Algebraic Identities…

By RASHMI KATHURIA

Activity 4

- Aim : To prove the algebraic identity

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

using unit cubes.

Material required: Unit Cubes.

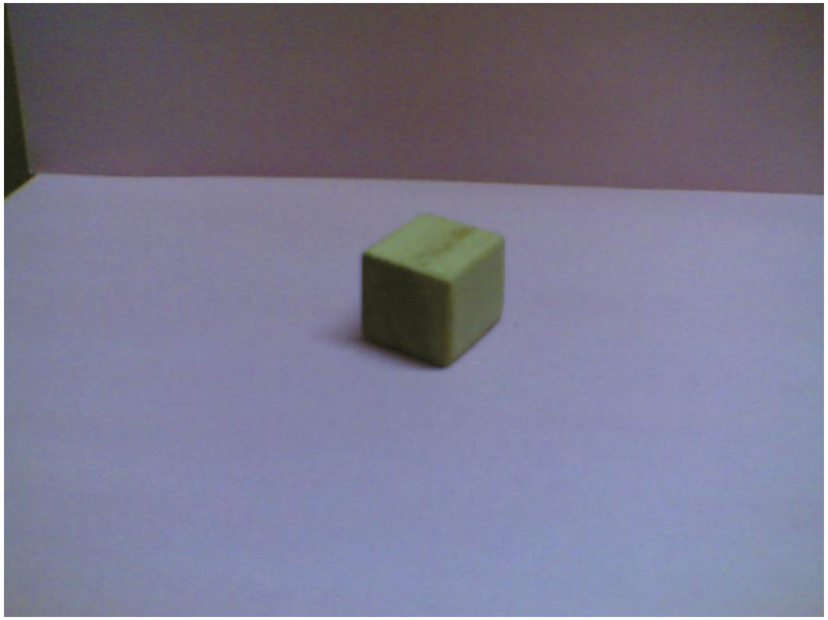
Start Working..

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 $(b)^3$ take a cube of dimension b x b x b i.e. 1x1x1 cubic units.



Step3. **To represent a^3+b^3 add a cube of dimension b x b x b i.e. 1x1x1 to the cube formed in the step 1 of dimension a x a x a i. e 3x3x3 cubic units.**

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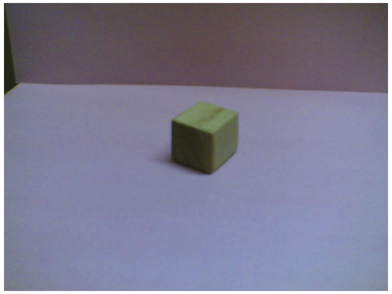

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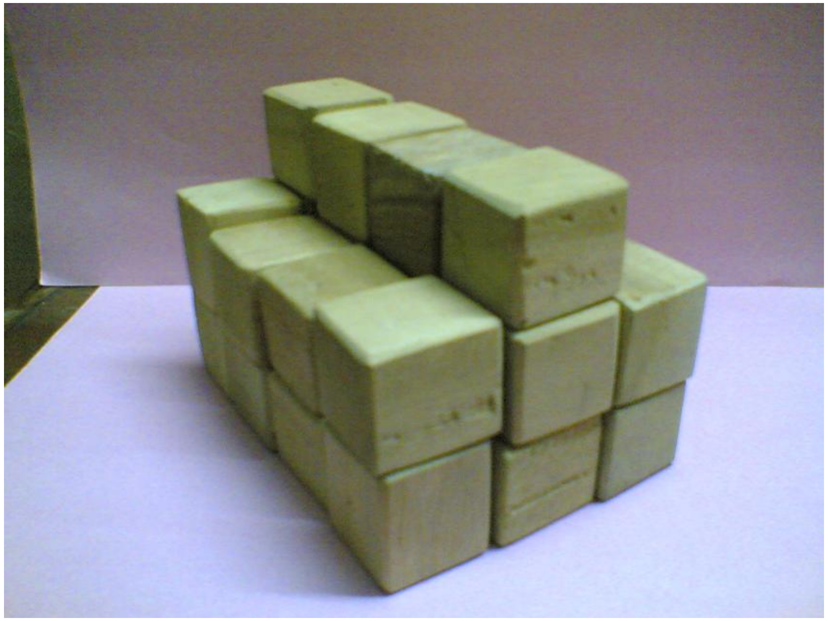
Step4. To represent (a+b)a^2 make a cuboid of dimension (a +b) x a x a i.e. 4x3x3 cubic units.

Step5. To represent $(a+b)a^2+(a+b)b^2$ add a cuboid of dimension $(a+b) \times b \times b$ i. e $4 \times 1 \times 1$ to the cuboid formed in the previous step.

Step6. To represent $(a+b)a^2+(a+b)b^2-(a+b)ab$ extract a cuboid of dimension $(a+b) \times a \times b$ i.e. $4 \times 3 \times 1$ cubic units from the shape formed in the previous step..



Step7. Rearrange the unit cubes left to form the shape formed in the Step 3.

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 = ...28.....
- The number of unit cubes in $(a+b)a^2$=...36......
- The number of unit cubes in $(a+ b) a b$=...12......
- The number of unit cubes in $(a+b)b^2$=...4......
- The number of unit cubes in $(a+b)a^2 \_ (a+ b) a b + (a+b)b^2$

  = ...28......

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

Acknowledgement

- I would like to thank my sister who has helped me to click these picture from the mobile and then transferring to the computer.

Thank You