Algebraic Identities..

By RASHMI KATHURIA

Activity 3

- Aim : To prove the algebraic identity

  $$a^3-b^3 = (a-b)(a^2+ab+b^2)$$

  using unit cubes.

Material required: Unit Cubes.

Start Working..

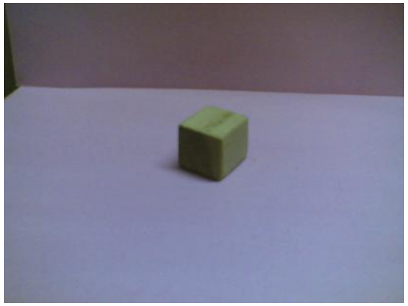
Take any suitable value for a and b.

Let $a=3$ and $b=1$

Step 1. To represent $(a)^3$ make a cube of dimension a x a x a i.e. 3x3x3 cubic units.

Step2. To represent $a^3 - b^3$ extract a cube of dimension b x b x b i.e. 1x1x1 from the cube formed in the step 1 of dimension a x ax a i. e 3x3x3 cubic units.

-



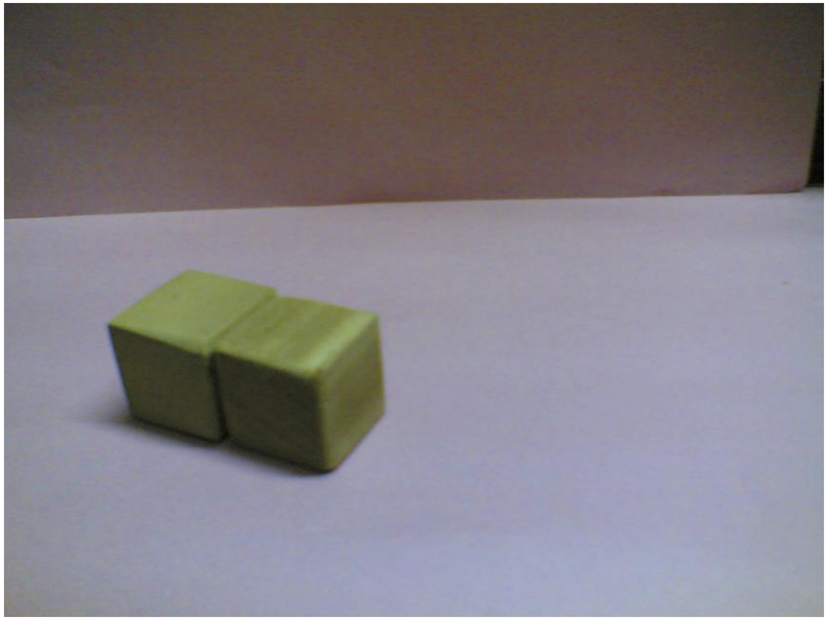
=

Step3.

To represent $(a-b)a^2$ make a cuboid of dimension $(a-b) \times a \times a$ i.e. $2 \times 3 \times 3$ cubic units.

Step4. To represent (a-b) a b make a cuboid of dimension (a-b) x a x b i.e. 2x3x1 cubic units.

Step5. To represent $(a-b)b^2$ make a cuboid of dimension $(a-b) \times b \times b$ i.e. $2 \times 1 \times 1$ cubic units.

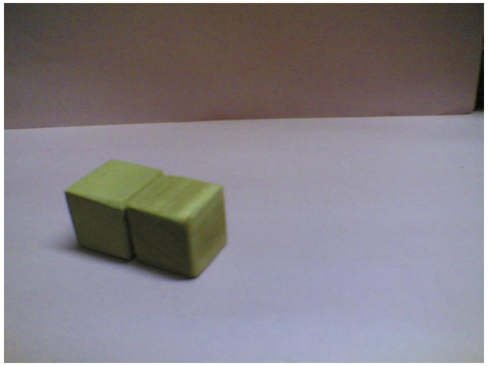


Step6.

To represent $(a-b)a^2 + (a-b)ab + (a-b)b^2$ I .e $(a-b)(a^2+ab+b^2)$, join all the cuboids formed in the Steps 3 ,4 and 5.

+

+



=

Observe the following

- The number of unit cubes in a^3 = …27…..
- The number of unit cubes in b^3 = …1…..
- The number of unit cubes in $a^3 – b^3$ = …26…..
- The number of unit cubes in $(a-b)a^2$=…18…
- The number of unit cubes in $(a-b\ )a\ b$=…6……
- The number of unit cubes in $(a-b)b^2$=…2……
- The number of unit cubes in $(a-b)a^2 + (a-\ b)\ a\ b + (a-b)b^2$

  = …26……

Learning Outcome

It is observed that the number of unit cubes in a^3-b^3 is equal to the number of unit cubes in $(a-b)a^2 + (a-b)ab + (a-b)b^2$ i.e.

$(a-b)(a^2+ab+b^2)$.