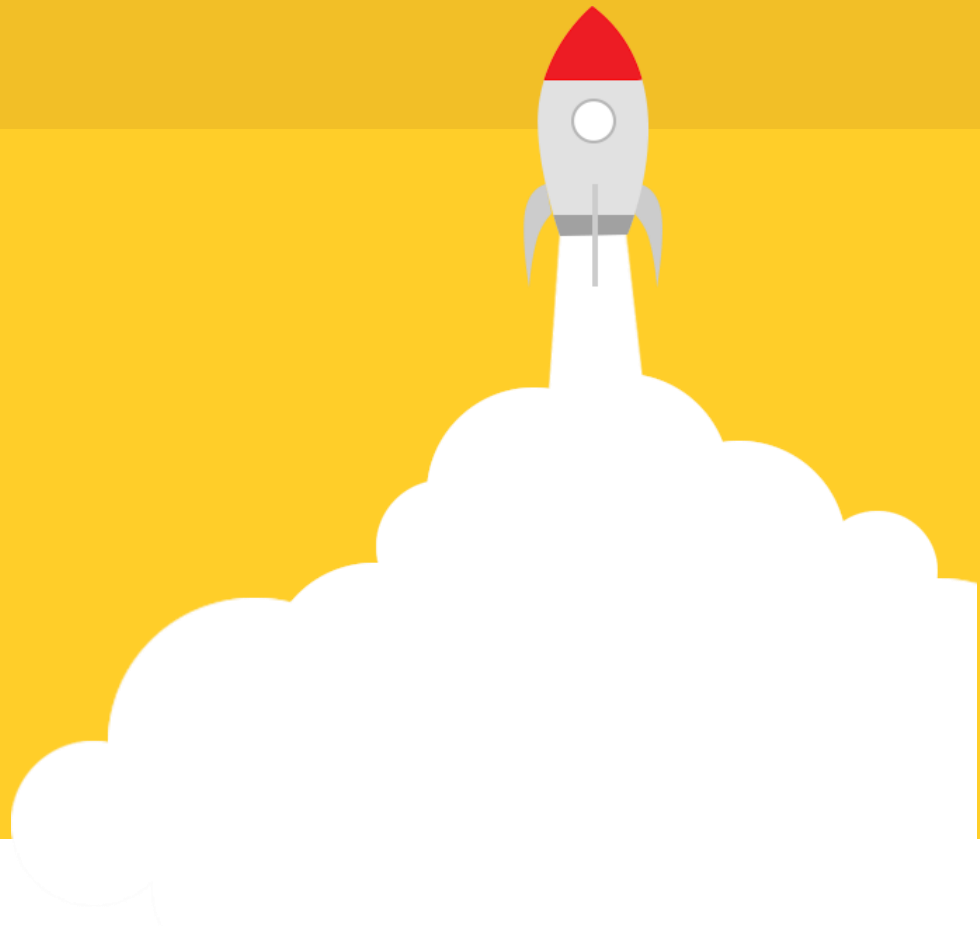
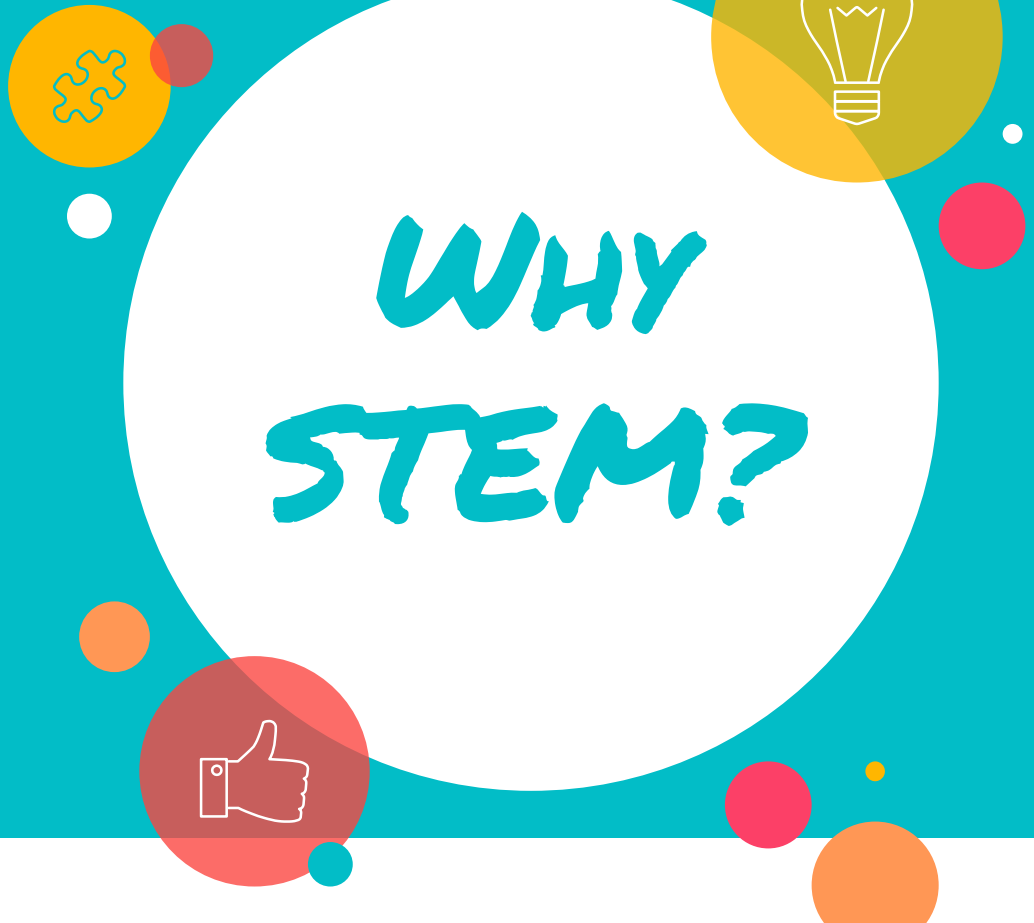
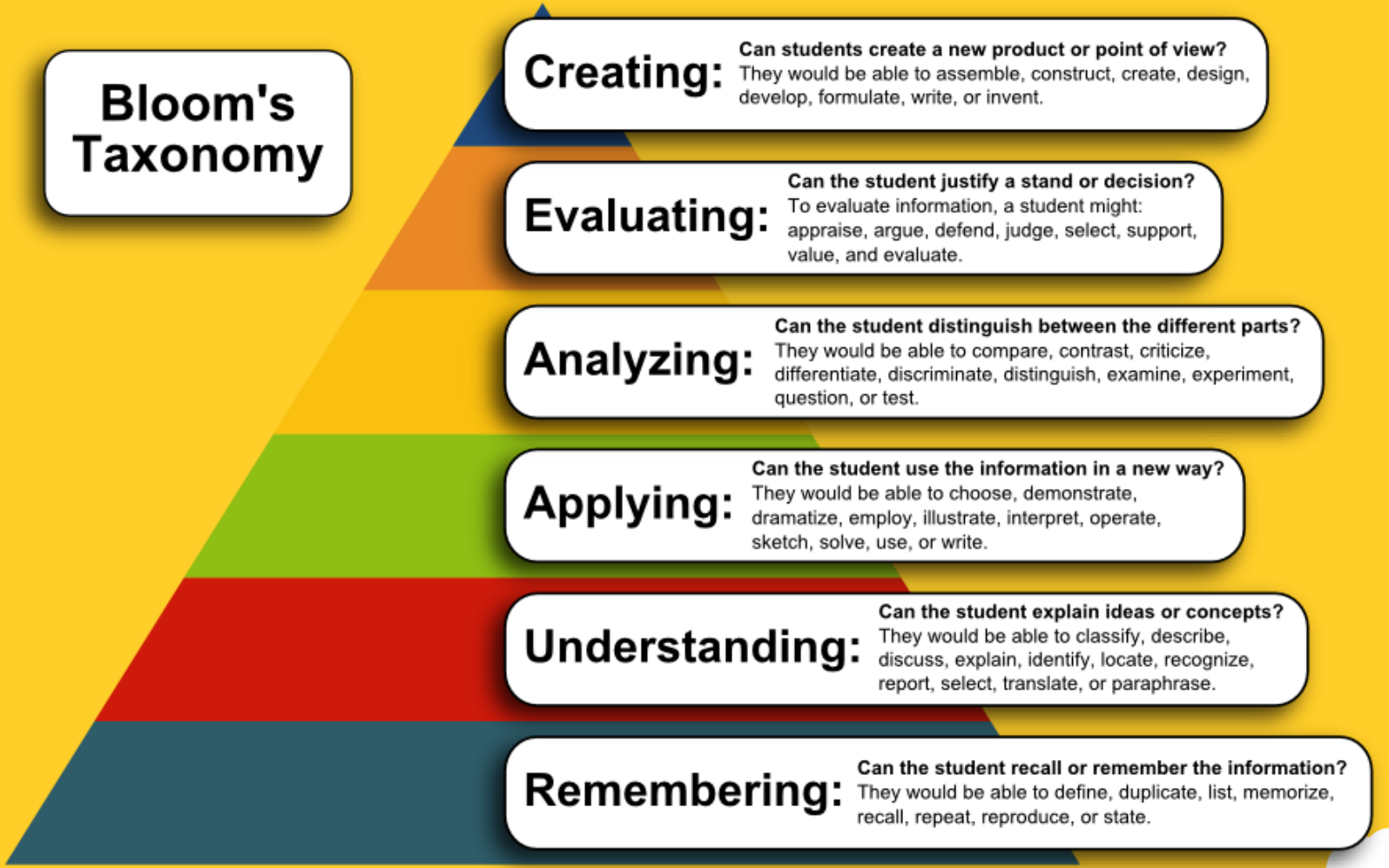
Action Rocket
動•火箭
@ UCCKE
STEM 課程分享



Why STEM?



Bloom's Taxonomy



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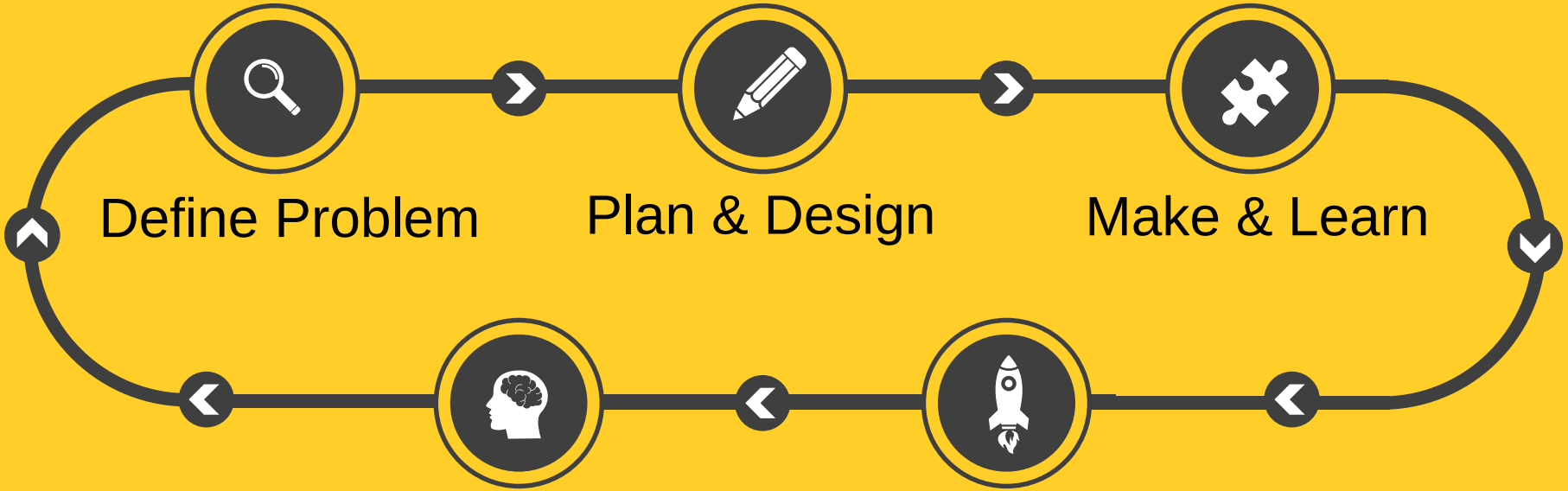
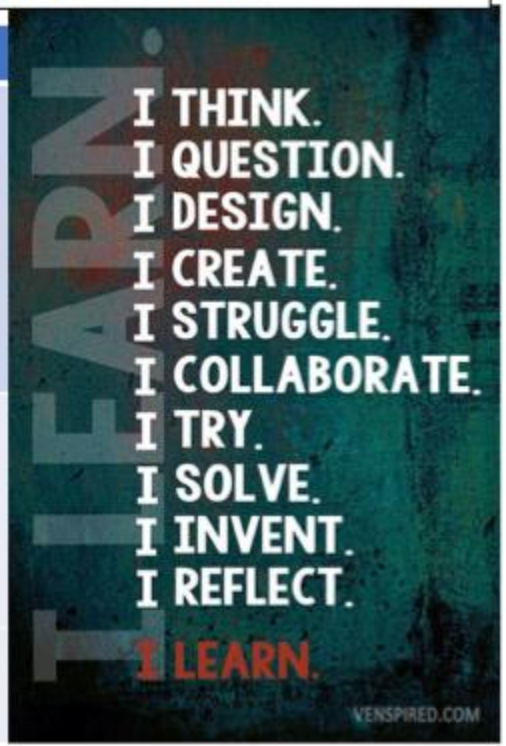
Engineering Design Process



STEM Lessons (General Flow)

STEM Maker Project: solve real-world problem by "design and make"

	Lessons	Activities
1	Problem Definition and Analysis	Problem-based Learning Share-start learning
2	STEM Investigation (Technology Education)	
3		
4		
5		
6	Model Design	Group Work Learning on Demand
7	Model Building	
8	Model Building	
9	Model Testing and Refinement	
10	Project Presentation and Evaluation	Presentation & Evaluation



STEM課程(每星期一節60分鐘)

	機械與編程 Robotics and Coding	生活與發明 Invention	科學與科技 Science and Technology
中一	Makeblock 機械人應用(任務)	智能家居 產品設計	智慧城市 未來交通系統
中二	Lego ev3 機械人應用(設計)	智慧綠色校園 人工智能與物聯網	太空科技 太空移民與交通
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太空移民與交通

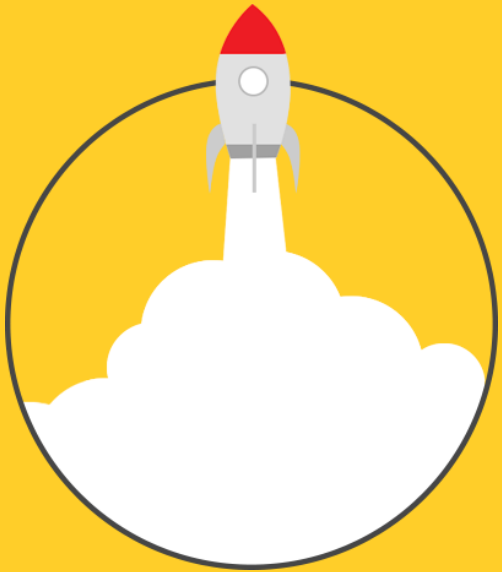
01 太空移民歷史 - 火星移民

02 火星移民 - 研究

03 火箭歷史

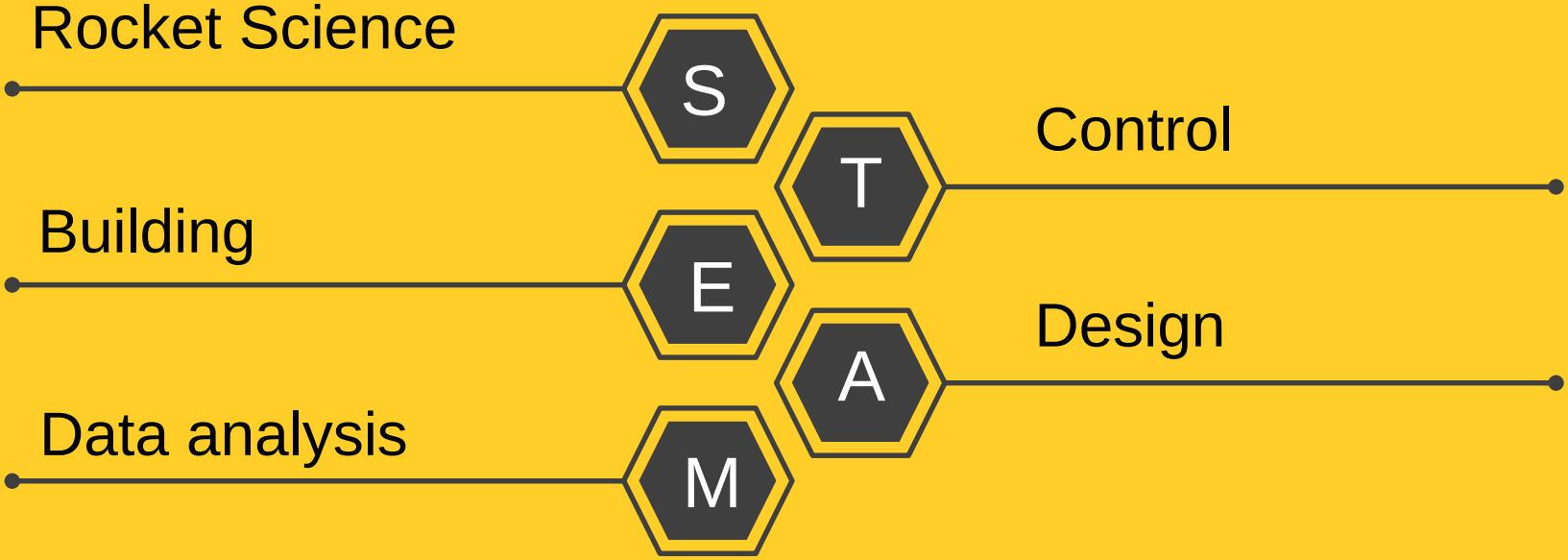
04 火箭設計及製作

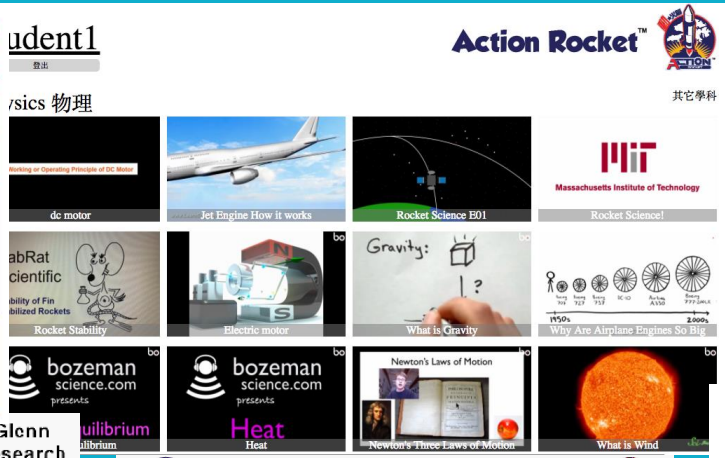
05 火箭測試及改良

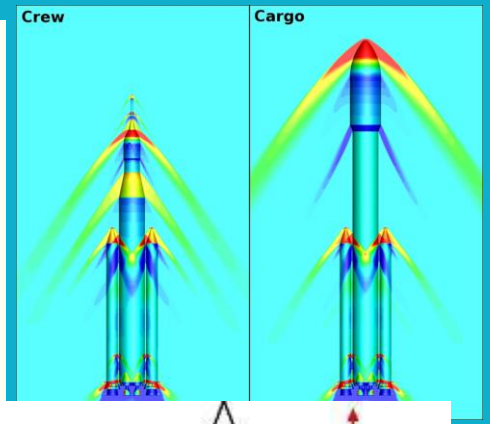


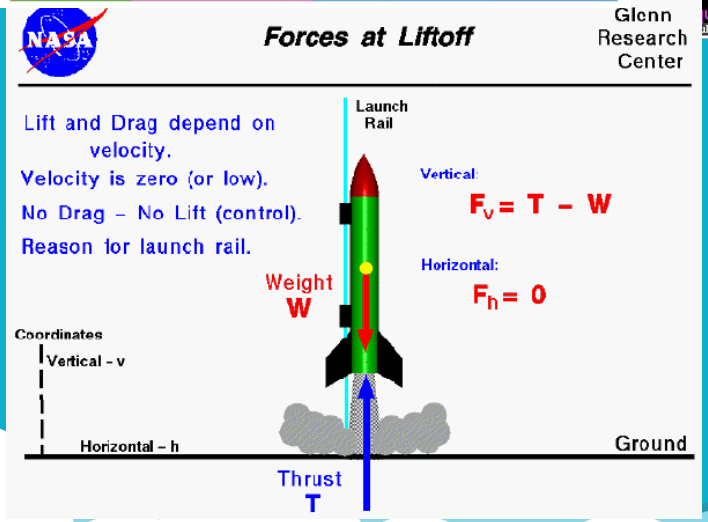
Action Rocket
動•火箭

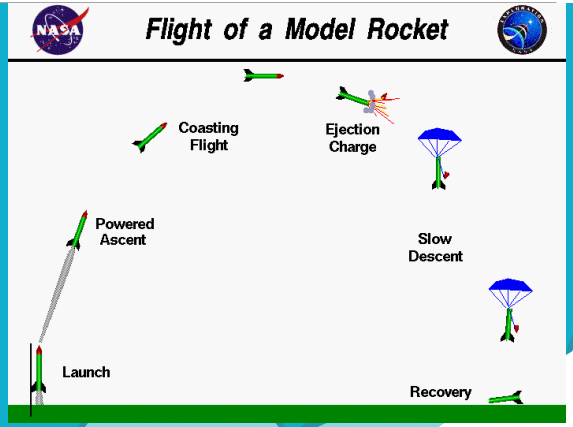
Action Rocket 動•火箭 課程

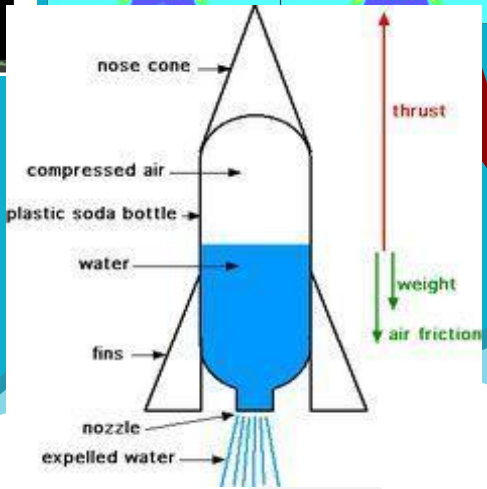












Rocket Science

https://www.nasa.gov/audience/foreducators/9-12/index.html

S

lab.objectblocks.cc/rocket/

Action Rocket

Rocket Controller powered by ObjectBlocks

Thruster Servo Config

Real-time Servo Control:

A

B

C

D

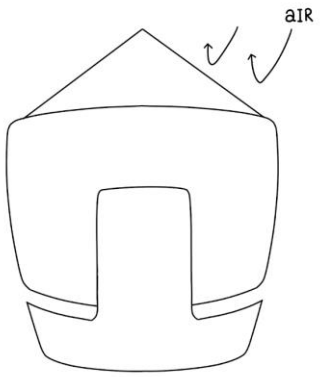
Set As 0% Thruster | Set As 100% Thruster

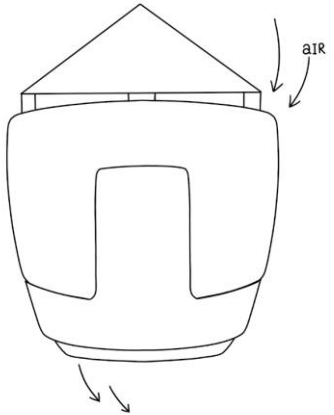
Launch Sequence Programming

Launch

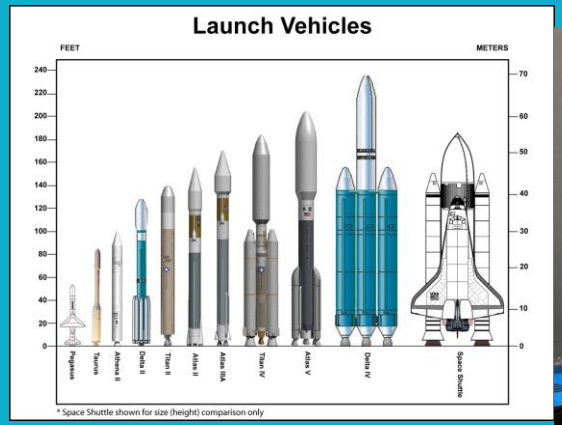
Flight Data

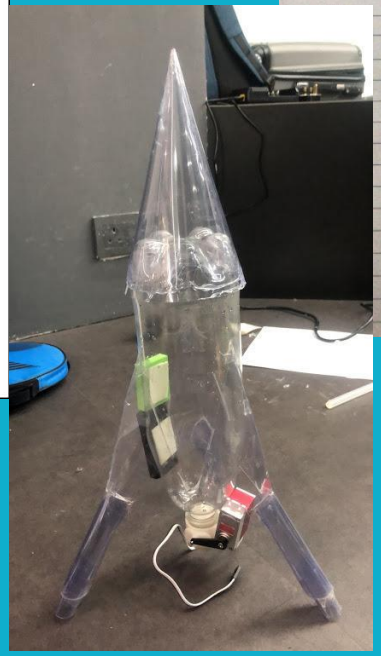
```
Thruster A .set( 0 %)
Board.pause( 1000 ms)
Thruster A .set( 100 %)
Board.pause( 800 ms)
Thruster A .set( 0 %)
Board.pause( 200 ms)
Thruster A .set( 100 %)
Board.pause( 800 ms)
Thruster A .set( 0 %)
```

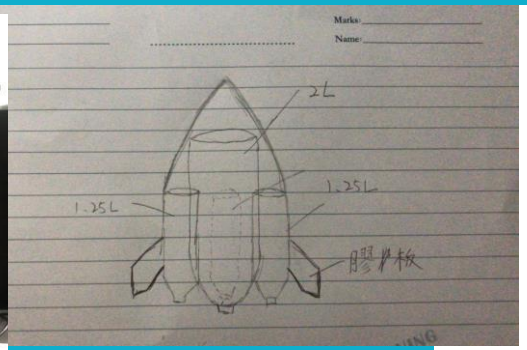


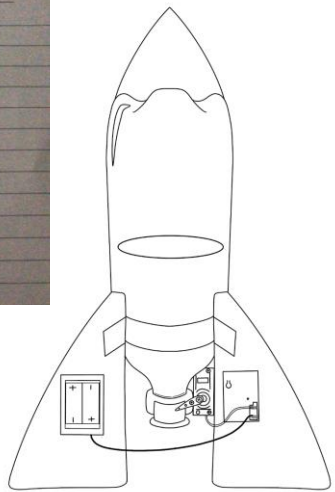


Control


Launch Vehicles
FEET
METERS
240
220
200
180
160
140
120
100
80
60
40
20
0
70
60
50
40
30
20
10
0
Pegasus
Taurus
Athena II
Delta II
Titan II
Atlas II
Atlas IIA
Titan IV
Atlas V
Delta IV
Space Shuttle
* Space Shuttle shown for size (height) comparison only

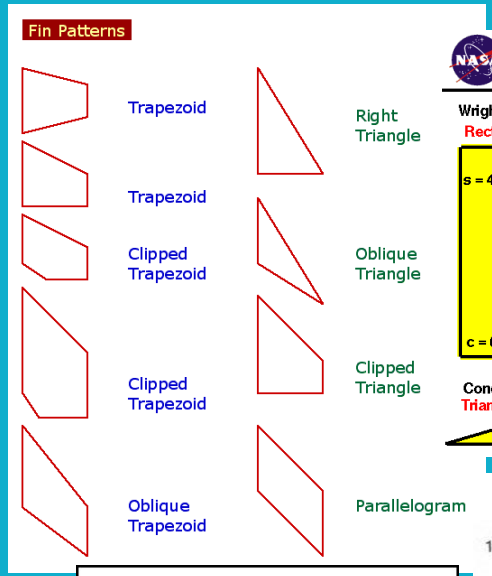


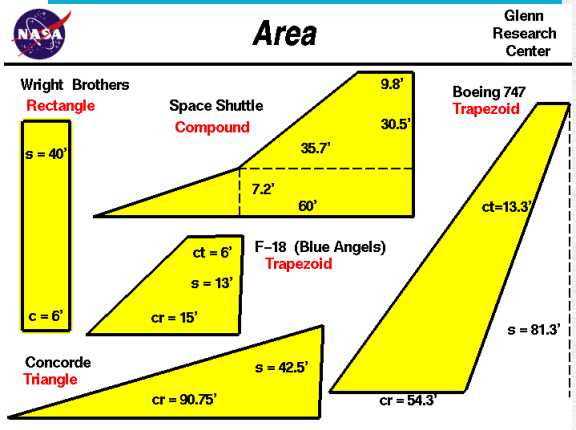

Marks:
Name:
2L
1.25L
1.25L

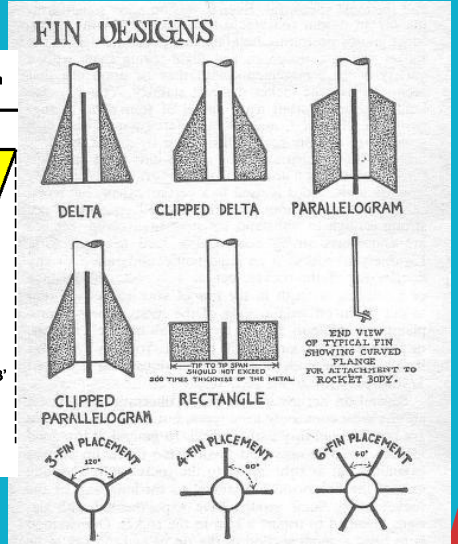


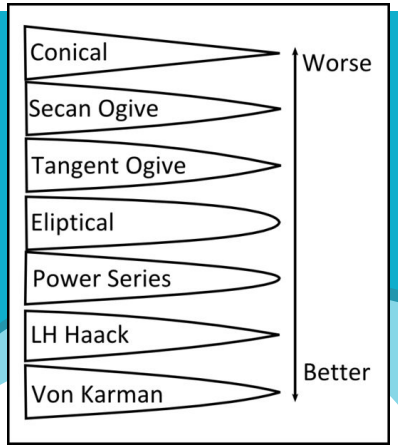
Building

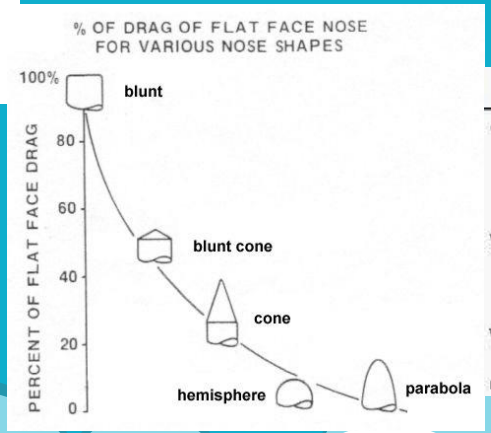
E

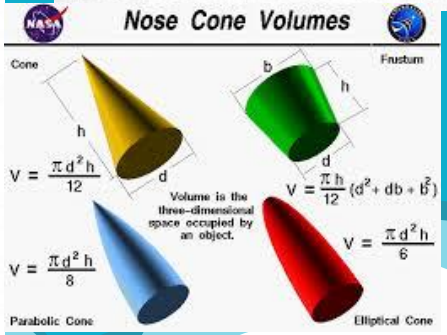

Fin Patterns
Trapezoid
Trapezoid
Clipped Trapezoid
Clipped Trapezoid
Oblique Trapezoid
Right Triangle
Oblique Triangle
Clipped Triangle
Parallelogram

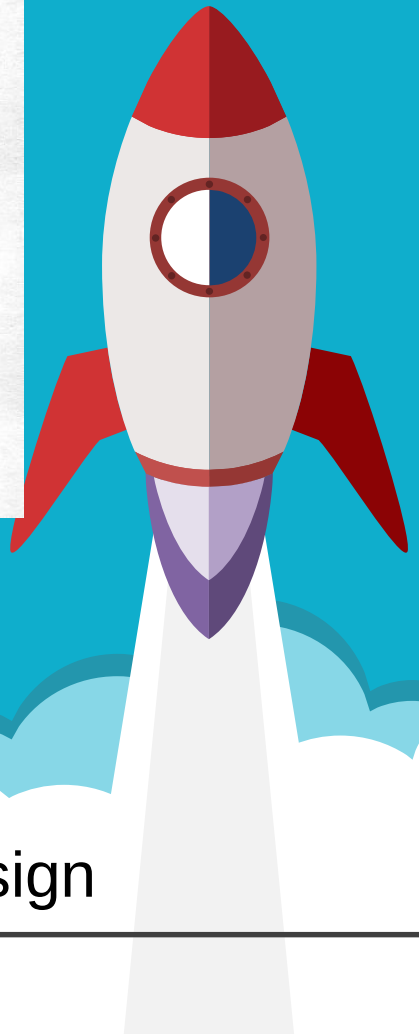

Area
Glenn Research Center
Wright Brothers
Rectangle
s = 40'
c = 6'
Space Shuttle
Compound
9.8'
30.5'
35.7'
7.2'
60'
Boeing 747
Trapezoid
ct=13.3'
s = 81.3'
cr = 54.3'
ct = 6'
s = 13'
cr = 15'
F-18 (Blue Angels)
Trapezoid
Concorde
Triangle
s = 42.5'
cr = 90.75'


FIN DESIGNS
DELTA
CLIPPED DELTA
PARALLELOGRAM
CLIPPED PARALLELOGRAM
RECTANGLE
END VIEW OF TYPICAL FIN SHOWING CURVED FLANGE FOR ATTACHMENT TO ROCKET BODY.
3-FIN PLACEMENT
4-FIN PLACEMENT
6-FIN PLACEMENT


Conical
Secan Ogive
Tangent Ogive
Eliptical
Power Series
LH Haack
Von Karman
Worse
Better


% OF DRAG OF FLAT FACE NOSE FOR VARIOUS NOSE SHAPES
PERCENT OF FLAT FACE DRAG
100%
80
60
40
20
0
blunt
blunt cone
cone
hemisphere
parabola

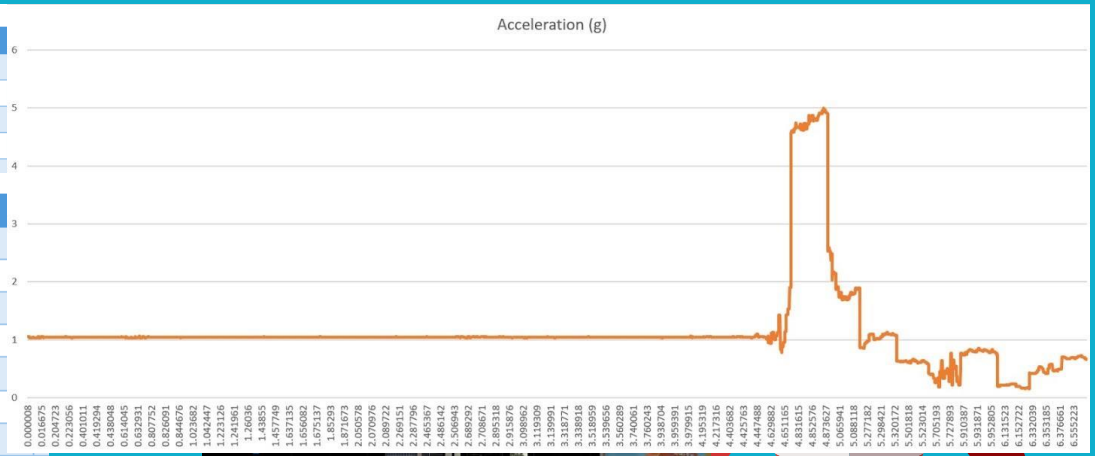

Nose Cone Volumes
Cone
Frustum
Volume is the three-dimensional space occupied by an object.
Parabolic Cone
Elliptical Cone

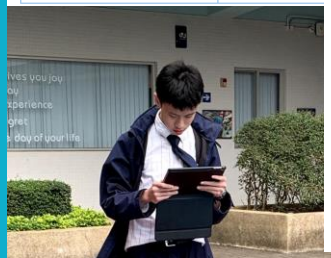


Design

	Water (ml)	Air Pressure (Pa)	Height (m)
Test 1			
Test 2			
Test 3			
Test 4			
Test 5			
Test 6			
Test 7			
Test 8			

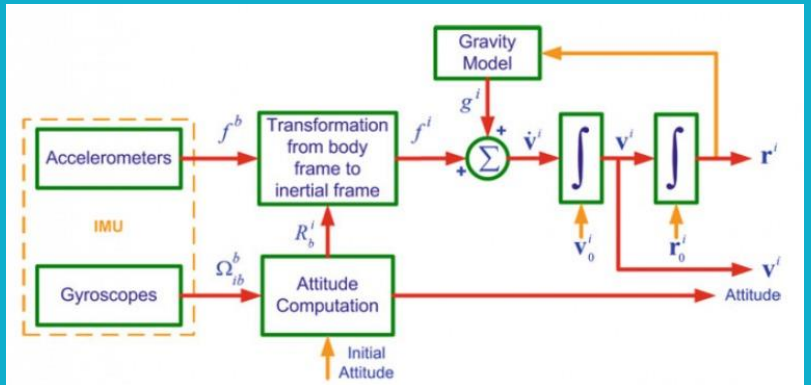
	Water (ml)
Test 1	100ml
Test 2	200ml
Test 3	300ml
Test 4	400ml
Test 5	500ml
Test 6	600ml
Test 7	800ml
Test 8	1000ml

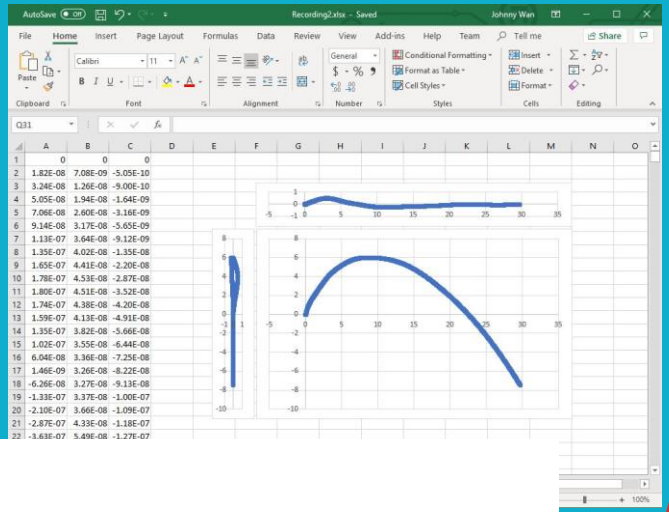


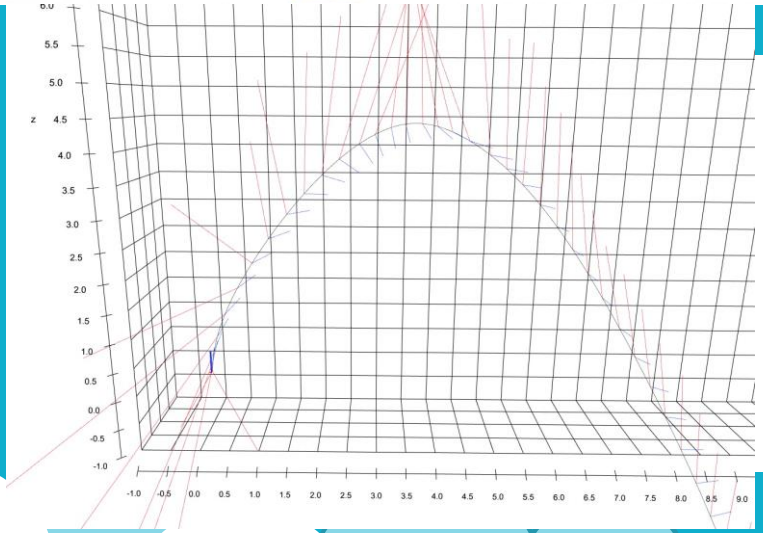


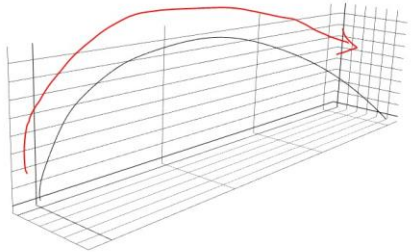
Data analysis

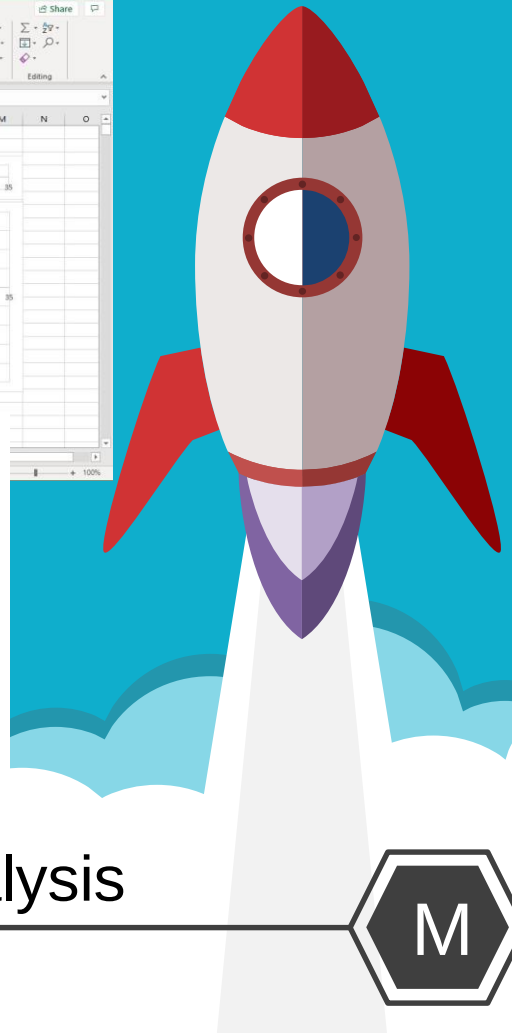
M











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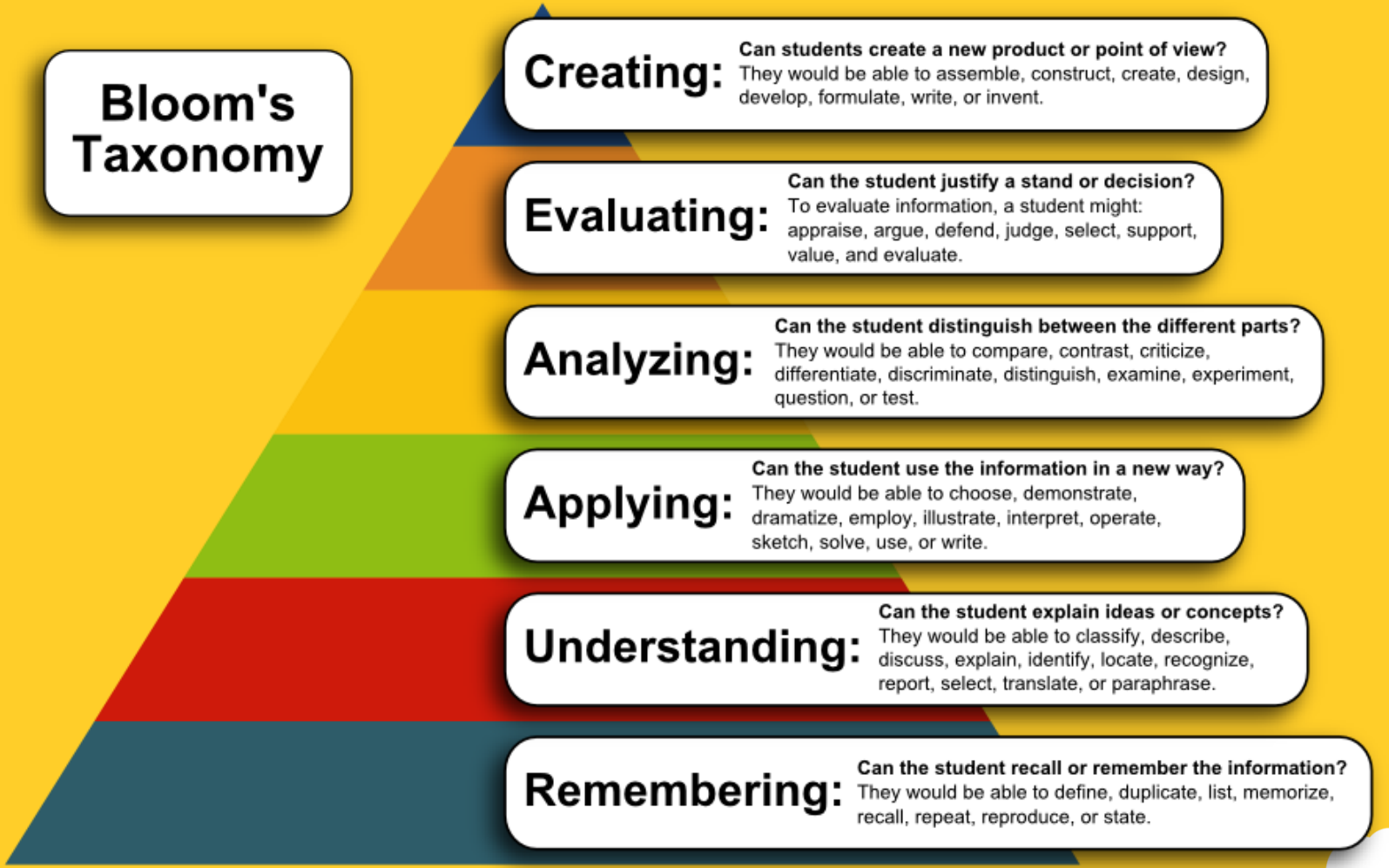

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Thank you

UNITED CHRISTIAN COLLEGE (KOWLOON EAST)

UCCKE
ifferent SKY OF LEARNING