Exploring Algebraic Identities

A presentation by..
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Activity 1

- Aim : To prove the algebraic identity $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ using unit cubes.

Material required: Unit Cubes.

Start Working..

Take any suitable value for a and b.

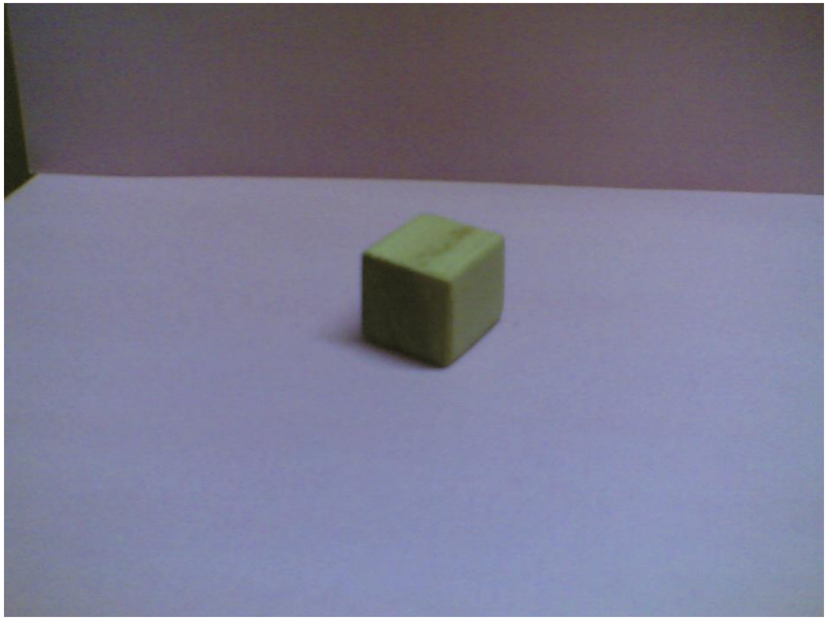
Let a=3 and b=1

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

Step 2. **To represent $3a^2b$ make 3 cuboids of dimension a x a x b i.e. 3x3x1 cubic units.**

Step 3. To represent $3ab^2$ make 3 cuboids of dimension a x b x b i.e. 3x1x1 cubic units.

Step 4. To represent b^3 make a cube of dimension a x a x a i.e. 1x1x1 cubic units.



Step 5. Join all the cubes and cuboids formed in the previous steps to make a cube of dimension (a +b) x (a +b) x (a +b) i.e. 4x4x4 cubic units.

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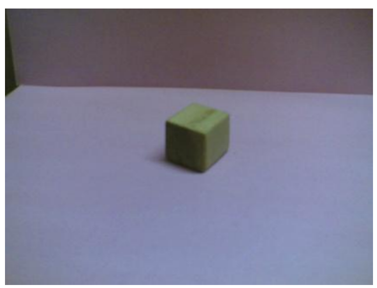

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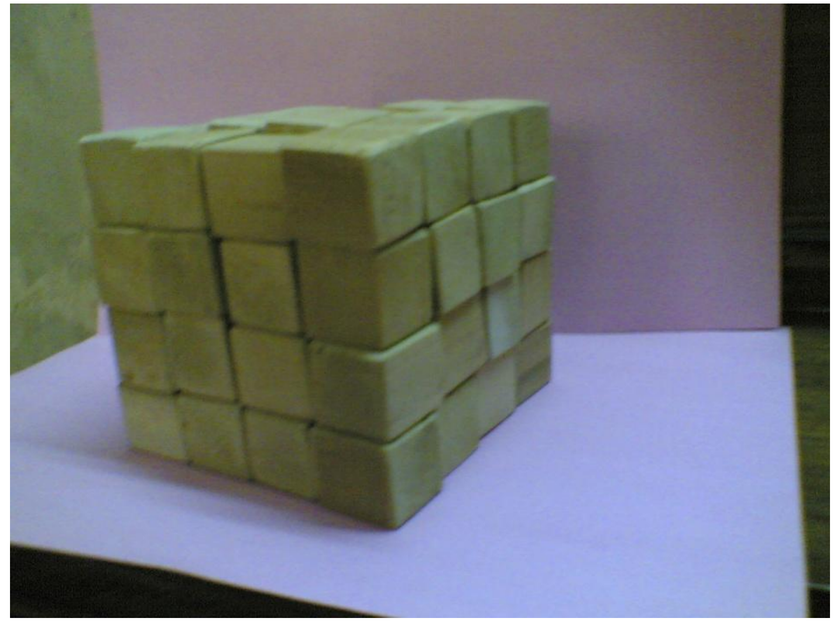

Observe the following

- The number of unit cubes in a^3 = ..27…..
- The number of unit cubes in $3a^2b$ =…27…
- The number of unit cubes in $3ab^2$ =…9……
- The number of unit cubes in b^3 =…1……
- The number of unit cubes in $a^3 + 3a^2b + 3ab^2 + b^3$

  = ..64….
- The number of unit cubes in $(a+b)^3$ =…64…

Learning outcome

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