

Significato geometrico di $(a+b)^3$

- Note

- Autore

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- Versione

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Maple V Release 6.02 for Windows 2000

```
> restart: with(plots):  
Warning, the name changecoords has been redefined
```

```
> (a+b)^3 = expand((a+b)^3);  

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

```

Per la visualizzazione scegliamo dei valori particolari di a e b

```
> a:=7; b:=3; c:=a+b;  

$$a := 7$$

$$b := 3$$

```

Costruzione del cubo di spigolo $c=a+b$

```
> p1 := PLOT3D( POLYGONS(  
  [ [0,0,0], [c,0,0], [c,c,0], [0,c,0] ],  
  [ [0,0,c], [c,0,c], [c,c,c], [0,c,c] ],  
  [ [0,0,0], [0,0,c] ],  
  [ [c,0,0], [c,0,c] ],  
  [ [c,c,0], [c,c,c] ],  
  [ [0,c,0], [0,c,c] ]),  
  STYLE(LINE), ORIENTATION(30,60), COLOUR(RGB,1,0,0),  
  SCALING(CONSTRAINED)):
```

Costruzione e visualizzazione dei cubi di spigoli a, rispettivamente b

```
> p2 := PLOT3D( POLYGONS(  
  [ [0,0,0], [a,0,0], [a,a,0], [0,a,0] ],  
  [ [0,0,a], [a,0,a], [a,a,a], [0,a,a] ],  
  [ [0,0,0], [0,0,a] ],  
  [ [a,0,0], [a,0,a] ],  
  [ [a,a,0], [a,a,a] ],  
  [ [0,a,0], [0,a,a] ]),  
  COLOUR(RGB,0,0,1)):
```

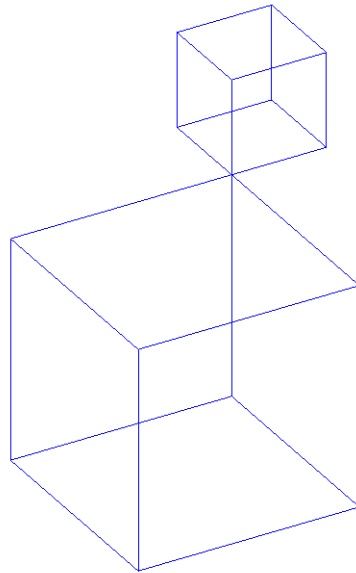
```

> p3 := PLOT3D( POLYGONS(
  [ [a,a,a], [c,a,a], [c,c,a], [a,c,a] ],
  [ [a,a,c], [c,a,c], [c,c,c], [a,c,c] ],
  [ [a,a,a], [a,a,c] ],
  [ [c,a,a], [c,a,c] ],
  [ [c,c,a], [c,c,c] ],
  [ [a,c,a], [a,c,c] ]),
  COLOUR(RGB,0,0,1));

> display({p2, p3}, title = `a^3 + b^3`, style = LINE, orientation
  = [30,120], scaling = CONSTRAINED);

```

$$a^3 + b^3$$



Costruzione e visualizzazione dei tre parallelepipedi di volume $b \cdot a^2$

```

> p4 := PLOT3D( POLYGONS(
  [ [0,0,a], [a,0,a], [a,a,a], [0,a,a] ],
  [ [0,0,c], [a,0,c], [a,a,c], [0,a,c] ],
  [ [0,0,a], [0,0,c] ],
  [ [a,0,a], [a,0,c] ],
  [ [a,a,a], [a,a,c] ],
  [ [0,a,a], [0,a,c] ]),
  COLOUR(RGB,1,0,0));

> p5 := PLOT3D( POLYGONS(
  [ [a,0,0], [c,0,0], [c,a,0], [a,a,0] ],
  [ [a,0,a], [c,0,a], [c,a,a], [a,a,a] ],
  [ [a,0,0], [a,0,a] ],

```

```

[ [c,0,0], [c,0,a] ],
[ [c,a,0], [c,a,a] ],
[ [a,a,0], [a,a,a] ]),
COLOUR(RGB,1,0,0):

```

```

> p6 := PLOT3D( POLYGONS(
[ [0,a,0], [a,a,0], [a,c,0], [0,c,0] ],
[ [0,a,a], [a,a,a], [a,c,a], [0,c,a] ],
[ [0,a,0], [0,a,a] ],
[ [a,a,0], [a,a,a] ],
[ [a,c,0], [a,c,a] ],
[ [0,c,0], [0,c,a] ]),
COLOUR(RGB,1,0,0):

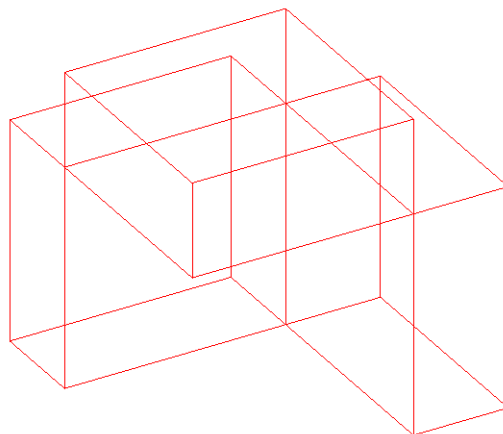
```

```

display({p4, p5, p6}, title = `3 * a^2 * b`, style = LINE,
orientation = [30,120], scaling = CONSTRAINED);

```

$3 * a^2 * b$



Costruzione e visualizzazione dei tre parallelepipedi di volume $a*b^2$

```

> p7 := PLOT3D( POLYGONS(
[ [a,0,a], [c,0,a], [c,a,a], [a,a,a] ],
[ [a,0,c], [c,0,c], [c,a,c], [a,a,c] ],
[ [a,0,a], [a,0,c] ],
[ [c,0,a], [c,0,c] ],
[ [c,a,a], [c,a,c] ],
[ [a,a,a], [a,a,c] ]),
COLOUR(RGB,0,1,0):

```

```

> p8 := PLOT3D( POLYGONS(

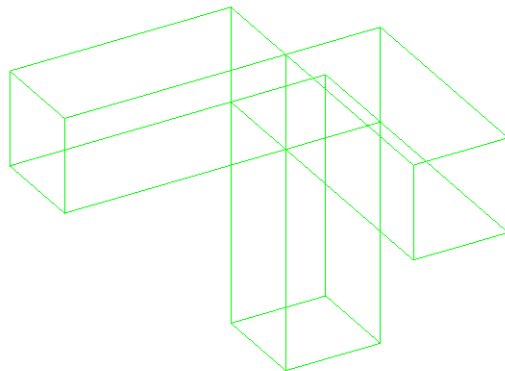
```

```

[ [a,a,0], [c,a,0], [c,c,0], [a,c,0] ],
[ [a,a,a], [c,a,a], [c,c,a], [a,c,a] ],
[ [a,a,0], [a,a,a] ],
[ [c,a,0], [c,a,a] ],
[ [c,c,0], [c,c,a] ],
[ [a,c,0], [a,c,a] ]),
COLOUR(RGB,0,1,0)):
> p9 := PLOT3D( POLYGONS(
  [ [0,a,a], [a,a,a], [a,c,a], [0,c,a] ],
  [ [0,a,c], [a,a,c], [a,c,c], [0,c,c] ],
  [ [0,a,a], [0,a,c] ],
  [ [a,a,a], [a,a,c] ],
  [ [a,c,a], [a,c,c] ],
  [ [0,c,a], [0,c,c]]),
COLOUR(RGB,0,1,0)):
> display({p7, p8, p9}, title = `3 * a * b^2`, style = LINE,
orientation = [30,120], scaling = CONSTRAINED);

```

$$3 * a * b^2$$



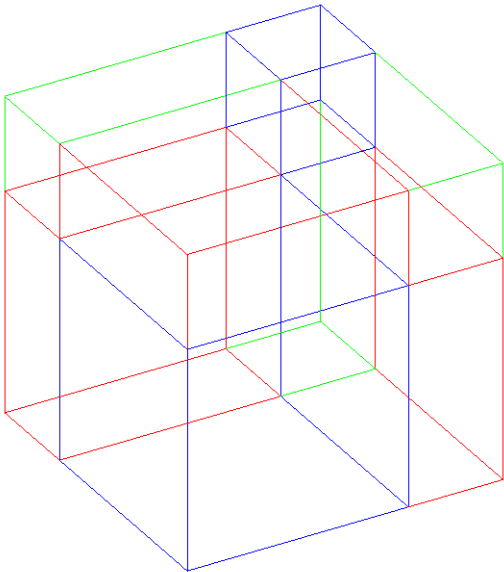
Visualizzazione dei due cubi e dei 6 parallelepipedi all'interno del cubo di volume $(a+b)^3$

```

> display({p2, p3, p4, p5, p6, p7, p8, p9}, title = `(a + b)^3`,
style = LINE, orientation = [30,120], scaling = CONSTRAINED);

```

$$(a + b)^3$$



[>