



Penguins

Why do penguins huddle?

In cool arctic conditions, penguins tend to huddle together. The huddle is in a constant state of motion, with the penguins on the outer of the huddle shuffling to get into the centre of the huddle. And the penguins in the centre of the huddle constantly being pushed around trying to maintain their position in the centre of the huddle. Why do they do this? The simple explanation is that they are trying to get warm. But a more scientific explanation is when you consider the conditions that a huddle creates.

In this investigation, you will create a huddle of penguins and explore features of the huddle by varying the number of penguins in it. The investigation uses cubes to represent penguins.

Materials: 2cm wooden or plastic blocks
calculator



1. Using 3 cubes, construct a 3-dimensional penguin in an upright position (one cube for the head, one cube for the upper body, one cube for the lower body).
2. Determine the volume of the penguin (count the cubes)
3. Determine the surface area of the penguin (count the number of square faces that are on the outside of the penguin).
4. Construct a data table, and enter this data in the data table.
5. Calculate the surface area to volume ratio.

Number of Penguins	Surface Area	Volume	Ratio SA:V
1			

6. Construct more penguins and completely surround the first penguin with the new penguins. You should have a total of 9 penguins in the huddle this time.
7. Calculate the surface area, volume and determine the ratio.
8. Create more penguins and determine the surface area, volume and ratio.
9. Examine the data and discuss what is happening as the number of penguins in the huddle increases. What can you say about the surface area and volume ratio as the huddle increases?
10. Write a statement explaining why penguins huddle, making mention of the ratio between surface area and volume?
11. Are there any other instances when surface area and volume are an issue?

Going further

12. Can you think of why babies and small animals suffer much more in hot cars than adults? Why do chips fry faster than whole potatoes?