

Hot Dogs

You need: multilink cubes

ACTIVITY

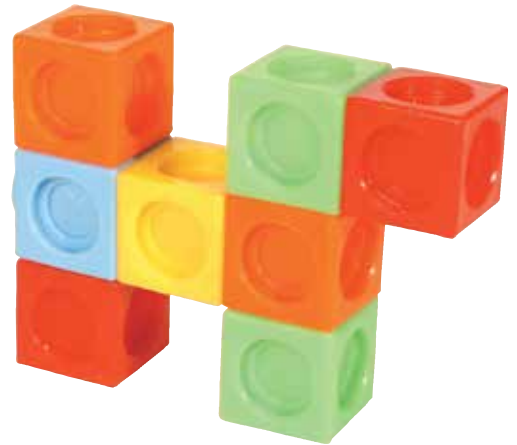
Jacinta read that a small dog nearly died of overheating after being left in a hot car for 15 minutes. She knew that all mammals lose heat into the air on cold days and gain heat from the air on hot days. They do this through their skin. She wondered if a small dog was more in danger of overheating than a large one.

1. She made a small “dog” with multilink cubes:

Her dog had a volume of 8 cubes.
 She worked out its surface area by counting the faces of the cubes exposed to the air.
 Build Jacinta’s dog and work out its surface area.

2. Jacinta decided to build some bigger dogs. She wondered what would happen to their surface area as the volume increased.

i.



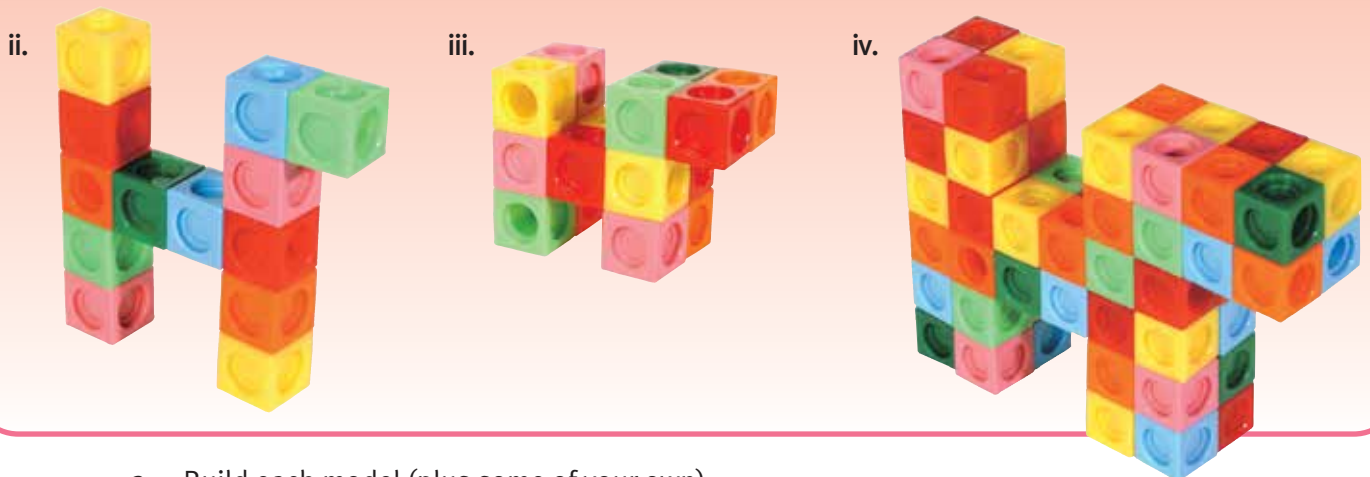
If the volume doubles, does the surface area also double?



She began this table to record her results:

| Dog | Volume in cubes | Surface area (number of exposed cube faces) | Ratio of surface area to volume (to 2 decimal places) | |
|-----|-----------------|---|---|----------|
| i. | 8 | | 34 : 8 | 4.25 : 1 |
| ii. | | | | |

Here are Jacinta's next three "dogs".



- Build each model (plus some of your own).
- Copy Jacinta's table. Count the number of cubes and faces for each dog and enter this information in the table.
- For each dog, calculate the ratio of surface area to volume. So that the ratios can be compared, make the volume 1 in each case.
- What do you notice about the relationship between the surface area of a dog and its volume?
- Give a reason why small dogs are more in danger of overheating than large dogs.

INVESTIGATION

Find out about hypothermia. What conditions make it a danger? Are some people more at risk of hypothermia than others? How can people protect themselves from it?

