

**Bukit Batok Secondary School
Science Research and Innovation Fair 2019
Handout**

Science Research Curriculum

Science is best learned through exploring things around us. The joy of learning Science emerges through the application of scientific knowledge in our daily lives to understand the world better. In Bukit Batok Secondary School Research Programme, students investigated on topics which interest them and presented their findings to their classmates. The research programme aims to nurture the spirit of inquiry in our students and equip them with the skills in conducting research. We cultivate good values, ethics and attitudes through research to benefit life and society.

Research Abstracts

Stations	Brief outline
Research Station 1 [R1]	Clean water is a scarce resource in third world countries. Simple chemicals (ferric sulfate and calcium chloride) have been used to purify dirty water into clean water. The group investigated on the effectiveness of the purification method.
Research Station 2 [R2]	Magnets have the capability to increase the growth rate of plants. In this investigation, the group used different types of magnets and tested out the effect on plant's growth. This can be beneficial to commercial farming as a cost effective measure to grow crops.
Research Station 3 [R3]	Food waste has been a serious issue in recent years. In an effort to reduce food waste, we investigated a method to renew unwanted food waste by fermenting fruit peels by using enzymes found in the fruits as a cleaning agent.
Research Station 4 [R4]	Temperature in Singapore is generally high throughout the year. Our research investigated the effectiveness of different types of leaves in bringing down the ambient temperature. This can influence the types of plants you choose to grow at home.
Research Station 5 [R5]	Silica gel can be obtained easily in our daily lives. This group investigated the effectiveness of silica gels in absorbing different types of moisture. Their discovery could help in the selection of preservative in food products.

Research Station 6 [R6]	Research has shown that there is a rapid increase in food spoilage which contributes to foodborne diseases. We investigated the use of spices in preventing the growth of bacteria in food such as bread which gets mouldy quickly. The usage of spices in preservation of food helps to reduce the rate of food spoilage.
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Applied Learning Programme (ALP)

In Applied Learning Programme (ALP), students learn to empathise with others and define the problems they wish to solve. Equipped with relevant skills, they are given ample opportunities to experiment and explore. In the process, they learn how to give their best while trying to come up with solutions. With an abundance mentality, they share their solutions with others.

The series of ALP projects highlights the use of sensors as well as automation applicable to our everyday lives.

Stations	Brief outline	Stations	Brief outline
ALP 1	robotic arm / robotic vehicle. Using mBot in transportation of objects.	ALP 5	temperature sensor & LCD Item delivery temperature sensor
ALP 2	motion sensor Water wastage alert system	ALP 6 & 7	Coding challenge code the mbot to move and stop within a certain zone
ALP 3	sound sensor Noise indicator	ALP 8 & 9	Drone station
ALP 4	servo motor & motion sensor Robotic bus ramp	ALP 10 & 11	Codey rocky stations

Chemical Powered Vehicle (CPC)

Secondary 2NA students were exposed to Design-Based Inquiry approach to science learning. Students designed and built a model of a chemical powered vehicle and assessed the performance of their vehicles through various test stations. Students were assessed in the application of scientific content knowledge from physics and chemistry domains using a formative assessment rubric.

This station comprises of simple challenge which allows you to have a race with your classmates.

Stations	Brief outline
CPC 1	Poster Station : Science concepts 1. Newton's 3 rd law, action and reaction force 2. Chemical Properties of Acid 3. Chemical reaction <i>a. Acid + metal carbonate -----> salt + water + CO₂</i> 4. Parallax error to measure volume using measuring cylinder 5. Pressure = Force / Area 6. Design of car body and its axle
CPC 2	Demo Station
CPC 3	Balloon powered try-outs (mini challenge) station
CPC 4	Quiz

Detailed Movement Plan:

Sec 1s

Classes	Timeline				
	Phase 1: Viewing Exhibits			Phase 2: Classroom	
	0730 - 0745	0745 - 0810	0810 - 0845	0845 - 0905	0905 - 0935
1E1	Assembly BB Court/ Movement to hall	R1/ ALP 1	R4/ ALP 4	Movement to class/ inquiry generation	Inquiry generation
1E2		R2/ ALP 2	R5/ ALP 5		
		R3/ ALP 3	R6/ALP 6 & 7		
1E3	Assembly	R4/ ALP 4	R1/ ALP 1	Movement to	Inquiry

1E4	BB court / Movement to hall	R5/ ALP 5 R6/ALP 6 & 7	R2/ ALP 2 R3/ ALP 3	class/ inquiry generation	generation
1N1	Assembly BB court / Movement to hall (1N1) / student plaza (1N2)	ALP 8 & 9/ ALP 10 & 11	Chemical powered	Movement to class/ inquiry generation	IDEA tion
1N2		Chemical powered	ALP 8 & 9/ ALP 10 & 11	Movement to class/ inquiry generation	IDEA tion

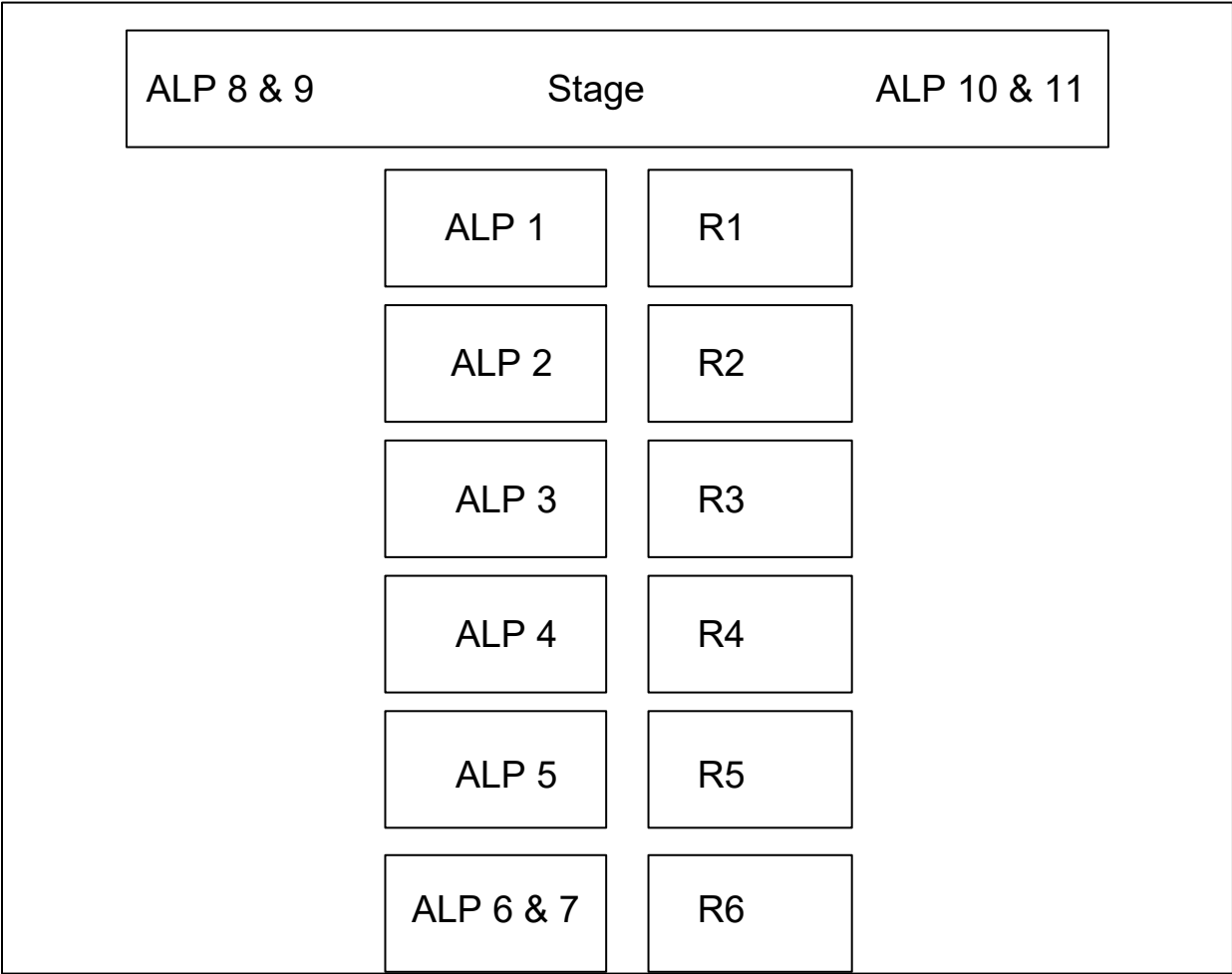
Detailed Movement Plan:

Sec 2s

Classes	Timeline				
	Phase 1: Classroom			Phase 2: Viewing	
	0730 - 0745	0745 - 0810	0810 - 0845	0845 - 0905	0905 - 0935
2E2	Assembly BB court/ Movement to LT	Closure to research project	Inquiry generation	Movement to hall/ R1/ ALP 1 R2/ ALP 2 R3/ ALP 3	R4/ ALP 4 R5/ ALP 5 R6/ALP 6 & 7
2N1					
2E3	Assembly BB court/ movement to CRs	Closure to research project	Inquiry generation	Movement to hall/ R4/ ALP 4 R5/ ALP 5 R6/ ALP 6 & 7	R1/ ALP 1 R2/ ALP 2 R3/ ALP 3
2E4					
2E1	Assembly BB court/ movement to CRs	Closure to chemical powered car project	IDEA tion	Movement to hall/ ALP 8 & 9/	Chemical powered
2N2				Movement to hall/ ALP 10 & 11	Chemical powered
2T1	Assembly BB court/ movement to CRs	Closure to Ignite project	IDEA tion	Chemical powered	ALP 8 & 9 ALP 10 & 11

Exhibition layouts:

1. Hall



2. Student Plaza

