Activity 5

Objective

To verify the algebraic identity :

$a^2 - b^2 = (a + b)(a - b)$

Material Required

Drawing sheets, cardboard, coloured papers, scissors, sketch pen, ruler, transparent sheet and adhesive.

Method of Construction

1. Take a cardboard of a convenient size and paste a coloured paper on it.
2. Cut out one square ABCD of side a units from a drawing sheet [see Fig. 1].
3. Cut out one square AEFG of side b units ($b < a$) from another drawing sheet [see Fig. 2].

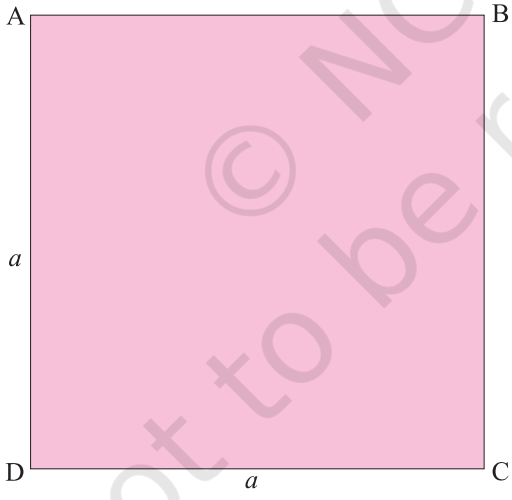

Fig. 1

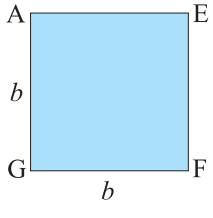

Fig. 2

4. Arrange these squares as shown in Fig. 3.

5. Join F to C using sketch pen. Cut out trapeziums congruent to EBCF and GFCD using a transparent sheet and name them as EBCF and GFCD, respectively [see Fig. 4 and Fig. 5].

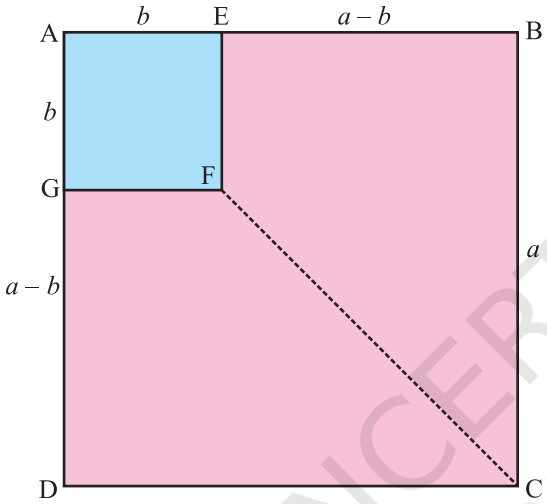

Fig. 3

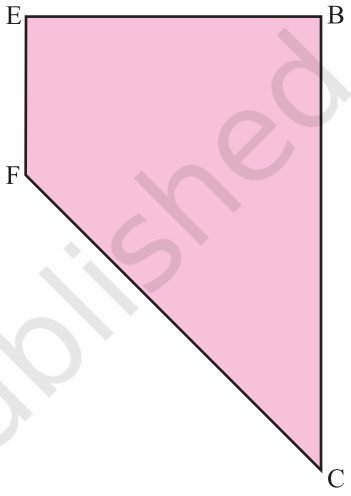

Fig. 4

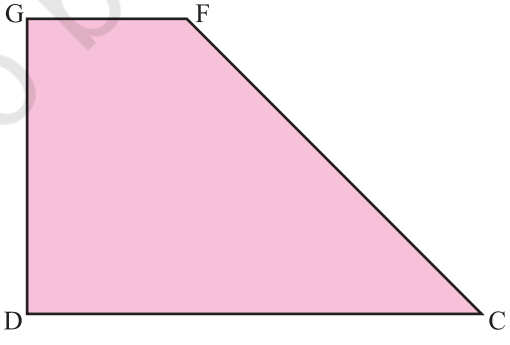

Fig. 5

6. Arrange these trapeziums as shown in Fig. 6.

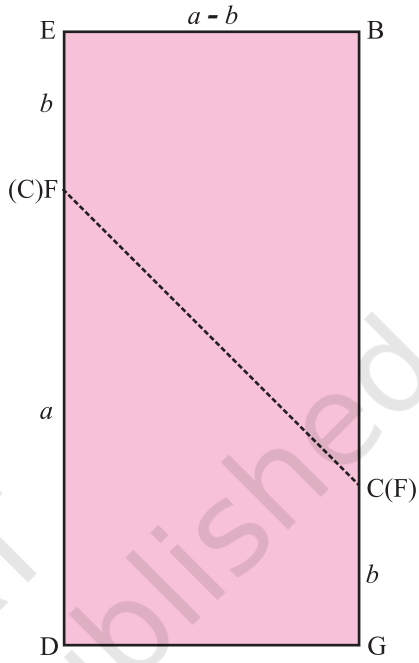

Fig. 6

Demonstration

Area of square ABCD = a^2

Area of square AEFG = b^2

In Fig. 3,

Area of square ABCD – Area of square AEFG

= Area of trapezium EBCF + Area of trapezium GFCD

= Area of rectangle EBGD [Fig. 6].

= ED × DG

Thus, $a^2 - b^2 = (a+b)\ (a-b)$

Here, area is in square units.

Observation

On actual measurement:

a = ..., b = ..., $(a+b)$ = ...,

So, a^2 = ..., b^2 = ..., $(a-b)$ = ...,

a^2-b^2 = ..., $(a+b)\ (a-b)$ = ...,

Therefore, $a^2-b^2 = (a+b)\ (a-b)$

Application

The identity may be used for

1. difference of two squares
2. some products involving two numbers
3. simplification and factorisation of algebraic expressions.