Algebraic identities…

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ISO 9001:2000 & 14001:1996

Activity 2

- Aim : To prove the algebraic identity

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

  using unit cubes.

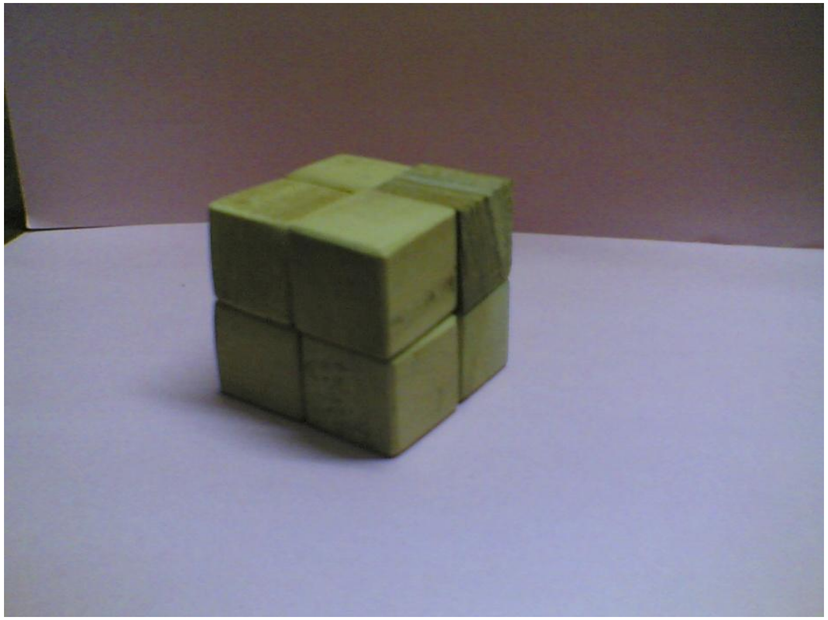
Material required : Unit Cubes.

Start Working..

Take any suitable value for a and b.

Let a=3 and b=1

Step 1. To represent $(a-b)^3$ make a cube of dimension $(a-b) \times (a-b) \times (a-b)$ i.e. $2 \times 2 \times 2$ cubic units.



Step 2. To represent $(a)^3$ make a cube of dimension a x a x a i.e. 3x3x3 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 $a^3 + 3ab^2$, join the cube and the cuboids formed in steps 2 and 3.

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Step 5. To represent $a^3 + 3ab^2 - 3a^2b$ extract from the shape formed in the previous step 3 cuboids of dimension 3x3x1.

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Step 6. To represent $a^3 + 3ab^2 - 3a^2b - b^3$ extract from the shape formed in the previous step 1 cube of dimension 1x1x1.

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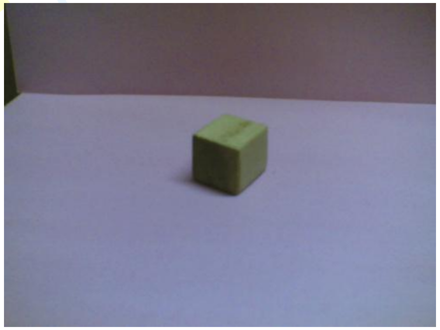

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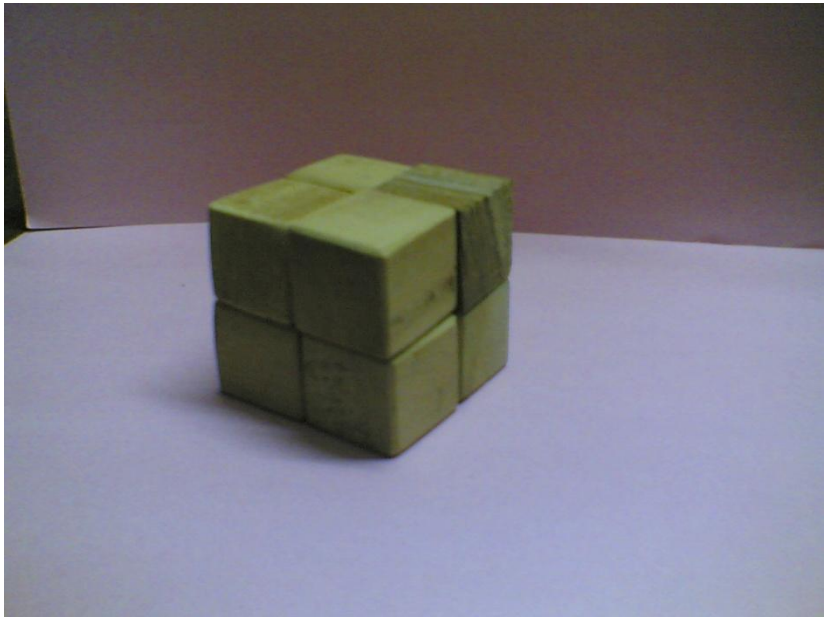
Step 7. **Arrange the unit cubes left to make a cube of dimension 2x2x2 cubic units.**



Observe the following

- The number of unit cubes in a^3 = …27…..
- The number of unit cubes in $3ab^2$ =…9……
- The number of unit cubes in $3a^2b$=…27……
- The number of unit cubes in b^3 =…1……
- The number of unit cubes in
  $a^3 - 3a^2b + 3ab^2 - b^3$ = …8…..

- The number of unit cubes in $(a-b)^3$ =…8…

Learning outcome

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