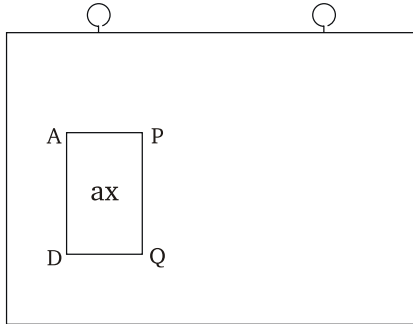


**1. Identity :  $x(a + b) = ax + bx$**

**To do and Observe :**

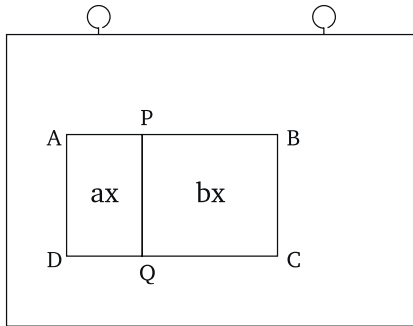
Step 1 :

Take the rectangle printed as 'ax' and fix it on the base using pins as shown below call it as APQD



Step 2 :

Now arrange another rectangle printed as 'bx' adjacent to ax as shown below to form another rectangle ABCD.



Now observe that area of rect. ABCD  
 = Area of rect. APQD + Area of rect. PBCQ  
 $AD \times AB = AD \times AP + BC \times PB$   
 $x(a + b) = xa + xb$

**Therefore,  $x(a + b) = ax + bx$**

**2.  $(a + b)^2 = a^2 + b^2 + 2ab$**

Step 1:

Fix the squares  $a^2$  &  $b^2$  and rectangles 'ab' using pins on the base as shown below.



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**ALGEBRA KIT 1**

To prove geometrically

1.  $x(a + b) = ax + bx$
2.  $(a + b)^2 = a^2 + b^2 + 2ab$
3.  $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

**Assembly :**

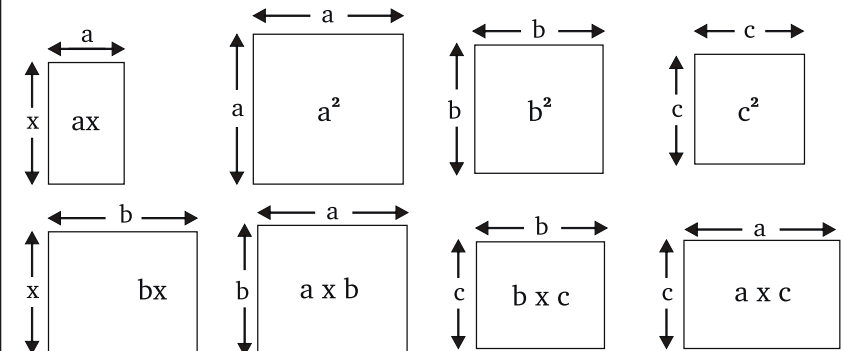
Consists of squares and rectangles made out of 12mm Eva rubber of the following sizes. A base of 300mm x 300mm made of 12mm viva rubber with hooks and pins are part of the kit.

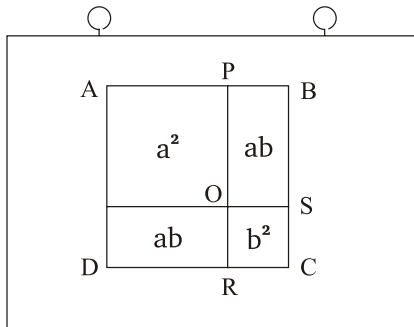
Squares

- 15 x 15 cms -1  $a^2$
- 8 x 8 cms -1  $b^2$
- 5 x 5 cms -1  $c^2$

Rectangles

- 15 x 8 cm -2 (a x b)
- 8 x 5 cm -2 (b x c)
- 15 x 5 cm -2 (a x c)





Now observe that

Area of square ABCD

$$= \text{Area of square APOQ} + \text{Area of square OSQR} \\ + \text{area of rect. PORS} + \text{area of rect. QORD}$$

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

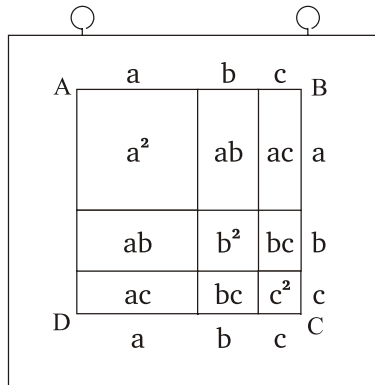
$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$\boxed{(a + b)^2 = a^2 + b^2 + 2ab}$$

$$\mathbf{3. (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca}$$

Step 1:

Fix the squares  $a^2$ ,  $b^2$  &  $c^2$  and rectangles 'ab', 'bc' & 'ca' using pins on the base as shown below.



Now observe that

Area of square ABCD

= sum of area of squares  $a^2$ ,  $b^2$ ,  $c^2$  & area of rectangles 'ab', 'bc' & 'ca'

$$(a + b + c)(a + b + c)$$

$$= a^2 + b^2 + c^2 + (ab + ab) + (bc + bc) + (ca + ca)$$

$$\boxed{\text{Therefore, } (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca}$$