EXPERIMENT No.

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Holiday Homework

→ To multiply two linear algebraic expressions (polynomials) using different strips of cardboard.

→ Answers:

Materials Required:

Cardboard sheets (blue, green and red), geometry box, white sheets of paper, ruler, pair of scissors and glue stick.

Procedure:

(1) Every x^2 represents the area of green square of side x - units.

Therefore, to represent $2x^2$, use two green squares of side x units each. Take x as 3 units.

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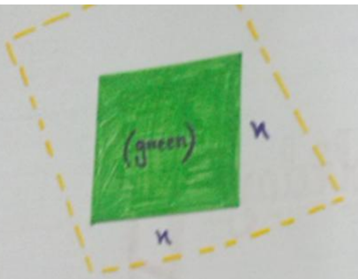
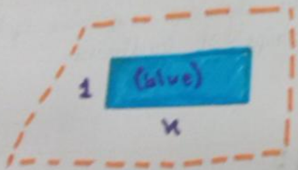
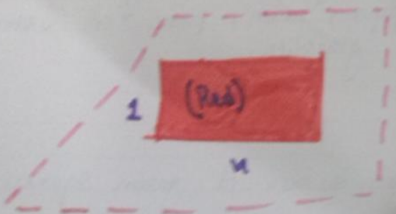






(2) Every x represents area of a blue rectangular strip of dimensions (1 x x). [For 5x, use 5 blue strips each of dimensions (1 x x)]

(3) Every (−x) is represented by a red rectangular strip of dimensions (1 x x). For (−5x), use 5 red strips each of dimensions (1 x x).

Case 1 :

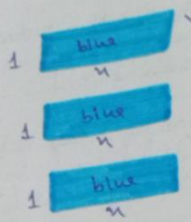
Let us consider the expression $x^2 + 5x + 6$ which is of the form $(ax^2 + bx + c)$

(1) The polynomial $x^2 + 5x + 6$ $= x^2 + 3x + 2x + 6$ can be factorized as $(x+3)(x+2)$.

(Fig.(i))

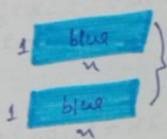
(2) To represent x^2, draw a green square of x units [Fig. i.].

(3) To represent 3x, draw three rectangular strips of blue colour of dimension (1 x x) [Fig. ii.].



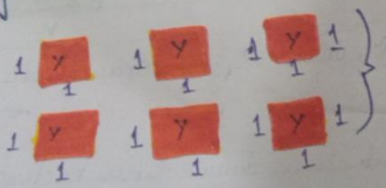
(Fig.(ii))

(4) To represent 2x, draw two blue rectangular strips of dimensions (1×x) [fig.(iii)].



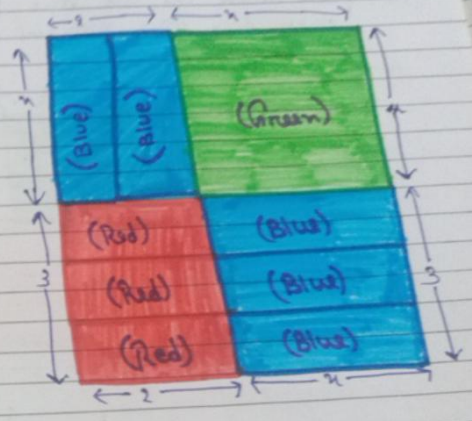
(Fig.(iii))

(5) To represent 6, draw 6 red unit squares [fig.(iv)].



(Fig.(iv))

(7) When we shown the strips together in (fig.v)



Case II :

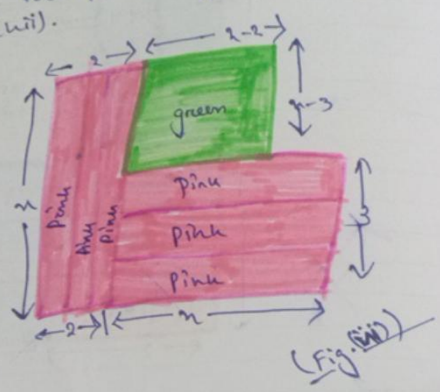
Consider the expression $x^2 - 5x + 6$ and factorise it $x^2 - 3x - 2x + 6 = (x-3)(x-2)$.

(1) draw a green square of dimension x (say 5 units).

(2) To represent 6, cut six red square dimension 1 unit.

(3) To repeat $-5x\{(-3x)+(-2x)\}$, cut five pink strips of dimension $(1 \times x)$.

(4) Now draw the all five pink strips over the pink polygon as shown in fig. (iii).



(Fig. (iii))

Observation and calculation :

case I

x^2+5x+6

area of 5 blue strips $= 5x = 2x+3x$

area of green square $= x^2$

area of 6 red unit squares $= 6$

Total area of rectangle obtained $= x^2+3x+2x+6 = x^2+5x+6 = (x+3)(x+2)$

case II

x^2-5x+6

area of 5 pink rectangular strips $= 5x$

area of green square $= x^2$

area of 6 red unit squares $= 6$

total area of green rectangle obtained after pasting all strips.

$= (x-2)(x-3)$

$= x^2-2x-3x+6$

$= x^2-5x+56$

$\therefore x^2-5x+6 = (x-3)(x-2)$

Result :

We verified the factors of two quadratic polynomials geometrically by paper cutting and pasting.

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