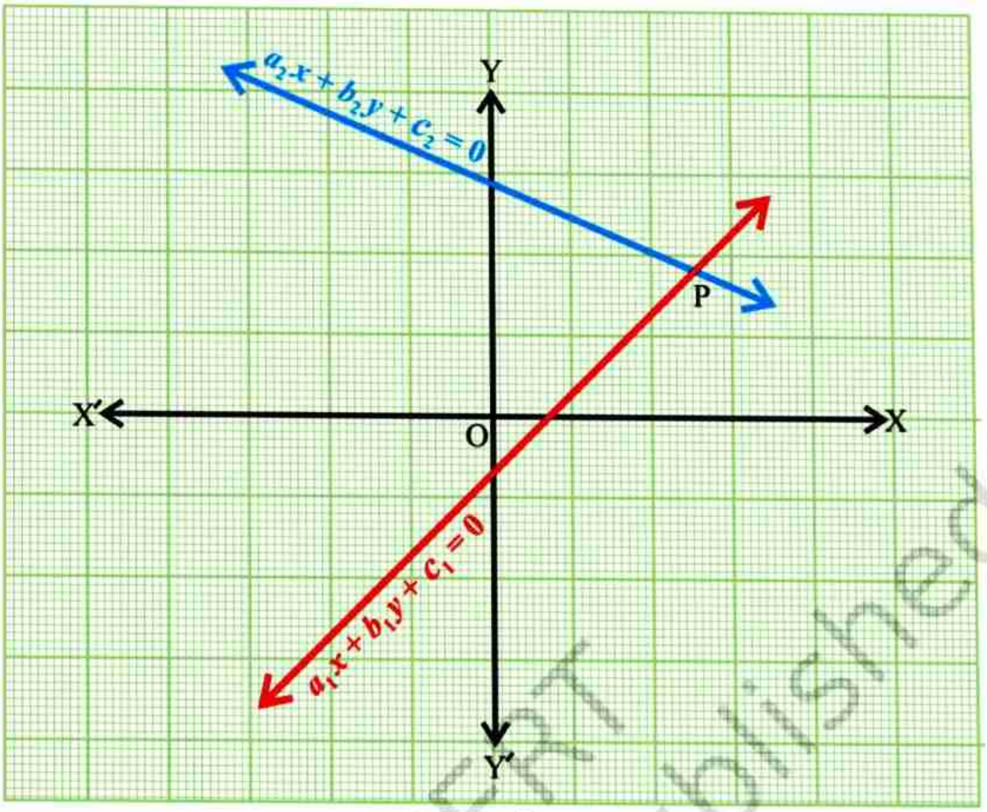

Fig. 1

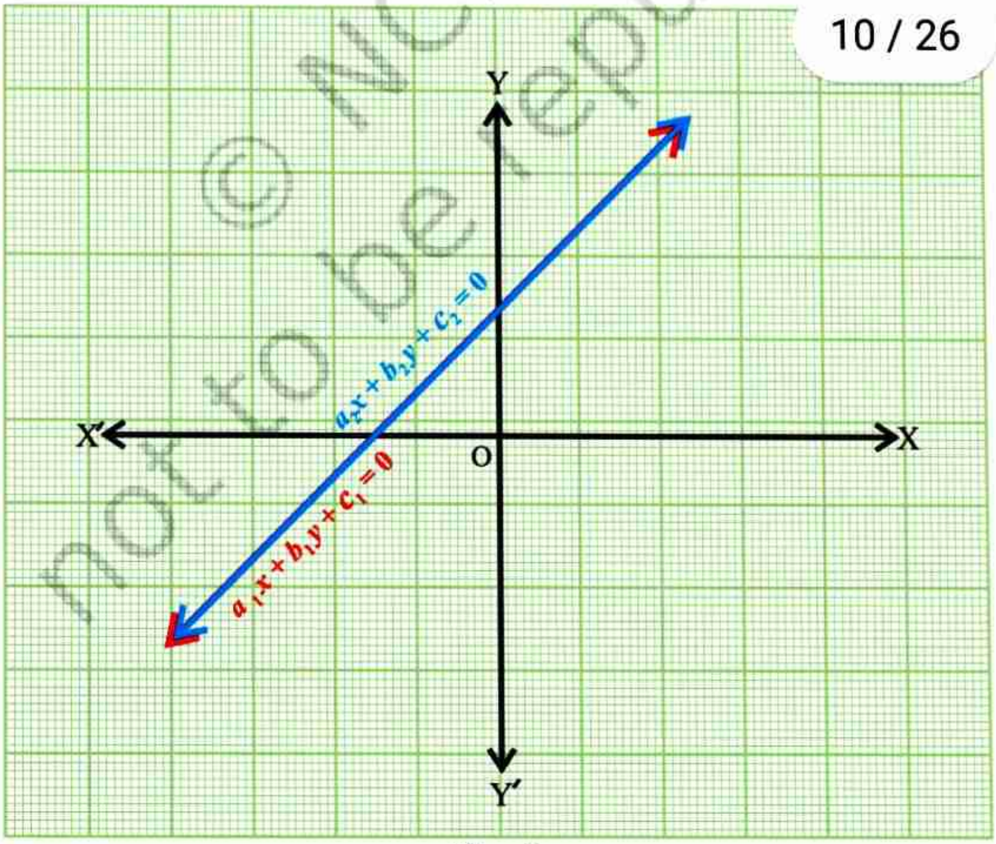

Fig. 2

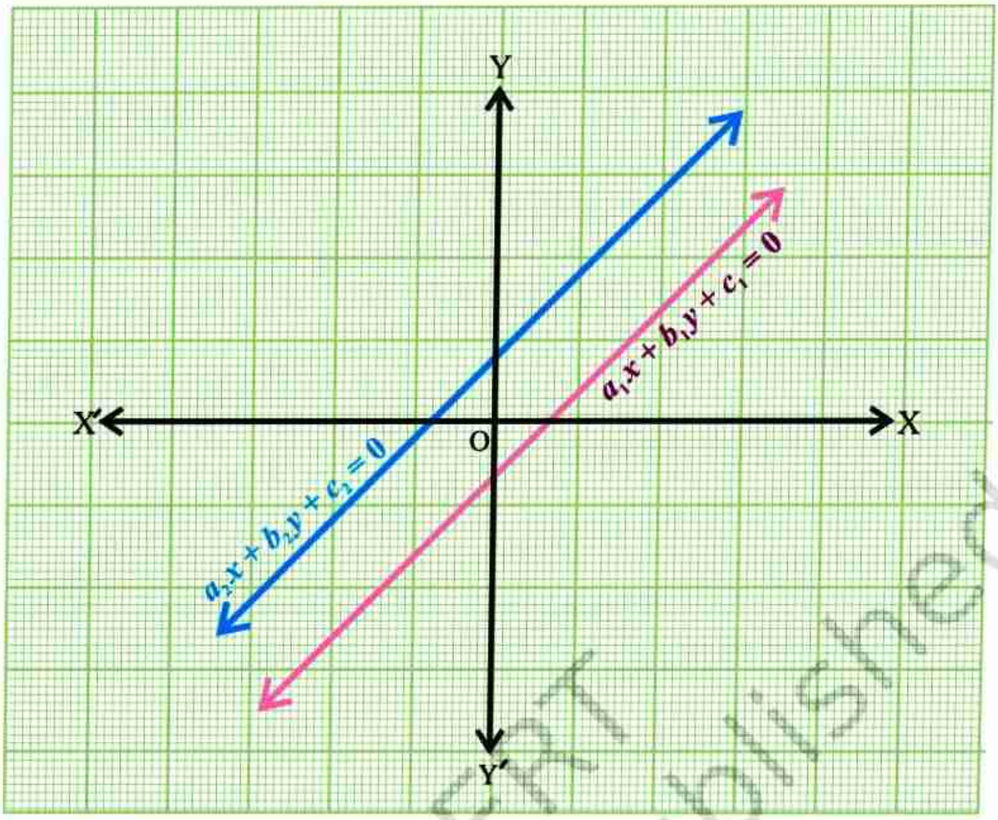

Fig. 3

Demonstration

Case I: We obtain the graph as shown in Fig. 1. The two lines are intersecting at one point P. Co-ordinates of the point P (x,y) give the unique solution for the pair of linear equations (1) and (2).

Therefore, the pair of linear equations with $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ is consistent and has the unique solution.

Case II: We obtain the graph as shown in Fig. 2. The two lines are coincident. Thus, the pair of linear equations has infinitely many solutions.

Therefore, the pair of linear equations with $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ is also consistent as well as dependent.

Case III: We obtain the graph as shown in Fig. 3. The two lines are parallel to each other.

This pair of equations has no solution, i.e., the pair of equations with $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ is inconsistent.

Observation

1. a_1 = ___________, a_2 = ___________,

b_1 = ___________, b_2 = ___________,

c_1 = ___________, c_2 = ___________,

So, $\frac{a_1}{a_2}$ = ..., $\frac{b_1}{b_2}$ = ..., $\frac{c_1}{c_2}$ = ...

$\frac{a_1}{a_2}$	$\frac{b_1}{b_2}$	$\frac{c_1}{c_2}$	Case I, II or III	Type of lines	Number of solution	Conclusion Consistent/ inconsistent/ dependent

Application

Conditions of consistency help to check whether a pair of linear equations have solution (s) or not.

In case, solutions/solution exist/exists, to find whether the solution is unique or the solutions are infinitely many.