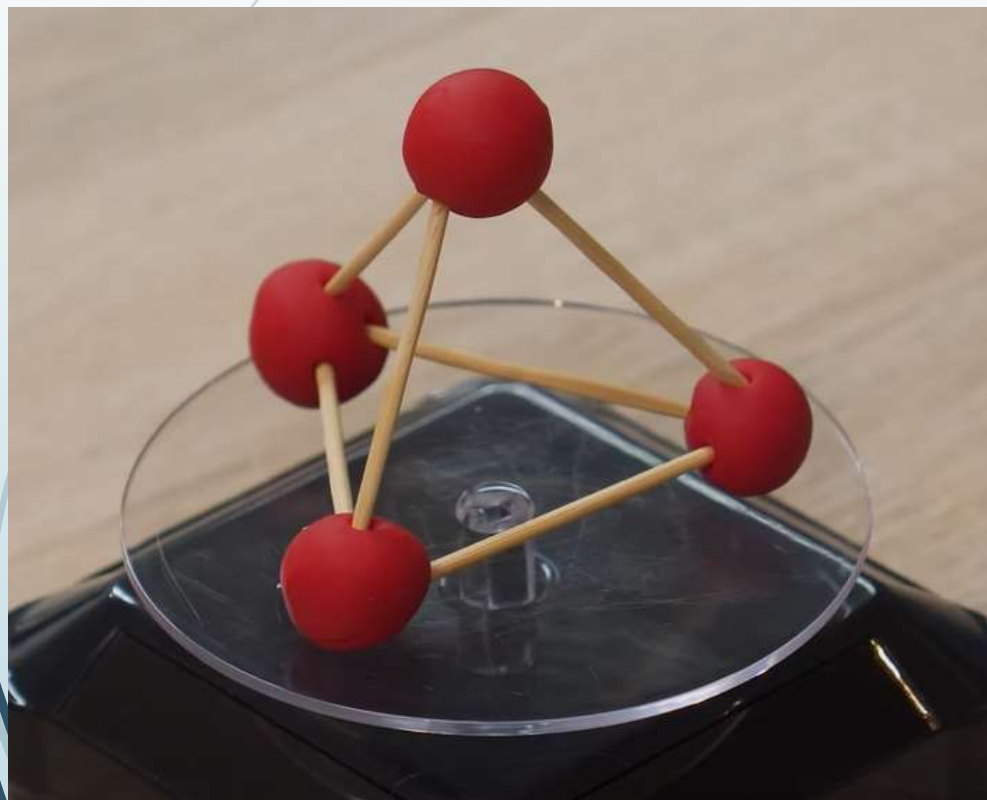


# The Education University of Hong Kong 2021-2022 Quality Education Fund Thematic Network – Tertiary Institutes STEM Project Team

SCHOOL: YING WA PRIMARY SCHOOL (P5)

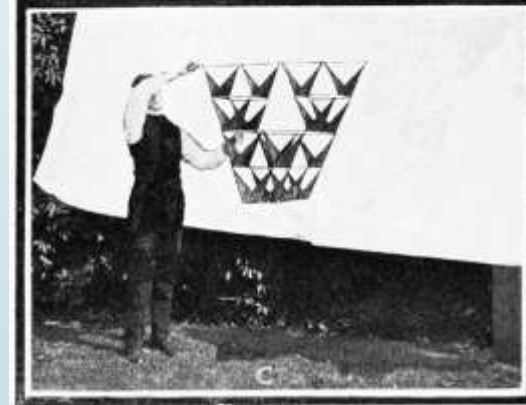
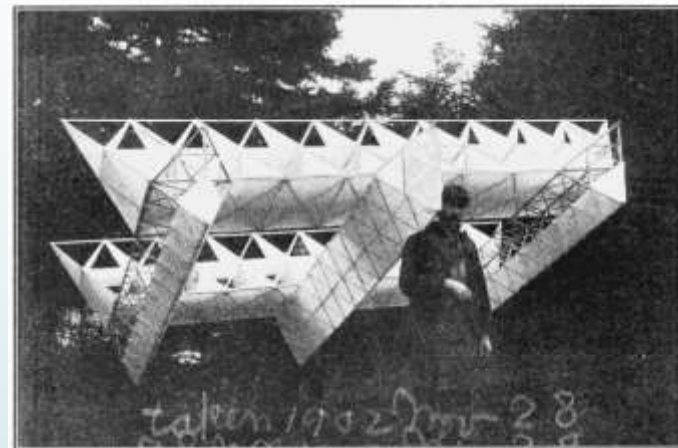
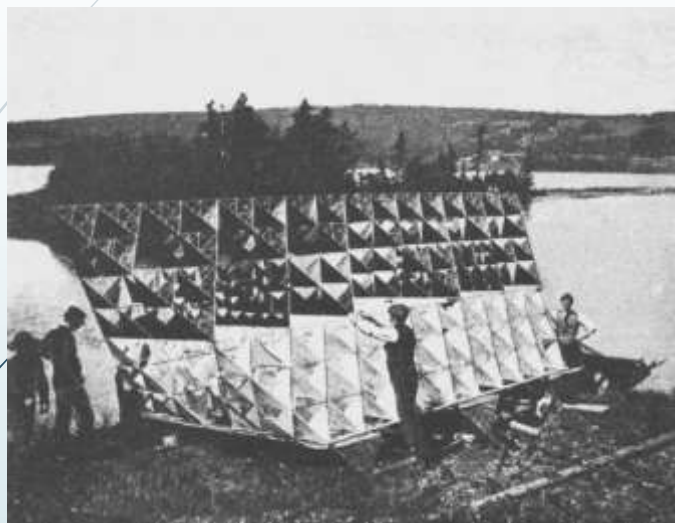
TOPIC: MATHEMATICS IN BUILDING TETRAHEDRAL  
KITE

# 由三角錐體/四面體 組成的 立體風箏



<https://www.youtube.com/watch?v=xNAio-EmzY&list=PLzA1Q82AYGfbhkiceDeltZYSxS8aTONMI&index=3>

# 1899年 貝爾除了發明了電話以外還傾心於飛行 器的設計...



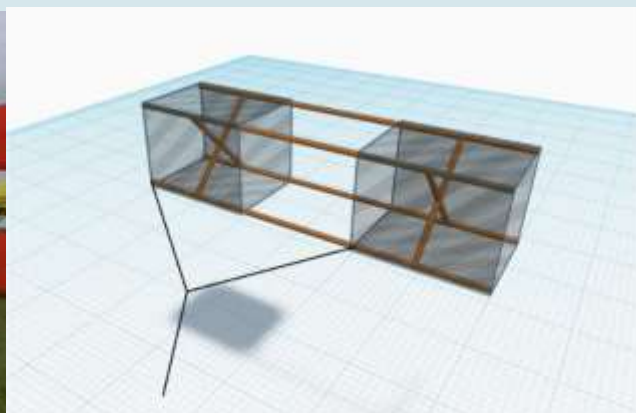
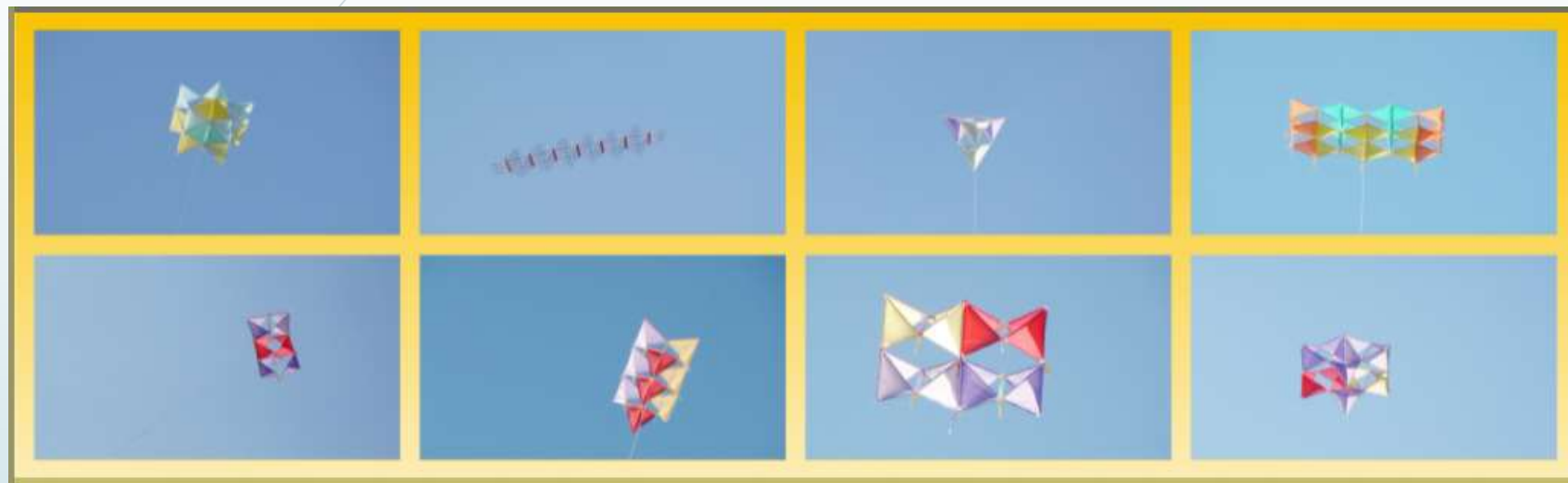
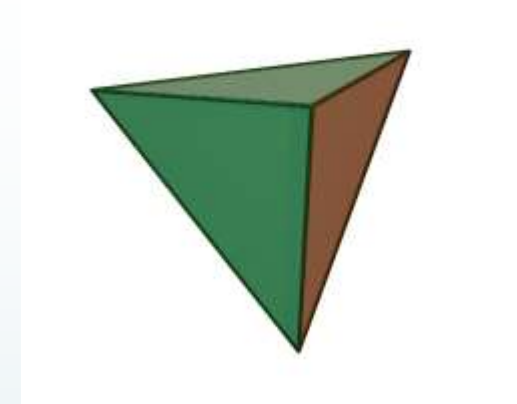
# 威爾斯的藝術家 Heather Morison 和 Ivan Morison (2011)



3D打印技術製作出各個構件，並把這個風箏命名為閃光的小人（Little Shining Man）。現在這個風箏在英國澤西島的丹達拉城堡內展示。

<https://www.gooood.cn/little-shining-man-heather-and-ivan-morison.htm>

# 立體風箏 設計



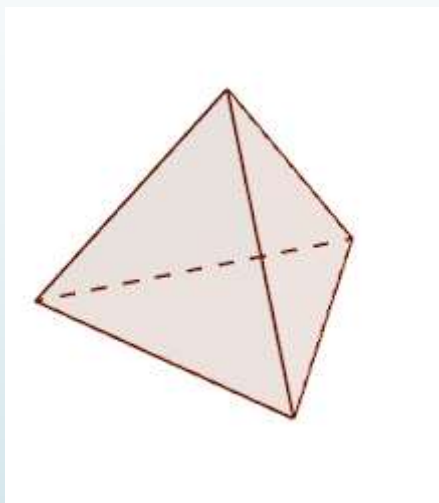
[https://www.teachengineering.org/activities/view/ucd\\_kite\\_activity1](https://www.teachengineering.org/activities/view/ucd_kite_activity1)

<https://www.justmeasuringup.com/homemade-kite/>

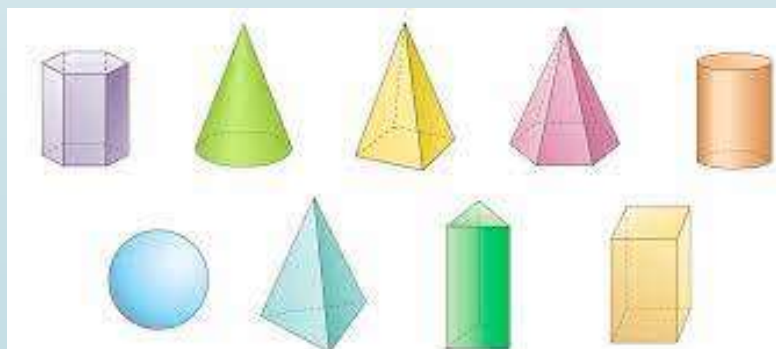
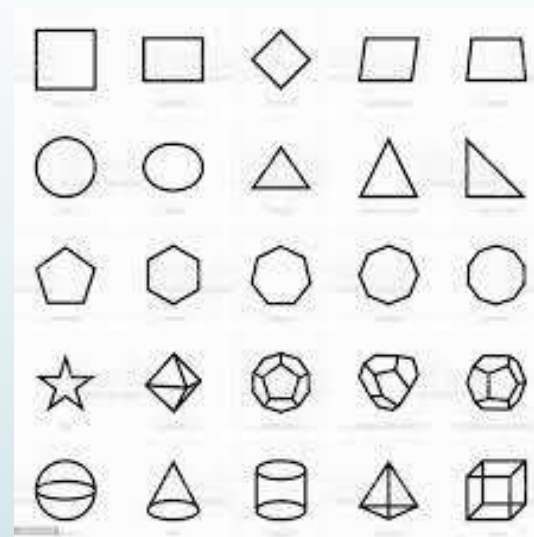
[https://kitesite.com.au/schools/kites/kit\\_kites.html](https://kitesite.com.au/schools/kites/kit_kites.html)

# 小五 數學

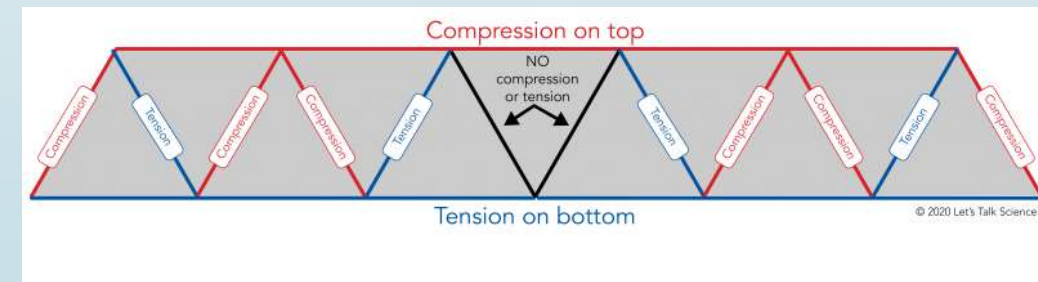
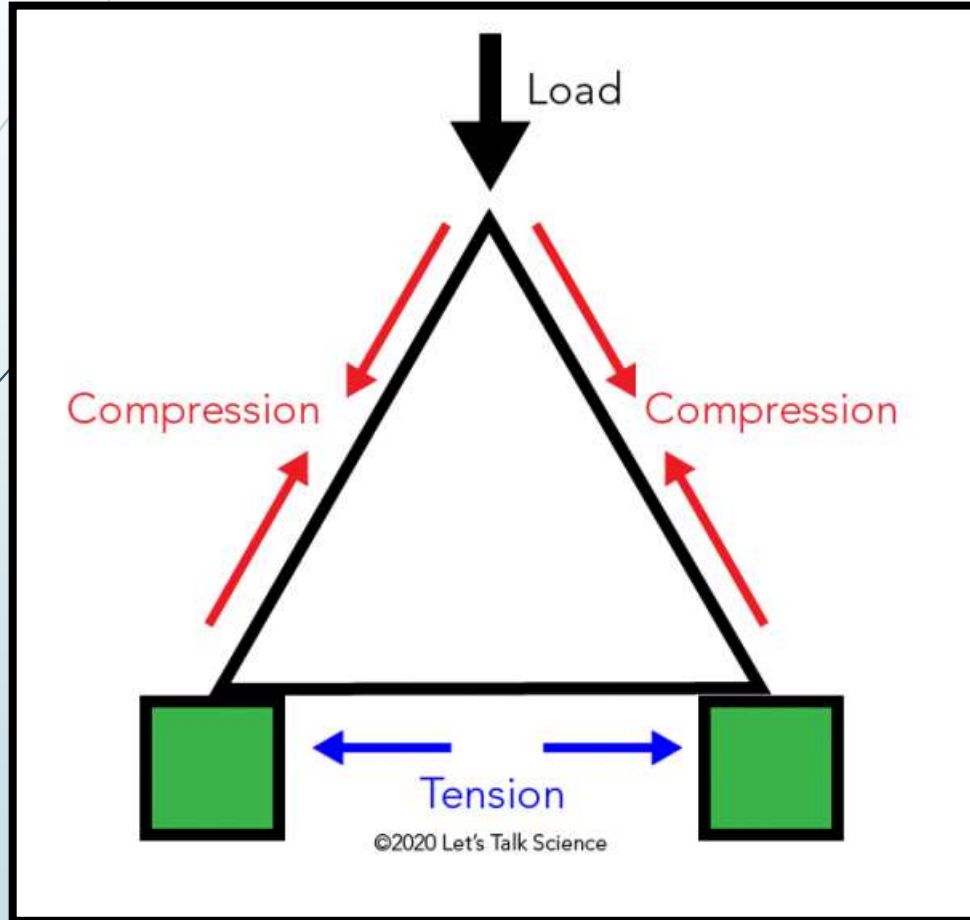
## 幾何/立體圖形, 立方體



邊 : 6  
面 : 4  
頂點 : 4



# 物理/工程 三角形/錐體



# NASA – Glenn Research Center

**Kites** Glenn Research Center

Winged Box

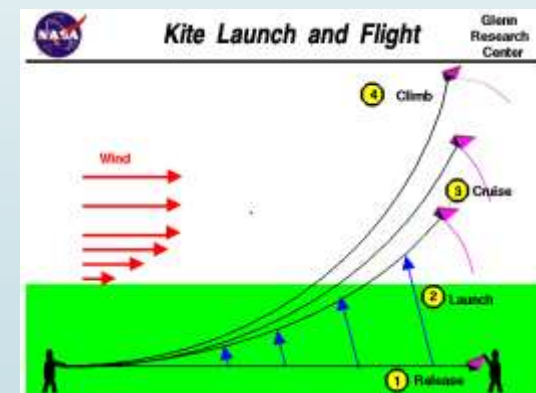
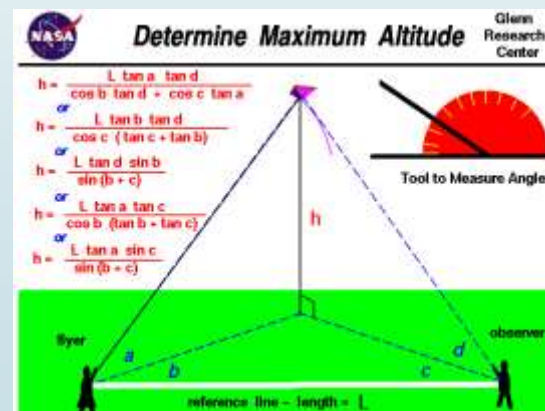
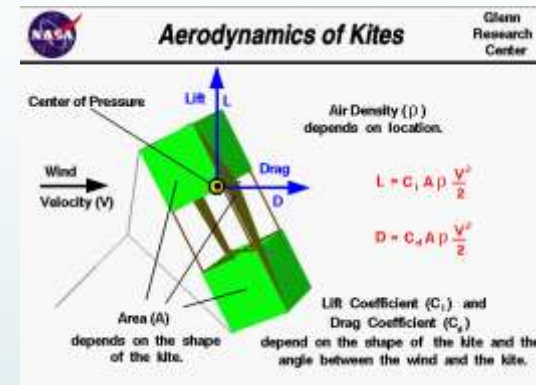
Sled

Delta

Box

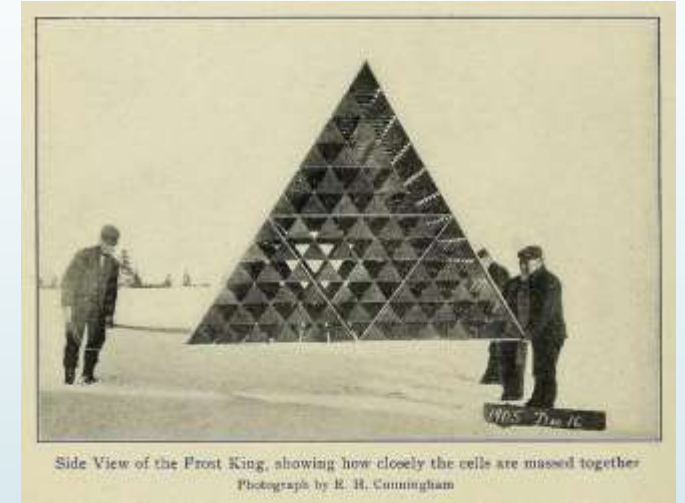
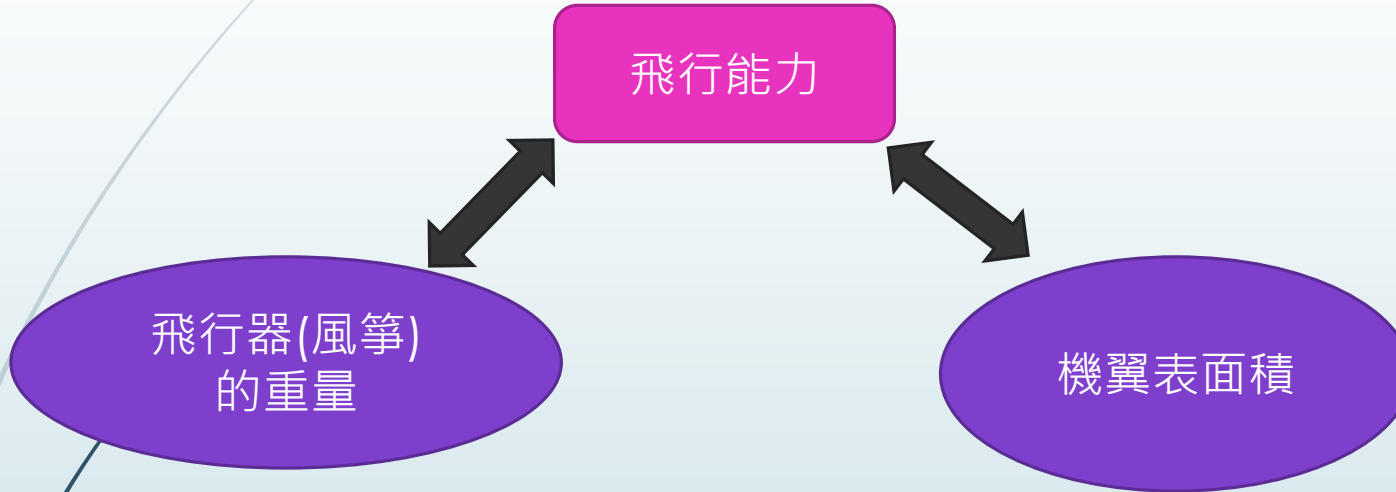
Diamond

An excellent way for students to gain a feel for [aerodynamic forces](#) is to fly a kite.





# 立體風箏的飛行能力



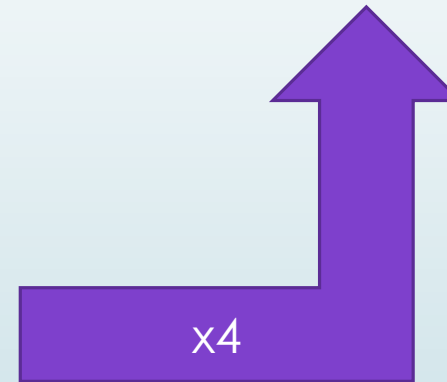
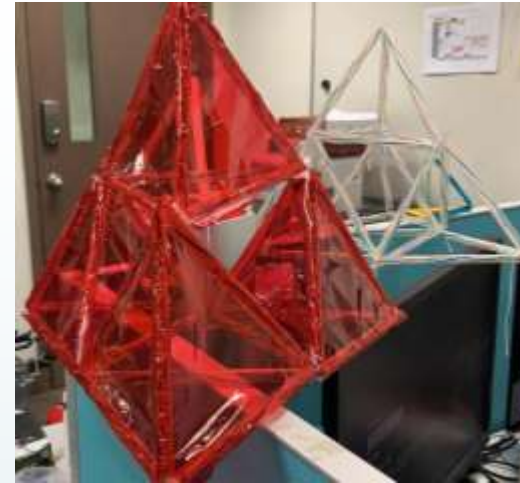
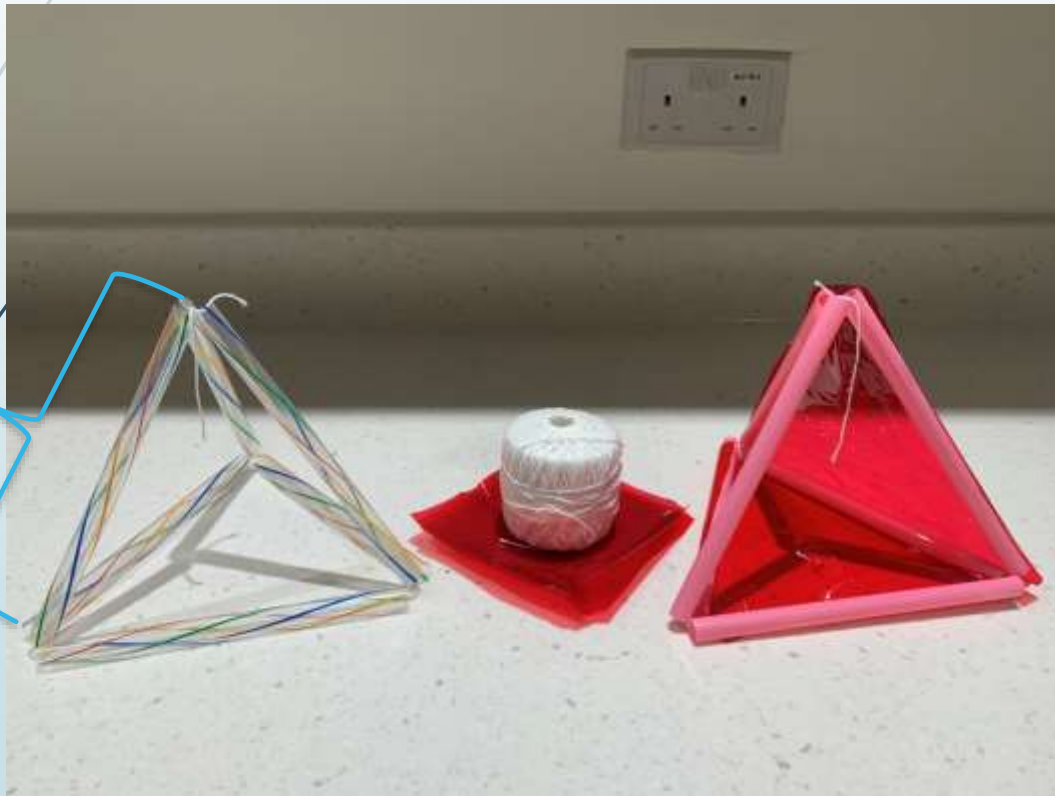
\*合適的物料\*

機翼表面積  $\wedge$  > 風箏的重量  $\wedge$

<https://kknews.cc/zh-hk/news/v6g55x4.html>

# Test 0

~18cm



# Remember

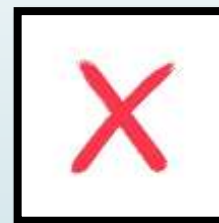
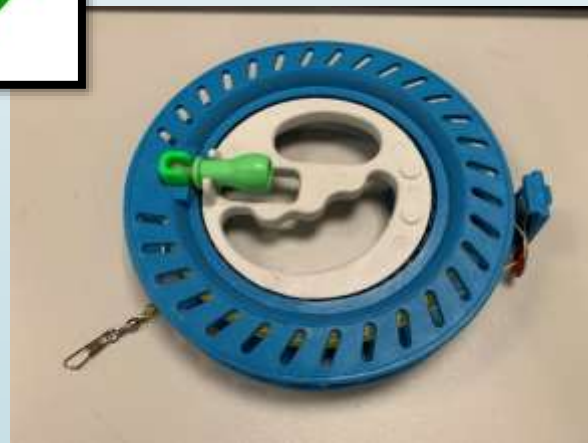


0.4 mm+

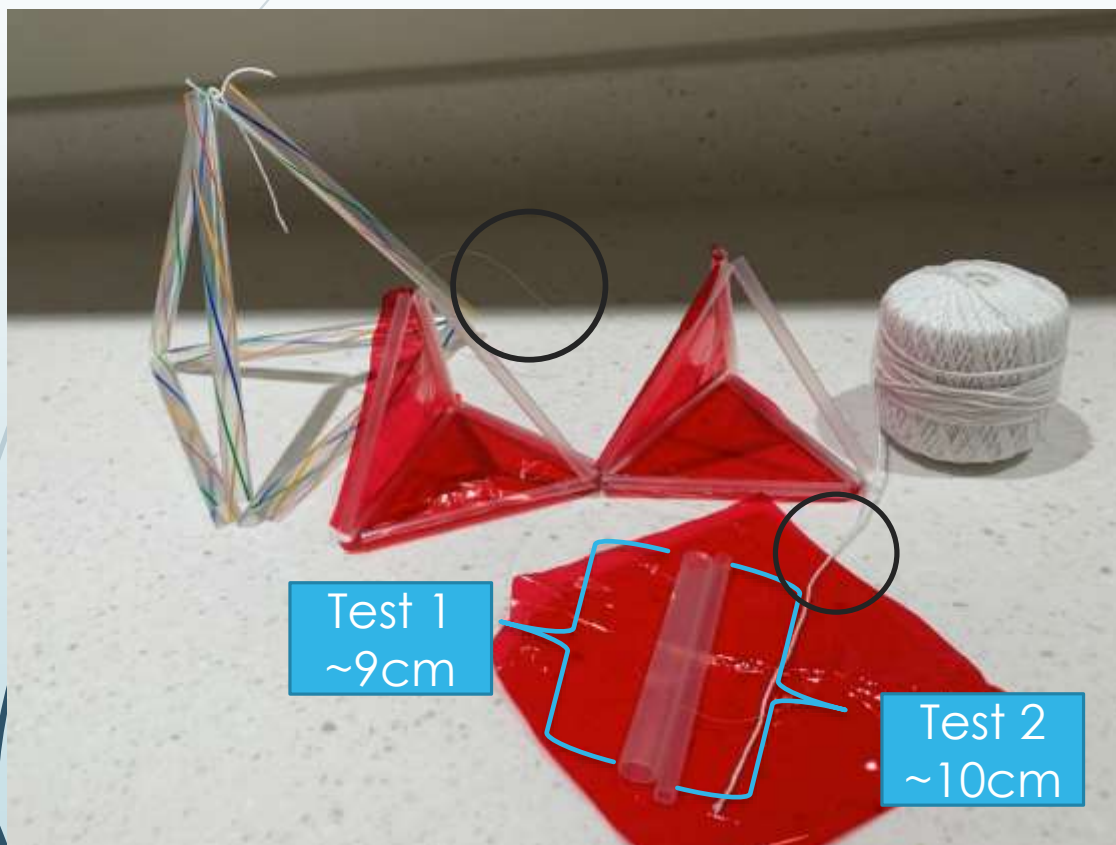


# 風箏手握

- 輪線 (100m)
- 大線板 (100m)



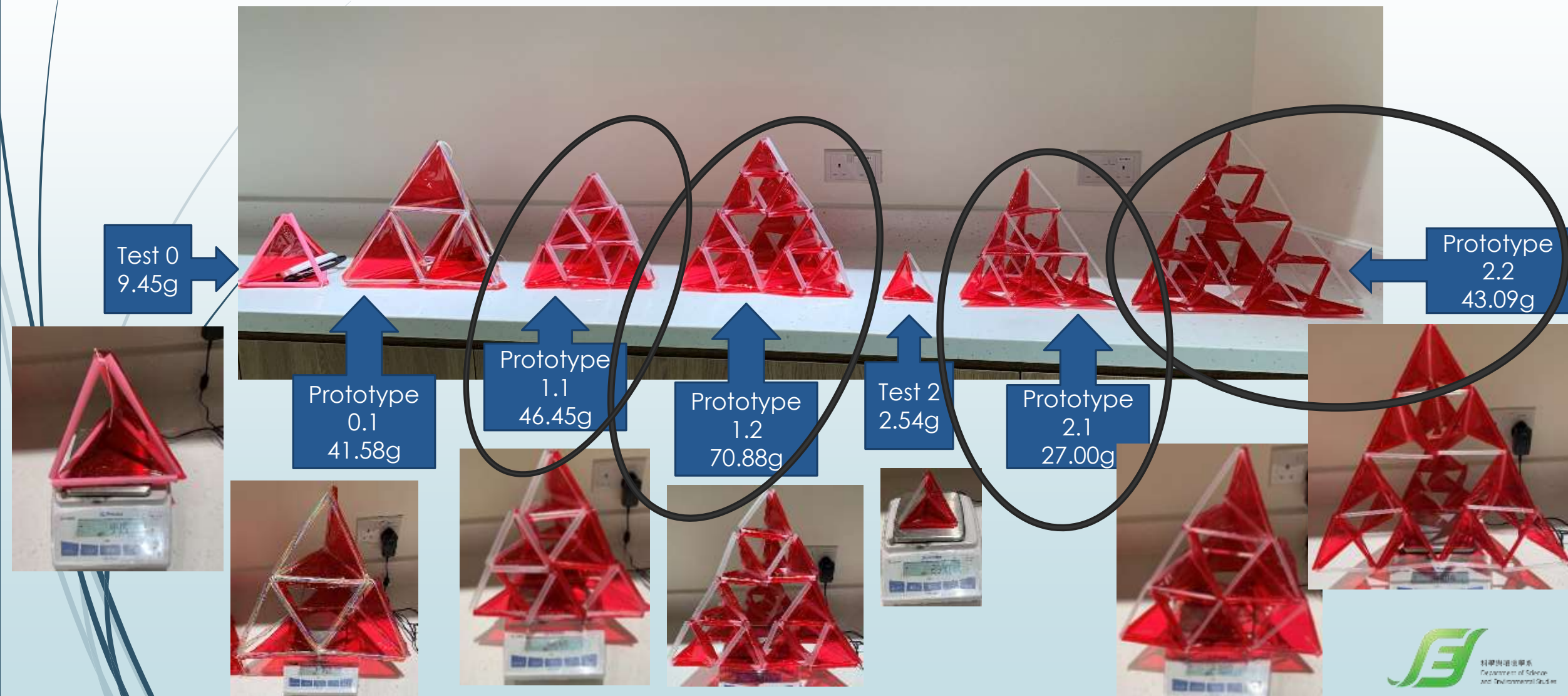
# Test 1 & 2



Prototype  
.1

Prototype  
.2

# Test 1 & 2 different model with weight



# 放風箏的技巧及測試

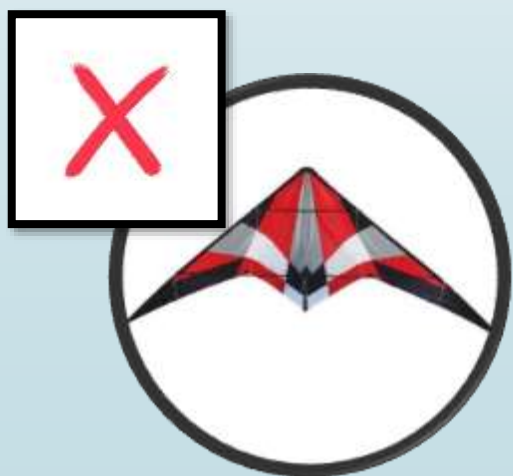
## 01 Wind



## 02 Running



## 03 Swinging




<https://www.youtube.com/watch?v=agut-BO4w2E>

<https://www.youtube.com/watch?v=saxKRZs1W7s>

<https://www.youtube.com/watch?v=56-9kfU4r4E>

# 27/10/2021 清水灣大坳門

 **26** °C | °F 降雨機會：32%  
濕度：68%  
風速：18 公里/時

大坳門  
星期三 下午1:00  
局部有雲

平均風速: 18





# 01 Wind Test



Prototype 1.2

vs

Prototype 2.1

vs

Prototype 2.2

## 02 Running Test



Prototype 2.1

vs



Prototype 2.2

## 03 Swinging Test



Prototype 1.1

vs



Prototype 1.2

vs



Prototype 2.2

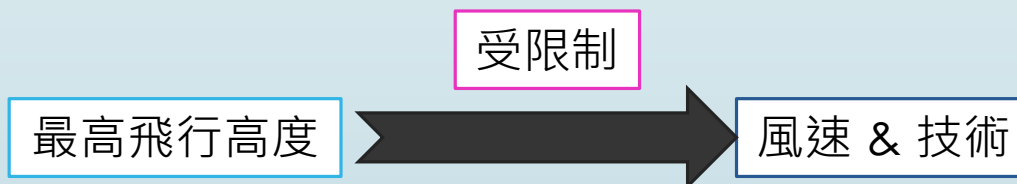
## Prototype 2.2



Prototype 2.2

- ▲ Triangle Side : 40 cm
- ▲ Area : 693 cm<sup>2</sup>
- Weight : 43.09g

Ratio of  
Area : Weight 16:1



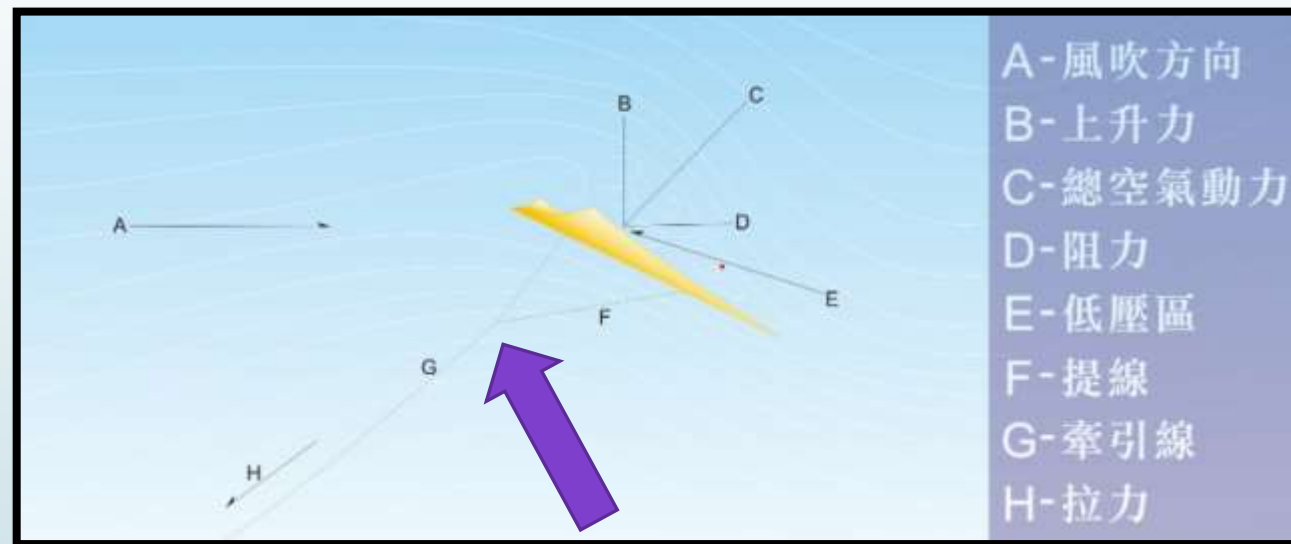
# 香港風箏學會 (9/2017)



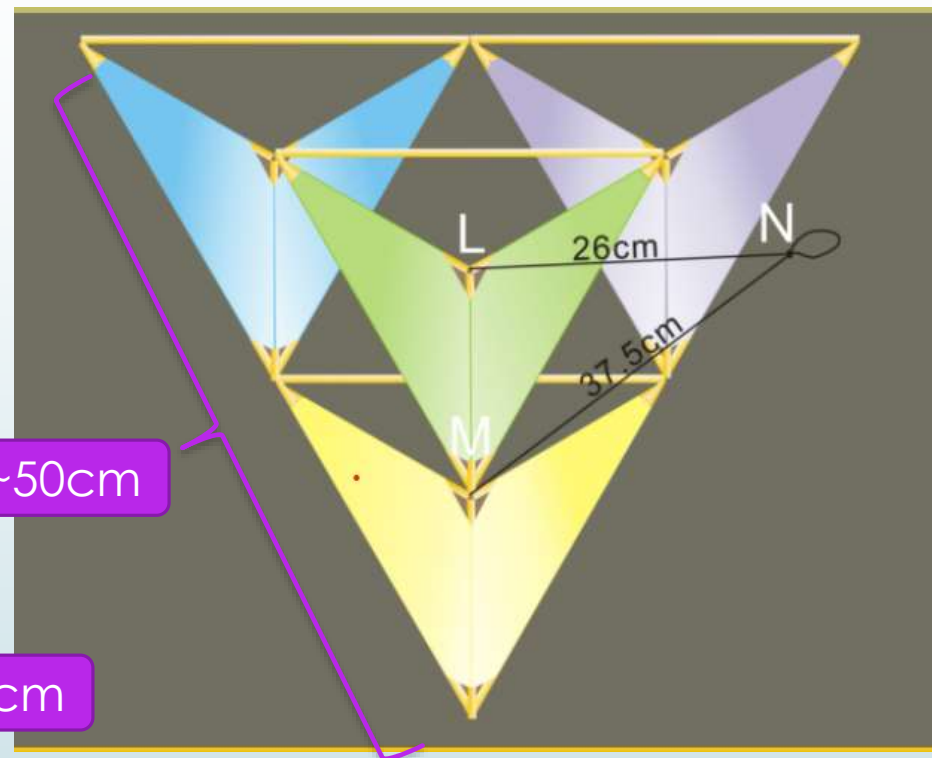
<https://www.facebook.com/watch/?v=1442729205847367>

## \*風箏管定線

- 風箏的結構
- 風箏的結實度
- 風箏表面積
- 風箏的重量
- 風箏管定線的角度 (G)
- 放風箏的技巧
- 風向/風速



# Test 3, 改良設計



風箏邊長/2	: LN	: MN
25.7cm	: 26cm	: 37.5cm

<http://kite.org.hk/page3.html>

# 14/11/2021 船灣水壩



分區天氣

風向及風速



11月14日11:00 的平均風向及風速 (公里/小時)

詳細資料

自動分區天氣預報



# Test 2.2 + 管定線

平均風速: 12



# Test 3.1 & 3.2



平均風速: 15





### Prototype 2.2

▲ Triangle Side : 40 cm  
▲ Area : 693 cm<sup>2</sup>  
Weight : 43.09 g  
Area : Weight 16:1

### Prototype 3.1

▲ Triangle Side : 40 cm  
▲ Area : 693 cm<sup>2</sup>  
Weight : 32.38 g  
Area : Weight 21:1

### Prototype 3.2

▲ Triangle Side : 80 cm  
▲ Area : 2771 cm<sup>2</sup>  
Weight : 120.82 g  
Area : Weight 23:1

# 進展元素建議

## 小六 數學 比例

### 何謂比例尺

比例尺是表示縮圖（或擴大圖）上的長度和實際長度的比或比值。縮圖或擴大圖和比例尺，完全是比和比值的應用。



上圖的比例尺應如何表示？注意單位長度要一致。

$$2 \text{ 公里} = 2000 \text{ 公尺} = 200000 \text{ 公分}$$

$$5 : 200000 = 1 : 40000$$

$$\text{比例尺為 } 1:40000 \text{ 或 } \frac{1}{40000}$$



# E-Resources (1)

- 用風箏把人送上天？一百年前就有人這麼幹過！ - 每日頭條

<https://kknews.cc/zh-hk/news/v6g55x4.html>

- 一百年前的發明家狂人曾經用這種奇怪的風箏設計把人送上天 - 人人焦點

<https://ppfocus.com/0/cu127355d.html>

- 數學風箏 | 巨大化，正四面體風箏！在家防疫DIY【數學實驗課】 - YouTube

<https://www.youtube.com/watch?v=xNAioEmzY&list=PLzA1Q82AYGfbhkiceDeltZYSxS8aTONMI&index=3>

## E-Resources (2)

- K-12 engineering

Hands-on Activity Design and Fly a Kite

[https://www.teachengineering.org/activities/view/ucd\\_kite\\_activity1](https://www.teachengineering.org/activities/view/ucd_kite_activity1)

- NASA

<https://www.grc.nasa.gov/www/k-12/airplane/kite1.html>

- American Kitefliers Association

Kites In The Classroom - A Guide For Teachers

<https://kitekits.com/pages/kites-in-the-classroom-guide-for-teachers>

## E-Resources (3)

- How to Make an Amazing Box Kite from Scratch - ByAsh
- August 20, 2017

<https://www.justmeasuringup.com/homemade-kite/>

- Michael & Rosie Richards, 2021

[https://kitesite.com.au/schools/kites/kit\\_kites.html](https://kitesite.com.au/schools/kites/kit_kites.html)

All Kits are made from white Tyvek and have Fibreglass frames. They include all materials to make the kite and come with instructions.

- Why is a Triangle a Strong Shape?

<https://letstalkscience.ca/educational-resources/backgrounders/why-a-triangle-a-strong-shape>

## E-Resources (4)

- ▶ 3D立體風箏 #香港教育大學

這3D立體類別風箏,在美國學成,並連同把我們用線穿飲管製作之原創技術,在最早期80年代,本會首位帶入香港,並公開廣泛教授,直到現在還是深受學界歡迎

<https://www.facebook.com/watch/?v=1442729205847367&ref=sharing>

- ▶ 香港天空風箏學會

<http://kite.org.hk/page3.html>

- ▶ Little Shining Man / Heather and Ivan Morison

Flying, the sculpture kite

<https://www.gooood.cn/little-shining-man-heather-and-ivan-morison.htm>



## E-Resources (5)

- 風箏放飛教學(基礎篇+進階篇) / 如何放風箏 / 風箏教學 / 風箏專賣店 / 風箏哪裡買 / 【888便利購】

<https://www.youtube.com/watch?v=agut-BO4w2E>

- 【又夠鐘上堂啦~ Jollymap風箏小學堂！教你點樣放起隻風箏！】

<https://www.youtube.com/watch?v=saxKRZs1W7s>

- TAIWAN Stunt kite Hsinchu 技術風箏 新手飛行入門教學

<https://www.youtube.com/watch?v=56-9kfU4r4E>