

## States of Matter 物質的狀態

### Does it Matter

Matter is all around us, it is in everything. Through the completion of this project, students learned to identify and describe the properties of matter, including flexibility, strength, transparency, hardness, size, color, weight, and texture. Students identified and explored three states of matter; solid, liquid, and gas. They learned that an object's properties determined the job it can do and discovered that some objects can serve a purpose better than others.

### Three states of Matter

Once the students grasped the concept of Matter it was time to look at each state individually. Solids were the easiest to identify and describe as an object that doesn't change shape and can be measured and weighed. We discovered that liquids can be manipulated and will take on the shape of their container and that gasses are all around and mostly invisible. There were some amazing discoveries made along the way with students making their own gas-filled balloons by combining liquids and solids as well as a hands-on activity showing that sometimes an object can be two or three states of Matter at the same time.

### Design and build

To end this fascinating learning experience the students were challenged to design and make a toy by using all three states of Matter. They were provided with a box of material containing solids, liquids, and gasses and managed to show their creativity with some amazing designs.

### 物質重要嗎

物質無所不在。藉由本次專題，學生學會分辨及描述物質的特性，包含延展性、力度、透明度、硬度、尺寸、顏色、重量、質地及三種物質狀態：固體、液體及氣體，並了解一個物質的特性可決定其效用，並發現有些物質能更好地發揮某種作用。

### 物質的三種狀態

一旦理解物質的概念後，學生開始了解不同的物質狀態。固體最容易被理解為形狀不變，且能測量及秤重的物體。液體會依容器形狀而改變形態。氣體則無所不在，且大部分都看不見。過程中，學生發現結合液體及固體，可使氣球充滿氣體，並透過實作了解，有時一種物體可同時包含兩種或三種的物質狀態。

### 設計及建造

在單元最後，學生試著用三種物質狀態設計並製作玩具。老師提供裝有固體、液體及氣體等不同物質的材料，讓學生設法運用創意來展現驚人的創作。

### 1 ASK + IMAGINE 提問 + 創思



### 3 PLAN 計畫



It was exciting to collaborate and come up with some creative designs for a toy. 小組合作設計創意玩具很好玩。

### 5 IMPROVE 改進



We reflected and shared ideas on how our toys worked with each other. 我們回饋及分享玩具的物質狀態。

Experimenting with Matter was fun, engaging, and informative. 物質的實驗很有趣，我們吸收新知並樂在其中。

### 4 CREATE 創造



We created a jet using a solid, liquid, and gas. 我們用固體、液體及氣體建造火箭。