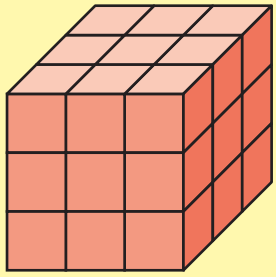
Painted cube

Generalising from games and investigations

Imagine a large cube made from 27 smaller red cubes. The large cube is dipped completely into yellow paint.

Take the large cube apart again and complete the first row of this table.



Size of large cube	No. of small cubes with 6 red faces	No. of small cubes with 5 red faces	No. of small cubes with 4 red faces	No. of small cubes with 3 red faces	Total no. of small cubes
$3 \times 3 \times 3$					27
$4 \times 4 \times 4$					
$10 \times 10 \times 10$					
$23 \times 23 \times 23$					

Imagine larger cubes being dipped into the yellow paint.
Try to predict how this table would be filled in.

Use linking cubes to test your predictions.

Can you see any patterns in the table?

Can you generalise these patterns?

How are they related to what you see?

What would the results be for an $n \times n \times n$ cube?