

Arctic Challenge – Construct an Igloo

建築挑戰 – 建造冰屋

Making a connection

At the onset of this project students were presented with the problem to design and construct an Igloo by selecting any one of four different shapes as the basis for the model. The testing parameters were to establish which one of these shapes would be able to retain heat the best, thus providing adequate protection from the cold. To enable students to understand the dynamics of airflow we conducted two inquiries, one of them was to prove that warm air rises. Students placed a balloon over a bottle and held the bottle in warm water, the air in the bottle warmed up and inflated the balloon.

Design and build

Once the discovery phase was complete the learners started to plan their designs. Firstly, students looked at selecting a dome, cylinder, cone, or a cube as a basis, knowing that all these shapes came with certain advantages and disadvantages. It was up to the students to make the best choice based on their research. A big part of the process was to study and discuss the material available. They had an opportunity to do this as a class by sharing ideas on how they can use the different elements and then again as a group finalizing their design. The variety and creativity was evident within the quality of the models constructed by the students. It was clear that the students were able to apply their knowledge and understanding of the effects of shapes on heat retention when building a structure.

建立連結

專題開始時，學生從四種不同的形狀中選擇一個作為模型基礎，並進行設計和建造冰屋。學生測試數據確認哪個形狀能保留最多的熱量，進而提供足夠的禦寒能力。為了讓學生了解氣流的形式，我們進行了兩次實驗，其中一項是證明暖空氣上升。學生將氣球套於瓶口，然後將瓶子放在溫水中，瓶內的空氣因加熱上升供氣球充氣。

設計與建構

完成探究階段後，學生開始進行設計。首先，學生知道選擇圓頂、圓柱體、圓錐體或立方體作為基礎都有其優點和缺點。學生依據研究做出最佳選擇，該過程大部分是探究和討論材料的可用性。他們藉此機會分享關於使用不同素材的想法，並於課堂分組完成模型。學生製作的模型品質具有多樣性和創造力，在製作過程中，也運用他們的知識和對形狀保溫效果的理解。

1 ASK + IMAGINE 提問 + 創思

We observed how warm air inflates a balloon.
我們觀察暖空氣如何使氣球充氣。



3 PLAN 計畫

We discussed shapes and construction material for our designs.
我們討論我們設計的形狀和製作材料。



4 CREATE 創造

There were many creative designs, to show off our engineering skills.
透過具有創意的設計展現我們的建造技巧。



5 IMPROVE 改進

We tested our igloos to see which design retained heat the best.
我們測試了冰屋以確認哪個設計能夠保留最多的熱量。

